# GW - 372

# REPORTS

# YEAR(S):

# 2007 - 2009

## Lowe, Leonard, EMNRD

**From:** Philley, Ted [tphilley@keyenergy.com]
**Sent:** Wednesday, August 27, 2008 10:09 AM
**To:** Lowe, Leonard, EMNRD
**Cc:** Hansen, Edward J., EMNRD; Johnson, Larry, EMNRD
**Subject:** RE: GW-372, Work plan approval
**Attachments:** Key Eunice .pdf

Leonard,

The groundwater and soil sampling at our Eunice Truck Yard went well. The site detail maps previously generated by our consultants documented the slab as a square, but the slab is not square at all. The actual edges of the slab increased the perimeter and the number of needed soil borings, resulting in using up all my available soil jars. Please review the attached drawing and let me know if you require any additional soil borings as there is a gap in the 10' spacing of borings in the North West corner.

Ted

**Ted Philley** | **Key Energy Services** | **o:** 432.571.7141 | **c:** 432.288.5358

-----Original Message-----
**From:** Lowe, Leonard, EMNRD [mailto:Leonard.Lowe@state.nm.us]
**Sent:** Thursday, August 14, 2008 5:31 PM
**To:** Philley, Ted
**Cc:** Hansen, Edward J., EMNRD; Johnson, Larry, EMNRD
**Subject:** GW-372, Work plan approval

Mr. Ted Philley,

The submitted Soil and groundwater sampling work plan dated July 22, 2008 for the Key Energy Service Yard in Eunice has been APPROVED.

The OCD Santa Fe office is not required to be in attendance for this work plan. You can contact the local OCD Environmental Bureau representative, Mr. Larry Johnson for notification if you should need to. The OCD only request if any changes or problems occur during this work plan that you keep us informed.

SIDE NOTE: I have yet to complete my inspection report for that facility, you should have it by next week.

If you have any questions please feel free to contact, Mr. Hansen or myself.

**Leonard Lowe**
Environmental Engineer
Oil Conservation Division/EMNRD
1220 S. St. Francis Drive
Santa Fe, N.M. 87505
Office: 505-476-3492
Fax: 505-476-3462
E-mail: leonard.lowe@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/

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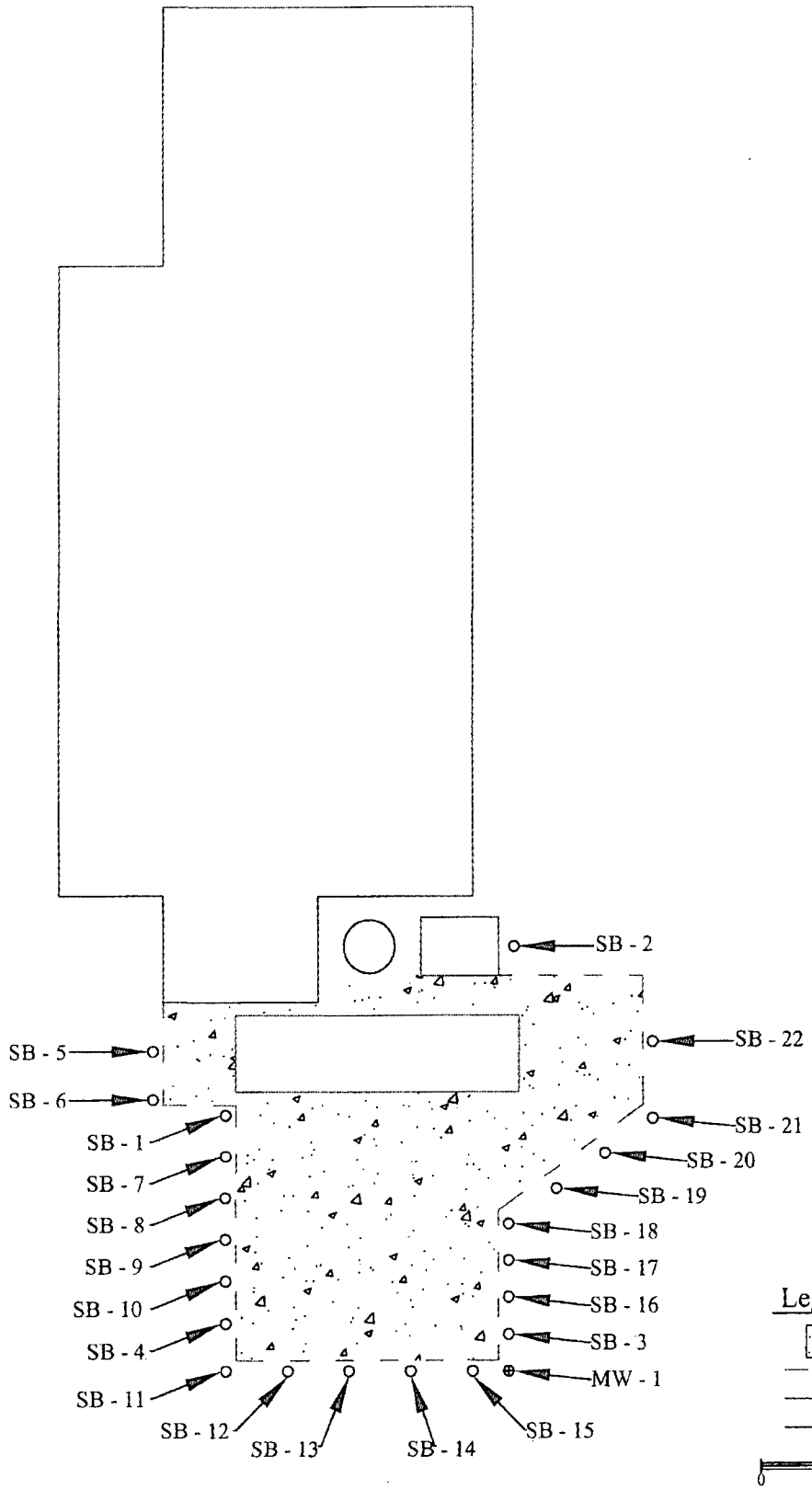
# Site Details




| | | |
|---|---|---|
| Key Energy Services<br>Environmental<br>Department | Eunice Trucking Yard<br>2105 Avenue O<br>Eunice, New Mexico 88231 | Figure 2<br>Date: 8-27-2008<br>By: KH |

## Lowe, Leonard, EMNRD

**From:** Lowe, Leonard, EMNRD
**Sent:** Thursday, August 14, 2008 4:31 PM
**To:** 'Philley, Ted'
**Cc:** Hansen, Edward J., EMNRD; Johnson, Larry, EMNRD
**Subject:** GW-372, Work plan approval

Mr. Ted Philley,

The submitted Soil and groundwater sampling work plan dated July 22, 2008 for the Key Energy Service Yard in Eunice has been APPROVED.

The OCD Santa Fe office is not required to be in attendance for this work plan. You can contact the local OCD Environmental Bureau representative, Mr. Larry Johnson for notification if you should need to. The OCD only request if any changes or problems occur during this work plan that you keep us informed.

SIDE NOTE: I have yet to complete my inspection report for that facility, you should have it by next week.

If you have any questions please feel free to contact, Mr. Hansen or myself.

**Leonard Lowe**
Environmental Engineer
Oil Conservation Division/EMNRD
1220 S. St. Francis Drive
Santa Fe, N.M. 87505
Office: 505-476-3492
Fax: 505-476-3462
E-mail: leonard.lowe@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/

Key Energy Services
6 Desta Drive
Suite 4400
Midland, Texas 79705

Telephone: 432.571.7141
Facsimile: 432.571.7173
www.keyenergy.com



July 22, 2008

Mr. Ed Hanson
New Mexico Oil Conservation District
P.O. Box 6429
Santa Fe, New Mexico 87505

Re: GW-372; Key Energy Services Yard in Eunice, Lea County, New Mexico
Soil and Groundwater Sampling Work Plan

Dear Mr. Hanson:

Key Energy Services (Key) respectfully submits this soil and groundwater sampling work plan to investigate elevated chlorides at the Key Eunice Truck Yard Washout Pit and Slab (Site) located in Lea County, New Mexico, in Section 33,T-21-S; R-31-E (Figure 1).

## PREVIOUS SOIL AND GROUNDWATER CHLORIDE ASSESSMENT ACTIVITIES

Arcadis G&M, Inc. (Arcadis) performed a soil investigation at the Site on behalf of Key in November 2002 comprised of four soil borings located at the corners of the Washout Pit and Slab. Samples from soil borings SB-1 through SB-4 (Figure 2) yielded chloride concentrations below 3000 mg/kg (Table 1). The SB-4 soil boring located at the southwest corner (Figure 2) yielded a chloride concentration of 4,259 mg/kg at 5-feet below ground surface (bgs). In 2004, Brown and Caldwell (B&C) installed a monitor well (MW-1) at the apparent down-gradient, southeast corner of the wash pad to determine impact of the elevated soil chloride concentration found in SB-4. The June 11, 2004 sample indicated a chloride content of 196 mg/L. The New Mexico Water Quality Control Commission (NMWQCC) domestic water supply standard for chloride is 250 mg/L.

## PROPOSED SOIL CHLORIDE ASSESSMENT ACTIVITIES

The previous soil assessment activities inadequately delineated soil chloride concentrations at the Site. Key proposes to hand-auger soil borings 1-foot from the edge of the slab at 10–foot intervals around the perimeter. Samples will be collected at 2.5-feet bgs and 5-feet bgs. Soil cuttings will be placed in the pit for disposal and clean caliche will be used for backfilling the soil boring. Four duplicate soil samples will be collected for quality control.

The hand auger will be decontaminated with potable water/non-phosphate detergent wash, a potable water rinse, and a de-ionized water rinse prior to collecting each soil sample. Each sample collected will be homogenized in a decontaminated stainless steel mixing bowl and immediately placed in

laboratory-supplied glass jars, properly labeled and placed on ice in an insulated cooler for preservation. The soil samples and duplicate sample will be sealed for shipment to Southern Petroleum Laboratories in Houston, Texas for EPA 300.0 laboratory analysis for chloride.

## PROPOSED GROUNDWATER CHLORIDE ASSESSMENT ACTIVITIES

Key proposes to collect a groundwater sample utilizing a new disposable bailer to remove a minimum of three well volumes of fluid from the well MW-1. Purged water collected during the sampling and well development events will be temporarily stored in 5-gallon buckets and emptied into the pit for evaporation. A groundwater sample and duplicate will be collected using the bailer and will be placed in laboratory supplied 250-ml plastic bottles. The groundwater samples will then be labeled and placed on ice in an insulated cooler for preservation. The groundwater sample and duplicate sample will be sealed for shipment to Southern Petroleum Laboratories in Houston, Texas for EPA 300.0 laboratory analysis for chloride.

## ANALYTICAL RESULTS

The analytical laboratory results will be forwarded to your office as an attachment to a *Proposed Excavation and Confirmation Sample Plan* for any areas exceeding 3000 mg/kg chloride concentration in soil.

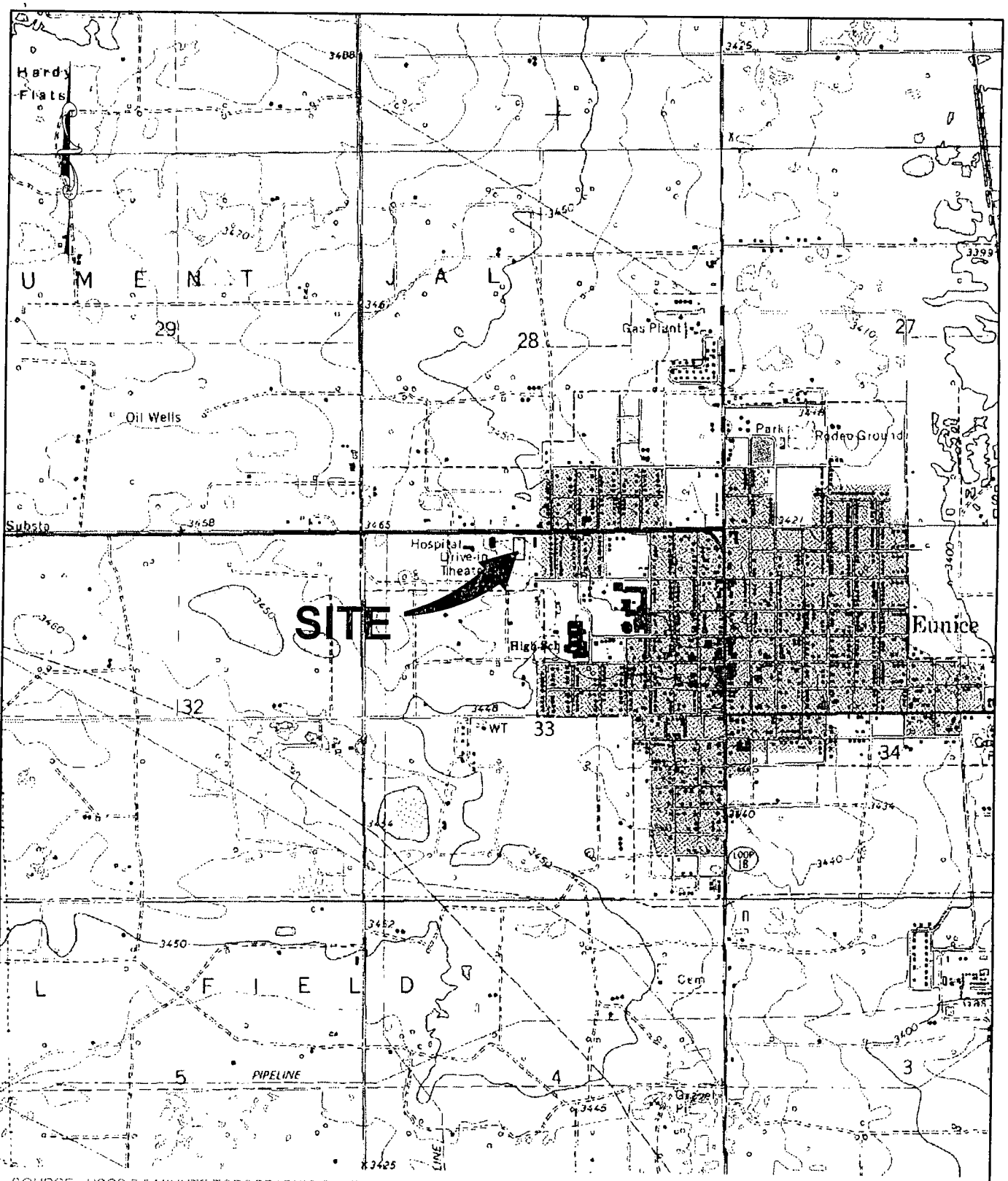
Yours truly,

Key Energy Services

Edward D. "Ted" Philley

Corporate Environmental Specialist

Figures
Table

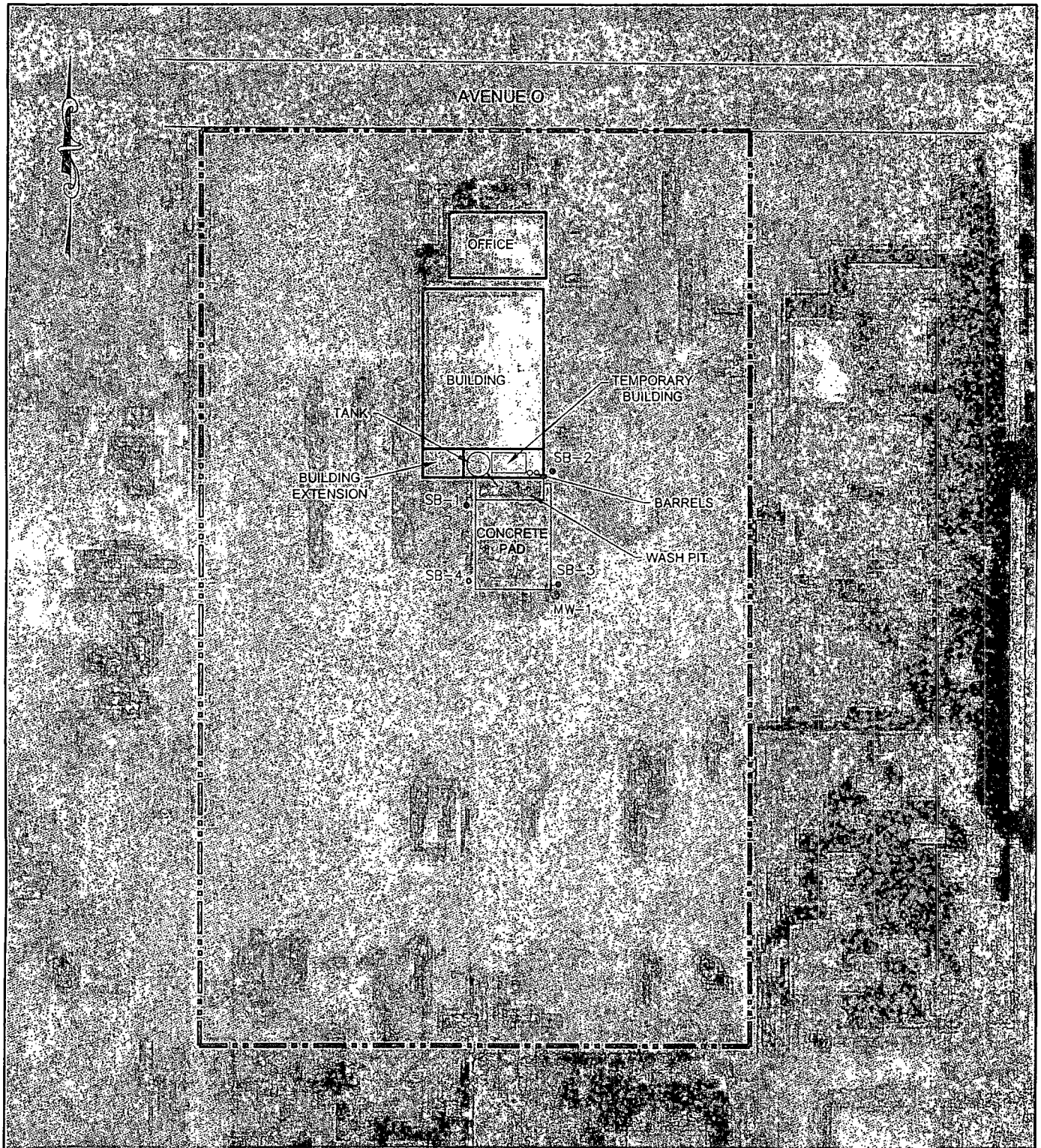



Aug 26, 2004 - 2:43pm ckelly
P:\Cad\JOBS\KeyEnerg\25934\EuniceSiteLocMap.dwg

BROWN AND CALDWELL
1415 Louisiana
Suite 2500
Houston, Texas 77002
Tel: (713) 759-0999
Fax: (713) 308-3886

KEY ENERGY SERVICES, INC.

SITE LOCATION MAP
EUNICE, NEW MEXICO
FIGURE 1




REFERENCE: NEW MEXICO RESOURCE GEOGRAPHIC INFORMATION SYSTEM PROGRAM, EUNICE - 7.5 MINUTE DIGITAL ORTHOPHOTO QUAD NE QUATER, UTM NAD 83

LEGEND

MW-1 ⊕ MONITOR WELL LOCATION (BROWN AND CALDWELL, JUNE 2004)

○ SOIL BORING (ARCADIS, NOVEMBER 2002)

PROPERTY BOUNDARY

0 50 100

APPROXIMATE SCALE IN FEET

BROWN AND CALDWELL

1415 Louisiana
Suite 2500
Houston, Texas 77002
Tel: (713) 759-0999
Fax: (713) 308-3886

KEY ENERGY SERVICES, INC.

TRUCK WASH PAD AND SUMP FACILITY
MONITORING WELL LOCATION MAP
EUNICE, NEW MEXICO
FIGURE 2

Aug 26, 2004 - 2:44pm ckelly
P:\Cad\JOBS\KeyEnerg\25934\EuniceSiteMap.dwg

Key Energy Services
Eunice Truck Yard
Wash Pad Sump Pit

| Soil Boring Location / Map Designation | Depth (Feet) | Sample Date | Benzene | Toluene | Ethylbenzene | Xylenes | Total BTEX | TPH | | Total TPH | Chlorides |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | GRO C-6-C-12 | DRO >C-12-C-35 | | |
| OCD Hydrocarbon Screening Level | | | 10 | --- | --- | --- | 50 | --- | --- | 1000 | --- |
| Northwest (SB-1) | 20 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 20.7 | 20.8 | 1060 |
| Northwest (SB-1) | 25 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 60.8 | 60.9 | --- |
| Northeast (SB-2) | 10 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | <0.10 | <0.10 | --- |
| Northeast (SB-2) | 15 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 16.8 | 16.9 | 1660 |
| Southeast (SB-3) | 2 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 110 | 110.1 | --- |
| Southeast (SB-3) | 5 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | <10.0 | <0.10 | 2390 |
| Southwest (SB-4) | 2 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 33.3 | 33.4 | --- |
| Southwest (SB-4) | 5 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | <10.0 | <0.10 | 4250 |

1) OCD's *Guidelines for Remediation of Leaks, Spills and Releases*, dated August 13, 1993, site specific hydrocarbon screening levels
2) Results and Screening Levels in mg/kg (Parts Per Million)
3)TPH by EPA 8015M, BTEX by EPA 8021B/5030, Chloride by SW 9253

Key Energy Services
6 Desta Drive
Suite 4400
Midland, Texas 79705

Telephone: 432.571.7141
Facsimile: 432.571.7173
www.keyenergy.com



April 30, 2008 GW-372

Mr. Leonard Lowe
New Mexico Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

Re: Key Energy Services Yard in Eunice, Lea County, New Mexico

Dear Mr. Lowe:

Please find enclosed a completed Form C-144 for the Key Energy Services (Key) Eunice Truck Yard wash out pit and first page of the July 20, 2007 letter to Mr. Wayne Price as requested.

Key wishes to backfill the pit with clean fill and cap with concrete to match the surrounding slab as it is a safety hazard. Please do not hesitate to call me if you require any additional information.

Yours truly,

Key Energy Services

Edward D. "Ted" Philley

Corporate Environmental Specialist II

Enclosures

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-144
June 1, 2004

**For drilling and production facilities**, submit to appropriate NMOCD District Office.
**For downstream facilities**, submit to Santa Fe office

# Pit or Below-Grade Tank Registration or Closure

Is pit or below-grade tank covered by a "general plan"? Yes ☐ No ☒
Type of action: Registration of a pit or below-grade tank ☐ Closure of a pit or below-grade tank ☒

Operator: Key Energy Services Telephone: 432-571-7141 e-mail address: tphilley@keyenergy.com
Address: 2105 Avenue O, Eunice, New Mexico, 88231
Facility or well name: Eunice Truck Yard (GW-372) API #: _____ U/L or Qtr/Qtr C Sec 33 T 21S R 31E
County: Lea Latitude N 32° 26' 29.94" Longitude W 103° 10' 9.41" NAD: 1927 ☐ 1983 ☒
Surface Owner: Federal ☐ State ☐ Private ☐ Indian ☐

| **Pit** | **Below-grade tank** | |
|---|---|---|
| Type: Drilling ☐ Production ☐ Disposal ☐<br>Workover ☐ Emergency ☐ Wash Out ☒<br>Lined ☐ Unlined ☐<br>Liner type: Synthetic ☐ Thickness ____mil Clay ☐<br>Pit Volume ~450 bbl Concrete ☒ | Volume: ____bbl Type of fluid: _____<br>Construction material: _____<br>Double-walled, with leak detection? Yes ☐ If not, explain why not. | |
| Depth to ground water (vertical distance from bottom of pit to seasonal high water elevation of ground water.) | Less than 50 feet<br>50 feet or more, but less than 100 feet<br>100 feet or more | (20 points)<br>(10 points) 10<br>( 0 points) |
| Wellhead protection area: (Less than 200 feet from a private domestic water source, or less than 1000 feet from all other water sources.) | Yes<br>No | (20 points)<br>( 0 points) 0 |
| Distance to surface water: (horizontal distance to all wetlands, playas, irrigation canals, ditches, and perennial and ephemeral watercourses.) | Less than 200 feet<br>200 feet or more, but less than 1000 feet<br>1000 feet or more | (20 points)<br>(10 points) 0<br>( 0 points) |
| | **Ranking Score (Total Points)** | 10 |

**If this is a pit closure:** (1) Attach a diagram of the facility showing the pit's relationship to other equipment and tanks. (2) Indicate disposal location: (check the onsite box if your are burying in place) onsite ☐ offsite ☒ If offsite, name of facility Sundance Services - Parabo. (3) Attach a general description of remedial action taken including remediation start date and end date. (4) Groundwater encountered: No ☐ Yes ☒ If yes, show depth below ground surface_____ft. and attach sample results.
(5) Attach soil sample results and a diagram of sample locations and excavations.

Additional Comments:
See pit closure request letter dated 7/20/2007 for diagram, addtional information and closure plan.

I hereby certify that the information above is true and complete to the best of my knowledge and belief. **I further certify that the above-described pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☒.**

Date: 4/30/08
Printed Name/Title Edward "Ted" Philley, Env. Spec. II Signature Edward D. Philley

Your certification and NMOCD approval of this application/closure does not relieve the operator of liability should the contents of the pit or tank contaminate ground water or otherwise endanger public health or the environment. Nor does it relieve the operator of its responsibility for compliance with any other federal, state, or local laws and/or regulations.

Approval:
Printed Name/Title _____ Signature _____ Date: _____

Key Energy Services
6 Desta Drive
Suite 4400
Midland, Texas 79705

Telephone: 432.571.7141
Facsimile: 432.571.7173
www.keyenergy.com

July 20, 2007

COPY

Mr. Wayne Price
New Mexico Oil Conservation District
P.O. Box 6429
Santa Fe, New Mexico 87505

Re: Key Energy Services Yard in Eunice, Lea County, New Mexico

Dear Mr. Price:

Key Energy Services (Key) respectfully requests closure of the Key Eunice Truck Yard Wash Pad Sump Pit (Site) located in Lea County New Mexico, in section 33,T-21-S; R-31-E (FIGURE 1). The Site coordinates are N 32° 26' 29.94", W 103° 10' 9.41". The concrete lined pit was constructed in 1984 and removed from service in 2002. A summary of the analytical results from soil and groundwater sampling activities performed is compared with OCD site specific ranking criteria and the New Mexico Water Quality Control Commission (WQCC) domestic water supply standard.

**REGULATORY FRAMEWORK**

Using the OCD's *Guidelines for Remediation of Leaks, Spills and Releases,* dated August 13, 1993, and site specific *general site characteristics,* hydrocarbon screening levels were developed for the Site. Information obtained by Key from the New Mexico Office of the State Engineer's iWaters database indicated that the depth-to-groundwater in the vicinity of the Site is 100-feet below ground surface (bgs). A copy of a water well record (APENDIX 1) for a location in the NE ¼ of the SE ¼ of section 33, T-21-S; R-37-E demonstrated a depth to water of 100 feet. On June 27, 2007, Key Environmental Department personnel met with City of Eunice Water Department personnel to discuss the location of nearby water wells. The nearest operational well known by the City of Eunice Water Department is located at 1508 7th Street (N 32° 26.610', W 103° 09.134'). The City of Eunice Water Department employees indicated that the municipal water supply wells were located 20 miles North of Eunice. A review of the 7.5 minute USGS Eunice Quadrangle, 1979 revision (FIGURE 2), indicates the nearest surface water exceeds 3500-feet in distance and nearest water source wells exceed 3000-feet in distance. Based on the August 26, 2004 Brown and Caldwell (B&C) report (APPENDIX 2) the onsite monitor well gauging data records the depth to water at the site as 80-feet bgs.

| CHARACTERISTIC | SELECTION | SCORE |
|---|---|---|
| Depth to Groundwater | 50 – 100-feet | 10 |
| Wellhead Protection Area | >1,000-feet (water source)<br>> 200-feet (private domestic water source) | 0 |
| Distance to Surface Water | >1,000 feet | 0 |

**Total Ranking Score =10**

Based on these general site characteristics and associated OCD ranking criteria presented in the table above, the following hydrocarbon screening levels apply at the Site in Parts Per Million (PPM): benzene- 10 ppm, Total BTEX- 50 ppm and TPH- 1,000 ppm.

Key Energy Services
6 Desta Drive
Suite 4400
Midland, Texas 79705

Telephone: 432.571.7141
Facsimile: 432.571.7173
www.keyenergy.com

July 20, 2007



Mr. Wayne Price
New Mexico Oil Conservation District
P.O. Box 6429
Santa Fe, New Mexico 87505

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| CHARACTERISTIC | SELECTION | SCORE |
|---|---|---|
| Depth to Groundwater | 50 – 100-feet | 10 |
| Wellhead Protection Area | >1,000-feet (water source)<br>> 200-feet (private domestic water source) | 0 |
| Distance to Surface Water | >1,000 feet | 0 |

**Total Ranking Score =10**

Based on these general site characteristics and associated OCD ranking criteria presented in the table above, the following hydrocarbon screening levels apply at the Site in Parts Per Million (PPM): benzene- 10 ppm, Total BTEX- 50 ppm and TPH- 1,000 ppm.

## SOIL ASSESSMENT ACTIVITIES

Arcadis G&M, Inc. (Arcadis) performed a soil investigation at the Site on behalf of Key in November 2002 comprised of four soil borings located at the corners of the Wash Pad and Sump Pit. An Arcadis report dated January 20, 2003 presents the sampling methodology, analytical results, logs and site plan (APPENDIX 3).

Arcadis collected samples at the surface, 2-foot, 5-foot, and at 5-foot intervals to total depth. The samples were field screened with a photo-ionizing detector (PID) for hydrocarbons and a scintillator for naturally occurring radioactive material (NORM). The borings were advanced until the instruments and field observation indicated no impact was apparent in the recovered soil. Arcadis selected samples for analytical laboratory analysis based on PID headspace readings, field observations, or deepest sample collected.

Two samples were selected from each boring for laboratory analysis for Total Petroleum Hydrocarbons (TPH) by EPA method 8015M, benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA method 8021B and Resource Conservation and Recovery Act (RCRA) 8 metals by SW 7470. One sample from each boring was analyzed for chloride by SW 9253. The samples were not analyzed for NORM in the laboratory as field screening results did not exceed background in any of the samples. The selected samples were delivered by Arcadis to Environmental Lab of Texas I, LTD in Odessa, Texas for laboratory analysis.

The selected samples did not exhibit hydrocarbon concentrations above the site specific hydrocarbon screening levels. BTEX was not detected above laboratory detection levels in any of the soil samples. The highest TPH (110 mg/kg) was found at 2-feet bgs in the southeast soil boring. Elevated chloride concentrations were identified in each soil boring with Arcadis noting chloride concentrations decreased with depth. The range of chlorides in the various wells was 4,259 mg/kg at 5-feet bgs in the southwest SB-4 soil boring to 1,060 mg/kg at 20-feet bgs in the northwest SB-1soil boring. Table I summarizes the hydrocarbon and chloride laboratory results.

The RCRA 8 metal concentrations found in the selected samples did not exceed New Mexico (NMED) Industrial/Occupational Soil Screening Levels (SSLs). Table II summarizes the RCRA 8 metals analytical laboratory results.

## GROUNDWATER ASSESSMENT ACTIVITIES

After reviewing the Arcadis soil investigation report, B&C determined no further hydrocarbon or metals analytical laboratory testing of soil samples was required. B&C installed a monitor well at the Site on behalf of Key in June 2004 for a groundwater investigation to determine impact of elevated soil chloride concentrations at the Wash Pad and Sump Pit. A monitor well (MW-1) placed at the apparent down-gradient, southeast corner of the wash pad. The B&C report dated August 26, 2004 presents the well installation, sampling methodology, analytical results, log, site plan, and conclusions for the Site.

B&C field screened soil samples with a PID during the drilling of MW-1 and no hydrocarbon readings were observed from surface to total depth. B&C completed the well to 100-feet bgs with a screened interval at 60-feet bgs to 100-feet bgs. After 48-hours, B&C noted no product in the well and recorded depth-to-water as 80.81-feet below top-of-casing (TOC). B&C collected a groundwater sample and duplicate using low flow sampling equipment at 85-feet below TOC. The groundwater sample and duplicate sample were delivered by B&C to Severn Trent Laboratories in Houston, Texas for EPA 160.1 Total Dissolved Solids (TDS) and EPA 300.0 Chloride laboratory analysis.

The B&C report compared the chloride concentration and TDS from MW-1at the southeast corner of the pad to the WQCC domestic water supply standard. The June 11, 2004 sample indicated a chloride content of 196 mg/L and a TDS content of 1,010 mg/L. The WQCC domestic water supply standard for chloride and TDS are 250 mg/L and 1000 mg/L respectively. Table III summarizes the Groundwater sample analytical results. B&C reported that the first measured (1,010 mg/L TDS) result becomes the default groundwater standard for the site under WQCC rules. At the time of the report, B&C concluded that groundwater does not appear to be impacted

at the site by the elevated chloride found in the soil samples and no further investigation of the groundwater is necessary.

The unused concrete pit is a safety hazard to personnel and Key wishes backfill the pit with clean fill and cap with concrete to match the surrounding slab. Key Energy Services (Key) respectfully requests written closure of the Key Eunice Truck Yard Wash Pad Sump Pit and authorization to plug and abandon the monitor well MW-1.

Yours truly,

Key Energy Services

Edward D. "Ted" Philley

Corporate Environmental Specialist

Figures
Tables
Appendices

# TABLES

Table I

Key Energy Services
Eunice Truck Yard
Wash Pad Sump Pit

| Soil Boring Location / Map Designation | Depth (Feet) | Sample Date | Benzene | Toluene | Ethylbenzene | Xylenes | Total BTEX | TPH | | Total TPH | Chlorides |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | GRO C-6-C-12 | DRO >C-12-C-35 | | |
| OCD Hydrocarbon Screening Level | | | 10 | --- | --- | --- | 50 | --- | --- | 1000 | --- |
| Northwest (SB-1) | 20 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 20.7 | 20.8 | 1060 |
| Northwest (SB-1) | 25 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 60.8 | 60.9 | --- |
| Northeast (SB-2) | 10 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | <0.10 | <0.10 | --- |
| Northeast (SB-2) | 15 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 16.8 | 16.9 | 1660 |
| Southeast (SB-3) | 2 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 110 | 110.1 | --- |
| Southeast (SB-3) | 5 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | <10.0 | <0.10 | 2390 |
| Southwest (SB-4) | 2 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | 33.3 | 33.4 | --- |
| Southwest (SB-4) | 5 | 11/19/2007 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 | <0.10 | <10.0 | <0.10 | 4250 |

1) OCD's *Guidelines for Remediation of Leaks, Spills and Releases*, dated August 13, 1993, site specific hydrocarbon screening levels
2) Results and Screening Levels in mg/kg (Parts Per Million)
3)TPH by EPA 8015M, BTEX by EPA 8021B/5030, Chloride by SW 9253

Table II

Key Energy Services
Eunice Truck Yard
Wash Pad Sump Pit

| Soil Boring Location / Map Designation | Depth (Feet) | Sample Date | Arsenic | Cadmium | Chromium[2] | Lead | Selenium | Silver | Mercury |
|---|---|---|---|---|---|---|---|---|---|
| NMED Soil Screening Levels Industrial / Occupational [1] | | | 17.7 | 564 | 3400 | 800 | 5680 | 5680 | 100,000 |
| Northwest (SB-1) | 20 | 11/19/2007 | <0.40 | 196 | 0.677 | 4.35 | <0.20 | <0.10 | <0.10 |
| Northwest (SB-1) | 25 | 11/19/2007 | <0.40 | 98.3 | 0.652 | 4.29 | <0.20 | <0.10 | <0.10 |
| Northeast (SB-2) | 10 | 11/19/2007 | 1.72 | 130 | 0.431 | 2.48 | <0.20 | <0.10 | <0.10 |
| Northeast (SB-2) | 15 | 11/19/2007 | 1.41 | 559 | 0.543 | 3.42 | <0.20 | <0.10 | <0.10 |
| Southeast (SB-3) | 2 | 11/19/2007 | 1.32 | 522 | 0.606 | 3.58 | <0.20 | <0.10 | <0.10 |
| Southeast (SB-3) | 5 | 11/19/2007 | 2.92 | 216 | 0.758 | 3.5 | <0.20 | <0.10 | <0.10 |
| Southwest (SB-4) | 2 | 11/19/2007 | 0.945 | 169 | 0.682 | 3.88 | <0.20 | <0.10 | <0.10 |
| Southwest (SB-4) | 5 | 11/19/2007 | 2.06 | 169 | 0.433 | 1.95 | <0.20 | <0.10 | <0.10 |

1) NMED Soil Screening Levels (SSLs), February 2004, Revision 2
2) Chromium SSL is Chromium VI (lowest SSL), value reported is Total Chromium
3) Results and SSLs in mg/kg
4) Color highlight indicates exeedence of respective SSL
5) Total Metals by SW 7470

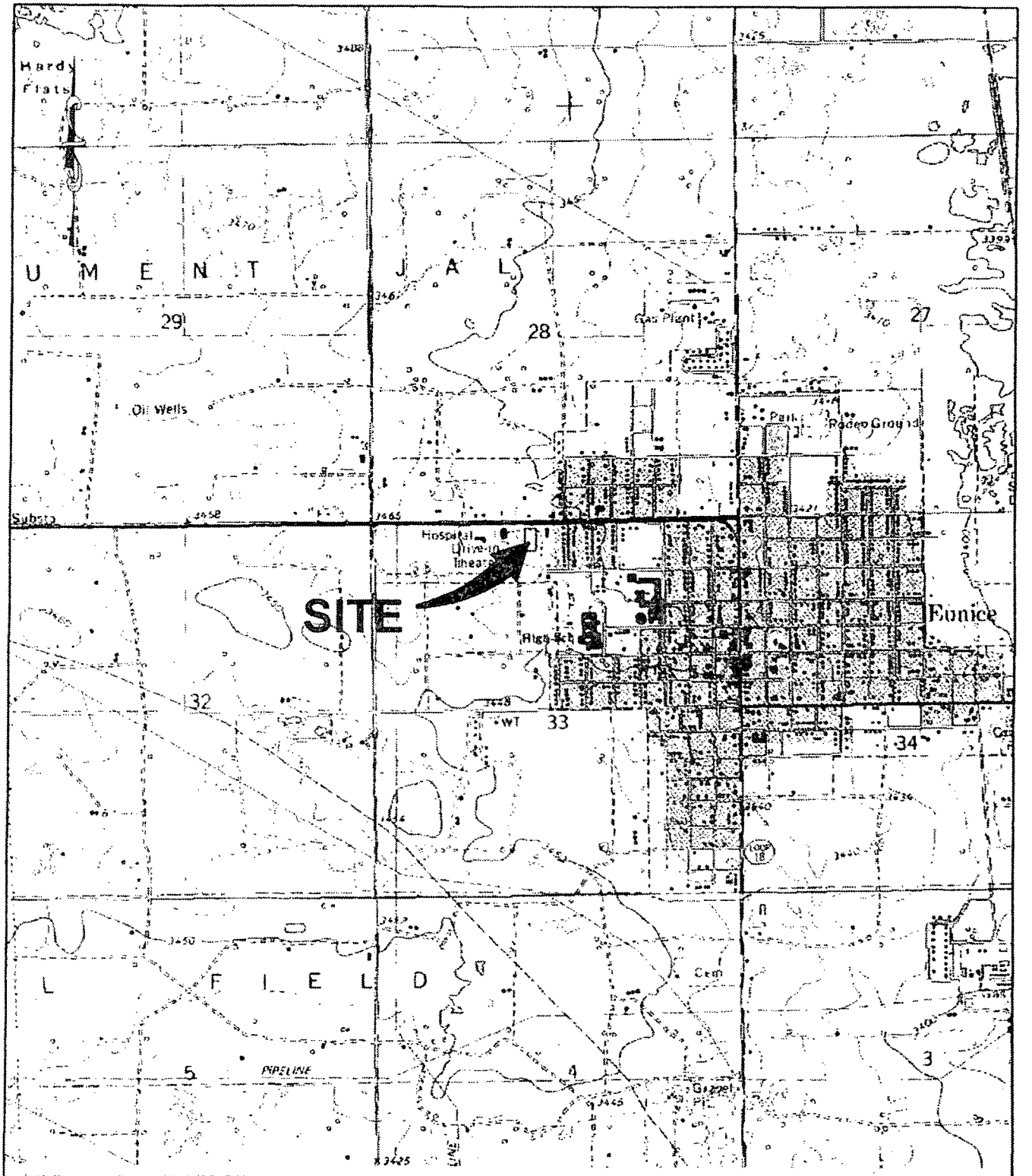
Table III

Key Energy Services
Eunice Truck Yard
Wash Pad Sump Pit

| Monitor Well Location / Map Designation | Sample ID | Sample Date | Chlorides | Total Dissolved Solids (TDS) |
|---|---|---|---|---|
| NMWQCC Groundwater Protection Limit[1] | | | 250 | 1,000 [2] |
| Southeast / MW-1 | MW-1 | 6/11/2004 | 196 | 1,010 [3] |
| Southeast / MW-1 | Dup-01 | 6/11/2004 | 195 | 1,050 |

1) New Mexico Water Quality Control Commission (NMWQCC) Regulation 20.6.2.3.3103, Subsections A-C
2) TDS limit etablished by NMWQCC: default value is first measured value established for site in the event that previous groundwater data is unavailable.
3) NMWQCC new site default groundwater standard value for TDS
4) Results and Protection limits in mg/L
5) TDS by EPA 160.1, Chlorides by EPA 300.0
6) Monitor well installation and ground water sampling by Brown & Caldwell

# FIGURES




SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, EUNICE, NEW MEXICO 1969 REVISED 1979

| | |
|---|---|
| BROWN AND CALDWELL<br>1415 Louisiana<br>Suite 2500<br>Houston, Texas 77002<br>Tel: (713) 759-0999<br>Fax: (713) 308-3886 | KEY ENERGY SERVICES, INC.<br>SITE LOCATION MAP<br>EUNICE, NEW MEXICO<br>FIGURE 1 |

Aug 26, 2004 - 2:43pm chelly
P:\Cad\JOBS\KeyEnerg\25934\EuniceSiteLocMap.dwg

Gravel Pit
PIPELINE
Gravel Pits
Hardy Flats
Oil Wells
Substa
West Well
Gas Plant
Park
Rodeo Ground
Sewage Disposal
Hospital
Drive-in Theatero
High Sch
Eunice
Gravel Pit
Radio Tower
WT
NEW MEXICO
Jones City
Draw
MONUMENT JAL
24
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3421
3386
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3591
3524
3472
3448
3373
3440
3434
3444
3380
3399
3391
8
176
TV. TEX. 21 MI. (EUNICE NE)
VS. TEX. 35 MI. 5348 I NE
EUNICE SE)
5348 I SE

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MN
GN
0°58'
17 MILS
10°
178 MILS

UTM GRID AND 1979 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION

Primary highway, all weather, hard surface
Secondary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
State Route

NEW MEXICO
QUADRANGLE LOCATION

SITE
WATER WELL
SURFACE WATER

EUNICE, N. MEX.
N3222.5—W10307.5/7.5

1969
PHOTOREVISED 1979
DMA 5348 I NW—SERIES V881

) place on the predicted North American Datum 1983
ove the projection lines 9 meters south and
1 meters east as shown by dashed corner ticks

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

# APPENDIX I

***New Mexico Office of the State Engineer***
**Point of Diversion Summary**

Back

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are biggest to smallest)

| POD Number | Tws | Rng | Sec | q | q | q | Zone | X | Y |
|---|---|---|---|---|---|---|---|---|---|
| CP 00726 | 21S | 37E | 33 | 4 | 2 | | | | |

Driller Licence: 208 VAN NOY, W.L.
Driller Name:
Source: Shallow
Drill Start Date: 02/23/1988
Drill Finish Date: 02/23/1988
Log File Date: 02/26/1988
PCW Received Date:
Pump Type:
Pipe Discharge Size:
Casing Size:
Estimated Yield:
Depth Well: 125
Depth Water: 100

# APPENDIX II

1415 Louisiana
Suite 2500
Houston, Texas 77002

Tel: (713) 759-0999
Fax: (713) 308-3886

www.brownandcaldwell.com

August 26, 2004

BROWN AND CALDWELL

Mr. Daniel K. Gibson
Key Energy Services, Inc.
6 Desta Drive, Suite 4400
Midland, Texas 79705

**Subject:** **Documentation of Monitoring Well Installation and Sampling**
**Key Energy Services, Inc. Truck Wash Pad and Sump**
**Eunice, Lea County, New Mexico**

Dear Mr. Gibson:

Brown and Caldwell completed the installation and sampling of one permanent groundwater monitoring well at the Key Energy Services, Inc. (Key) truck wash pad and sump facility in Eunice, New Mexico on June 9-11, 2004. Key currently operates the truck wash facility at 2105 Avenue O (New Mexico Highway 176) in Eunice, New Mexico (Figure 1). Soil assessment activities were previously performed by ARCADIS G&M, Inc. (ARCADIS) on November 19, 2002 to determine potential soil impact associated with the Key truck wash pad and sump. Findings from the November 19, 2002 field investigation indicated elevated concentrations of chlorides in soil surrounding the cement truck wash pad, detected in the range between 1,060 and 4,520 milligrams per kilogram (mg/kg). Benzene, toluene, ethylbenzene or xylene (BTEX) were not detected above the respective detection limits in samples collected by ARCADIS; consequently, further sampling of soils for BTEX was not performed. Metals concentrations from the investigation conducted by ARCADIS were screened against the New Mexico Environment Department (NMED) Soil Screening Levels (SSLs), February 2004, Revision 2. No metals concentrations were found to exceed the Industrial/Occupational SSLs; consequently, further sampling of soils for metals was not performed. The groundwater assessment was performed to establish groundwater quality and determine if chlorides in soil had potentially caused impact to groundwater in the vicinity of the apparent downgradient, southeast corner of the truck wash pad. Field activities for the June 2004 investigation included monitoring well installation, groundwater sampling, and laboratory analytical results and are discussed in the following paragraphs.

## Field Activities

One monitoring well (MW-1) was installed at the southeast corner of the truck wash pad where elevated levels of chlorides in soils were detected during the November 19, 2002 investigation conducted by ARCADIS. One groundwater sample and one duplicate groundwater sample were collected from monitoring well MW-1 for laboratory analysis. Prior to drilling activities, utility clearance was obtained through coordination with site personnel and by contacting New Mexico One-Call. The New Mexico Oil Control Division (OCD) was notified in advance of commencement of field activities.

***Monitoring Well Installation***

Brown and Caldwell installed permanent groundwater monitoring well MW-1 using an air rotary rig. Soil cores were continuously sampled to a depth of 10 feet and sampled at least once every 10 feet thereafter using decontaminated 2-foot split-spoons and/or shovels for cuttings. Each sample interval was logged for recovery length and lithology, visually observed for impacts, and field screened with a photo-ionization detector (PID). No PID readings were observed from ground surface to the total depth of the borehole. Soil cores and cuttings were logged by a field geologist. The lithologic description and moisture content were described in accordance with ASTM International Standard D 2488, Standard Practice for Description and Identification of Soils (Visual Manual Procedure), and classified in accordance with the Unified Soil Classification System (USCS). The soil boring/monitoring well log for monitoring well MW-1 is included in Attachment 1. The lithology consisted predominantly of fine to medium-grained, rounded, well sorted, brownish-red sand. A significant increase in moisture content was observed at 62 feet below ground surface (bgs), and saturation was observed at approximately 79 feet bgs. The monitoring well borehole was initially drilled to 90 feet bgs, but collapsed in to 80 feet bgs. The borehole was cleaned out, and re-drilled to 100 feet bgs to ensure an adequate water column; however, the hole collapsed a second time due to wet formation sands. The monitoring well was installed to a total depth of 90 feet bgs and was constructed with 30 feet of 2-inch diameter, 0.010 machine slot, flush-threaded, Schedule 40 polyvinyl chloride (PVC) screen, and 2-inch diameter Schedule 40 PVC casing to ground surface. The screened interval intersects the first area where increased moisture was observed, though the water table was found to equilibrate at approximately 80 feet bgs. The monitoring well was completed a few inches bgs and protected with a flush-to-grade manhole set in a 3-foot square concrete pad that is 4 inches thick.

Brown and Caldwell developed the monitoring well using a 1.5-inch disposable PVC bailer. Monitoring well development was considered complete when produced fluids were relatively free of suspended material. Approximately 20 gallons of groundwater was bailed from monitoring well MW-1 during development.

Brown and Caldwell used a handheld Global Positioning System (GPS) device to determine the location of the monitoring well, as required by the New Mexico OCD. The monitoring well location is depicted on Figure 2 and the GPS coordinates are listed on Table 1.

***Collection and Analysis of Groundwater Samples***

Brown and Caldwell measured the static water level in the monitoring well immediately prior to sampling and purging using a decontaminated oil/water interface probe. The monitoring well was purged using low flow/low stress purging procedures with a 2-inch submersible stainless steel Fultz pump and disposable polyethylene tubing. The oil/water interface probe and pump were decontaminated in the field before and after use by washing with a non-phosphate detergent (Liquinox) and distilled water wash, followed by a distilled water rinse.

The intake of the Fultz pump was placed at 85 feet bgs. A pumping rate of 0.25 liters per minute was sustained while field parameter measurements for pH, specific conductivity, turbidity, and temperature were collected during the purging process. A YSI 600 XL flow cell was used to measure these parameters at approximate 3 minute increments. A total of 6.25 liters of groundwater were produced before parameters indicated groundwater stabilization had occurred. The field data sheet for purging and sampling of monitoring well MW-1 is included as Attachment 2.

Upon completion of purging operations, a groundwater sample and a duplicate groundwater sample were immediately collected from the monitoring well at the pump discharge line after the flow cell had been disconnected. The samples were transferred into laboratory-supplied, 500-milliliter plastic containers, labeled, and placed on ice in an insulated cooler using standard chain-of-custody procedures. The samples were hand delivered to Severn Trent Laboratories, Inc. in Houston, Texas the following morning. The groundwater samples were analyzed for:

- Total Dissolved Solids (TDS) by EPA Method 160.1 and
- Chlorides by EPA Method 300.0

***Groundwater Analytical Results***

The groundwater sample collected from monitoring well MW-1 indicates a chlorides content of 196 milligrams per liter (mg/L) and a TDS content of 1,010 mg/L. The chloride content is below the 250 mg/L domestic water supply standard for chloride established in the New Mexico Water Quality Control Commission (WQCC) Regulations, Section 20.6.2.3103, Subsection A-C. The New Mexico WQCC has established a limit of 1,000 mg/L for TDS; however, in the event that previous TDS data for the site is not available, the first measured concentration becomes the new groundwater standard by default. Therefore, site activities may not indicate TDS impact to groundwater above approximately 1,010 mg/L during any subsequent monitoring event. Duplicate sample results were comparable to the original sample results. The analytical results are presented in Table 2 and the laboratory analytical report is included as Attachment 3.

***Waste Management***

Soil cuttings generated during the well installation activities were placed in clean, 55-gallon steel drums. Decontamination water, well development water, and purge water produced during well installation and sampling activities were also placed in a clean, 55-gallon steel drum. Non-hazardous waste labels were affixed to each drum. A total of three drums containing soil and one drum containing water were produced during investigation activities and staged near the southeast corner of the concrete pad pending offsite disposal.

**Conclusions and Recommendations**

Analytical results indicate the elevated levels of chlorides present in near surface soils potentially due to truck washing operations do not appear to have impacted groundwater at the southeast corner of the truck wash pad. Further investigation of groundwater in the area is not necessary at this time.

If you have any additional questions regarding the information contained in this correspondence, please contact Madeline Mauk at (713)-646-1119.

Sincerely,

**BROWN AND CALDWELL**

Madeline S. Mauk, P.E.
Supervising Engineer

**BROWN AND CALDWELL**

Lynn M. Wright, P.G.
Supervising Geologist

cc: Brown and Caldwell project file

Figures

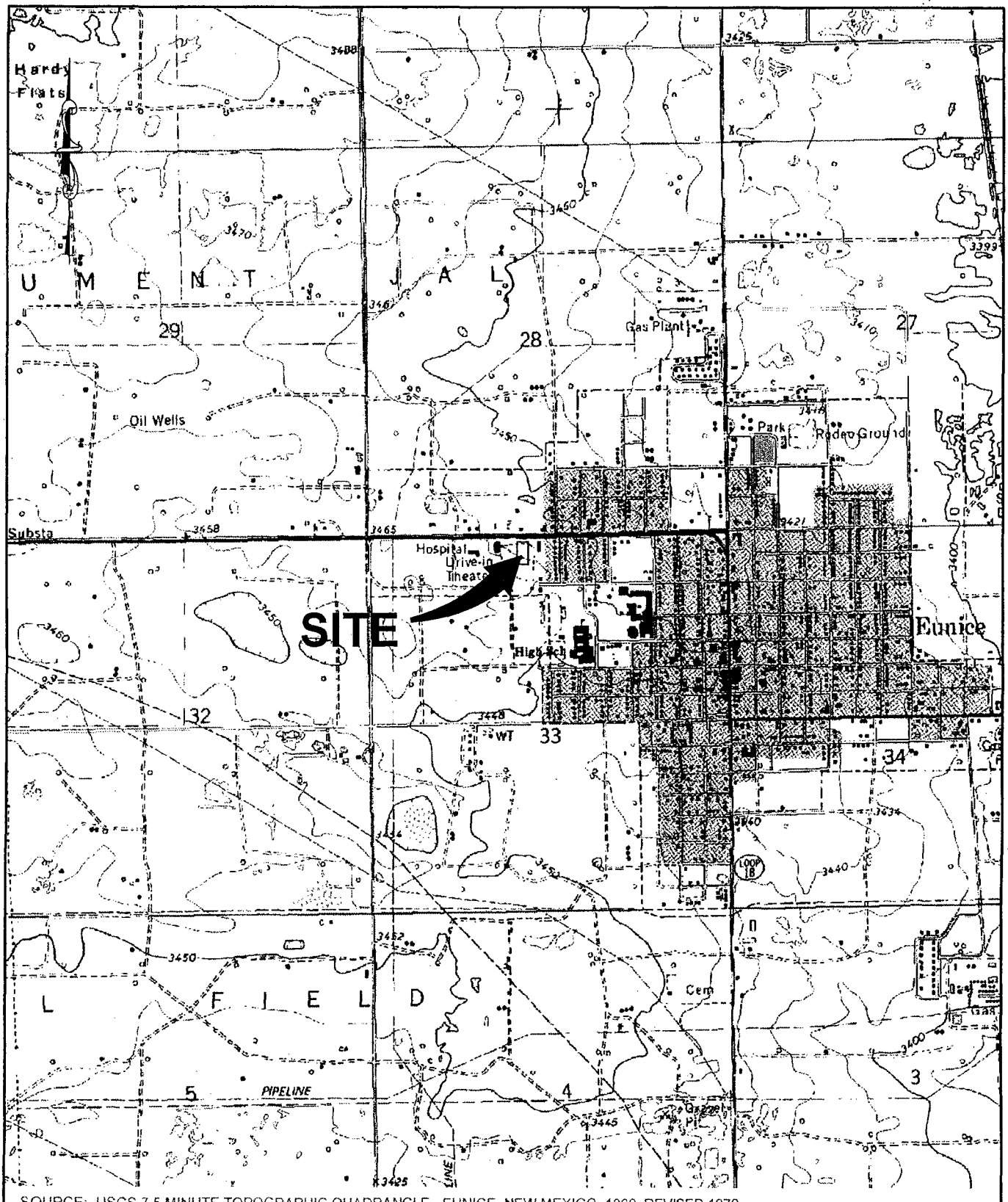
1 Site Location Map
2 Monitoring Well Location Map

Tables

1 GPS Coordinates for Monitoring Well
2 Groundwater Analytical Results

Attachments

Soil Boring/Monitoring Well Log
Groundwater Sampling Field Data Sheet
Laboratory Analytical Report




SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE - EUNICE, NEW MEXICO; 1969; REVISED 1979

0 1000 2000

APPROXIMATE SCALE IN FEET

BROWN AND CALDWELL

1415 Louisiana
Suite 2500
Houston, Texas 77002
Tel: (713) 759-0999
Fax: (713) 308-3886

KEY ENERGY SERVICES, INC.

SITE LOCATION MAP
EUNICE, NEW MEXICO
FIGURE 1

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REFERENCE: NEW MEXICO RESOURCE GEOGRAPHIC INFORMATION SYSTEM PROGRAM, EUNICE - 7.5 MINUTE DIGITAL ORTHOPHOTO QUAD NE QUATER, UTM NAD 83

LEGEND

MW-1 ⊕ MONITOR WELL LOCATION (BROWN AND CALDWELL, JUNE 2004)

● SOIL BORING (ARCADIS, NOVEMBER 2002)

PROPERTY BOUNDARY

0 50 100

APPROXIMATE SCALE IN FEET

BROWN AND CALDWELL

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Suite 2500
Houston, Texas 77002
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Fax: (713) 308-3886

KEY ENERGY SERVICES, INC.

# TRUCK WASH PAD AND SUMP FACILITY MONITORING WELL LOCATION MAP EUNICE, NEW MEXICO FIGURE 2

Aug 26, 2004 - 2:44pm ckelly P:\Cad\JOBS\KeyEnerg\25934\EuniceSiteMap.dwg

# TABLES

# Table 1
## Coordinates for Monitoring Well
### Key Energy Services, Inc. - Eunice Truck Wash Pad and Sump Facility
### Eunice, New Mexico

| Monitoring Well | Latitude | Longitude |
|---|---|---|
| MW-1 | 32°26.493' | -103°10.140' |

**Notes:**

1) GARMIN brand handheld Global Positioning System unit. North American Datum (1983). (dd°mm.mmm')
2) GPS was not getting adequate satellite coverage during marking of coordinates.

# Table 2
# Groundwater Analytical Results
## Key Energy Services, Inc. - Eunice Truck Wash Pad and Sump Facility
## Eunice, New Mexico

| Laboratory Analysis | | | Total Dissolved Solids (mg/L) [EPA Method 160.1] | Chlorides (mg/L) [EPA Method 300.0] |
|---|---|---|---|---|
| NMWQCC[1] Groundwater Protection Limit | | | 1,000[2] | 250 |
| **Sample Location** | **Sample ID** | **Sample Date** | | |
| MW-1 | MW-1 | 6/11/2004 | 1,010 | 196 |
| MW-1 | DUP-01 | 6/11/2004 | 1,050 | 195 |

**Notes:**

1) NMWQCC = New Mexico Water Quality Control Commission (Regulation 20.6.2.3103, Subsections A-C).

2) Total Dissolved Solids limit established by NMWQCC; default value is first measured value established for site in the event that previous groundwater data for site is unavailable.

# ATTACHMENT 1

## Soil Boring/Monitoring Well Log

Monitoring Well: **MW-1**

Project Name: **Eunice Truck Wash and Sump Facility Monitor Well** Project Number: **25934.001** Sheet **1** of **3**

| | | | |
|---|---|---|---|
| Project Location: **2105 Avenue O, Eunice, New Mexico** | | Logged By: **C. Putney** | Approved: |
| Drilling Contractor: **Harrison and Cooper** | | Date Started: **6/9/04** | Date Finished: **6/9/04** |
| Drilling Equipment: **IR TH-60** | Driller: **Leonard** | Total Boring Depth: (feet) **100.0** | Depth to Static Water: (feet) |
| Drilling Method: **Air Rotary** | Borehole Diameter: **8"** | TOC Elevation: | Ground Elevation: |
| Sampling Method: **split-spoon/shovel** | | Diameter and Type of Well Casing: **2" PVC** | |
| Comments: **Water level measured from top of casing.** | | Slot Size: **0.010 "** | Filter Material: **20/40 silica** |
| | | Development Method: **bailer** | |

| Depth (feet) | Depth to Water | USC Soil Type | Lithology | Description | PID Readings | Sampled Interval | Recovery (feet) | Sample ID | Monitoring Well Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 2 | | | | Cleared for utlities to 2'. Fill material and fine to medium sand with gravel. | 0 | | 0 | | Flush mount completion |
| 4 | | | | | 0 | | .6 | | |
| | | | | | 0 | | .5 | | |
| 6 | | SP SM | | Silty sand, fine, trace hard caliche/calcareous cementation at 10 feet, dry. | 0 | | .5 | | |
| 8 | | | | | 0 | | .5 | | |
| | | | | | 0 | | .2 | | |
| 10 | | | | | 0 | | 0 | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | Caliche/calcareous cementation and nodules increase, brown to light grayish brown with interlayered fine to medium sand seams, dry. Very hard cemented sand in split-spoon shoe at 22'. | 0 | | .2 | | |
| 18 | | | | | | | | | |
| 20 | | | | | 0 | | .5 | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
| 26 | | SP SM | | Silty sand, fine to medium, light reddish-brown, trace caliche, mostly loose, dry. Calcarous nodules at 42'. | 0 | | 0 | | |
| 28 | | | | | | | | | |
| 30 | | | | | 0 | | .3 | | |
| 32 | | | | | | | | | |

Monitoring Well: **MW-1**

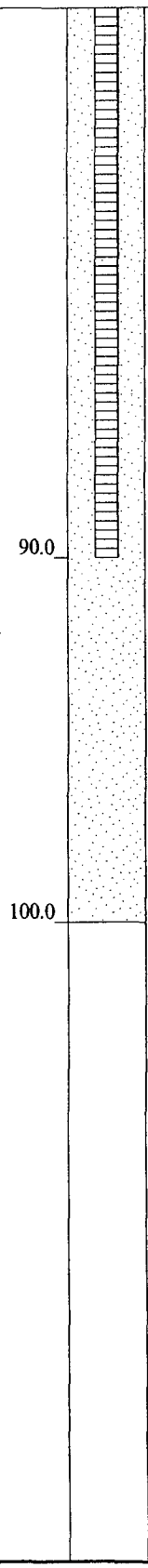
Project Name: **Eunice Truck Wash and Sump Facility Monitor Well** Project Number: **25934.001** Sheet **2** of **3**

| Depth (feet) | Depth to Water | USC Soil Type | Lithology | Description | PID Readings | Sampled Interval | Recovery (feet) | Sample ID | Monitoring Well Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 34 | | | | | | | | | |
| 36 | | | | | 0 | | .5 | | |
| 38 | | | | | | | | | |
| 40 | | | | | 0 | | 1.4 | | |
| 42 | | | | | | | | | |
| 44 | | | | | | | | | |
| 46 | | | | | 0 | | 0 | | |
| 48 | | | | | | | | | |
| 50 | | | | | 0 | | 0 | | |
| 52 | | | | | | | | | |
| 54 | | | | | | | | | |
| 56 | | SP | | Sand, slight increase in grain size, grading to darker reddish-brown in color. Slightly cemented portion at 59.5'. | 0 | | .3 | | 56.0 |
| 58 | | | | | | | | | |
| 60 | | | | | 0 | | .9 | | Top of screened interval at 60 ft. |
| 62 | | | | | | | | | |
| 64 | | | | | | | | | |
| 66 | | SP | | Sand, very moist, lt. reddish-brown, trace calcareous/cemented fragments, no odor. | 0 | | 0 | | |
| 68 | | | | | | | | | |
| 70 | | | | | 0 | | 1 | | |
| 72 | | | | | | | | | |
| 74 | | | | | | | | | |

Monitoring Well: **MW-1**

Project Name: **Eunice Truck Wash and Sump Facility Monitor Well** Project Number: **25934.001** Sheet 3 of 3

| Depth (feet) | Depth to Water | USC Soil Type | Lithology | Description | PID Readings | Sampled Interval | Recovery (feet) | Sample ID | Monitoring Well Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 76 | | SP | | Sand, wet, reddish-brown, loose, unconsolidated, no odor. | 0 | | .9 | | |
| 78 | | | | | | | | | |
| 80 | ▼ | | | | 0 | | 0 | | |
| 82 | | | | | | | | | |
| 84 | | | | | | | | | |
| 86 | | | | | 0 | | 0 | | |
| 88 | | | | | | | | | |
| 90 | | | | | 0 | | .2 | | 90.0 |
| 92 | | | | | | | | | |
| 94 | | | | | | | | | |
| 96 | | | | | | | | | |
| 98 | | | | | | | | | |
| 100 | | | | | | | | | 100.0 |



Drilled to 100'; hole sluffed in to 80 feet. Cleaned out and redrilled; hole sluffed in to 90 feet due to wet formation sands. Set screen at 90'.

# ATTACHMENT 2

## Groundwater Sampling Field Data Sheet

BROWN AND CALDWELL

# GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-1

## 1. PROJECT INFORMATION

Project Number: 25934 Task Number: 001 Date: 6-11-04 Time: 1545

Client: KEY ENERGY Personnel: C. PUTNEY

Project Location: EUNICE, NM Weather: WINDY, 85'F, SUNNY

## 2. WELL DATA

| | |
|---|---|
| Casing Diameter: 2 inches | Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: |
| Screen Diameter: 2 inches | Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: |
| Total Depth of Well: 90 feet | From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: |
| Depth to Static Water: 80.81 feet | From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: |
| Depth to Product: — feet | From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: |
| Length of Water Column: 9.19 feet | Well Volume: ____ gal |
| Pump intake depth 85' (from GS) | Screened Interval (from GS): 100' - 90' |

*Note: 2-inch well = 0.16 gal/ft 4-inch well = 0.65 gal/ft*

## 3. PURGE DATA

Purge Method: ☐ Bailer, Size: ____ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: ____

Materials: Pump/Bailer ☒ Stainless ☐ PVC ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Rope/Tubing ☒ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Was well purged dry? ☐ Yes ☒ No Pumping Rate: 0.25 liters/min

Equipment Model(s)

1. YSI 1600 XL
2. HACH TURBIDITY
3. 2" FULTZ PUMP

| Time | Cum. Liters Removed | pH | Temp | Spec. Cond. | Eh | Dissolved Oxygen | Turbidity | Depth to Water (TOC) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 1600 | 0.25 | 7.27 | 27.12 | 1.207 | -48.9 | 3.02 | 320 | 80.88 | VERY CLOUDY |
| 1603 | 1.0 | 7.31 | 27.41 | 1.220 | -44.9 | 3.30 | 328 | 80.88 | " |
| 1606 | 1.75 | 7.30 | 27.16 | 1.279 | -43.6 | 3.59 | 292 | 80.87 | " |
| 1609 | 2.5 | 7.29 | 27.13 | 1.230 | -36.7 | 3.76 | 273 | 80.86 | SL. CLOUDY |
| 1612 | 3.25 | 7.29 | 26.85 | 1.214 | -31.8 | 4.01 | 181 | 80.86 | " |
| 1615 | 4.0 | 7.32 | 26.41 | 1.184 | -31.9 | 4.35 | 99.2 | 80.85 | " |
| 1618 | 4.75 | 7.33 | 26.09 | 1.171 | -32 | 4.58 | 70.6 | 80.85 | CLEARING UP |
| 1621 | 5.5 | 7.32 | 26.15 | 1.175 | -33 | 4.50 | 40.5 | 80.84 | " |
| 1624 | 6.25 | 7.33 | 26.10 | 1.180 | -32 | 4.42 | 35.9 | 80.83 | " |

## 4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ____ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:

Materials: Pump/Bailer ☒ Stainless ☐ PVC ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☒ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Depth to Water at Time of Sampling: 80.82 Field Filtered? ☐ Yes ☐ No

Sample ID: MW-1 Sample Time: 1625 # of Containers: 1

Duplicate Sample Collected? ☐ Yes ☐ No ID: DUP-01

Geochemical Analyses

Ferrous Iron: ____ mg/L

DO: ____ mg/L

Nitrate: ____ mg/L

Sulfate: ____ mg/L

Alkalinity: ____ mg/L

## 5. COMMENTS

TDS + CHLORIDES

*Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.*

Gen\non-proj\forms\Field Data Sheet.xls\BC-liters

FORM GW-1 (Rev 2/26/02 - dg)

Signature

# ATTACHMENT 3

## Laboratory Analytical Report

SEVERN TRENT STL

EUNICE

# ANALYTICAL REPORT

JOB NUMBER: 275517

Prepared For:

Brown and Caldwell
1415 Louisiana
Suite 2500
Houston, TX 77002

Attention: Madeline Mauk

Date: 07/08/2004

Signature

Date 7/8/04

Name: Ed B. Fry

Title: Project Manager III

E-Mail: efry@stl-inc.com

Severn Trent Laboratories
6310 Rothway Drive
Houston, TX 77040

PHONE: (713) 690-4444

SEVERN TRENT STL

07/08/2004

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

Reference:
Project : Brown and Caldwell-Hobbs Eunice
Project No. : 275517
Date Received : 06/12/2004
STL Job : 275517

Dear Madeline Mauk:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

1. MW-1
2. DUP-01

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,

Ed B. Fry
Project Manager

SEVERN TRENT STL

## SAMPLE INFORMATION
Date: 07/08/2004

Job Number.: 275517
Customer...: Brown and Caldwell
Attn.....: Madeline Mauk

Project Number.....: 99004969
Customer Project ID....: KEY ENERGY
Project Description....: Brown and Caldwell-Hobbs Eunice

| Laboratory Sample ID | Customer Sample ID | Sample Matrix | Date Sampled | Time Sampled | Date Received | Time Received |
|---|---|---|---|---|---|---|
| 275517-1 | MW-1 | Water | 06/11/2004 | 16:25 | 06/12/2004 | 11:52 |
| 275517-2 | DUP-01 | Water | 06/11/2004 | 00:00 | 06/12/2004 | 11:52 |



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SEVERN TRENT STL

# LABORATORY TEST RESULTS

Job Number: 275517

Date:07/08/2004

CUSTOMER: Brown and Caldwell PROJECT: KEY ENERGY ATTN: Madeline Mauk

Customer Sample ID: MW-1
Date Sampled.....: 06/11/2004
Time Sampled.....: 16:25
Sample Matrix.....: Water

Laboratory Sample ID: 275517-1
Date Received.....: 06/12/2004
Time Received.....: 11:52

| TEST METHOD | PARAMETER/TEST DESCRIPTION | SAMPLE RESULT | Q | FLAGS | MDL | RL | DILUTION | UNITS | BATCH | DT | DATE/TIME | TECH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPA 160.1 | Solids, Total Dissolved (TDS), Water | 1010 | | | 2.99 | 10 | 1 | mg/L | 102935 | | 06/14/04 1800 | sur |
| EPA 300.0 | Chloride, Water | 196 | | | 0.70 | 4.0 | 10 | mg/L | 103052 | | 06/15/04 2029 | cas |

* In Description = Dry Wgt.



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SEVERN TRENT STL

LABORATORY TEST RESULTS

Job Number: 275517

Date:07/08/2004

CUSTOMER: Brown and Caldwell PROJECT: KEY ENERGY ATTN: Madeline Mauk

Customer Sample ID: DUP-01
Date Sampled.....: 06/11/2004
Time Sampled.....: 00:00
Sample Matrix.....: Water

Laboratory Sample ID: 275517-2
Date Received.....: 06/12/2004
Time Received.....: 11:52

| TEST METHOD | PARAMETER/TEST DESCRIPTION | SAMPLE RESULT | Q | FLAGS | MDL | RL | DILUTION | UNITS | BATCH | DT | DATE/TIME | TECH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPA 160.1 | Solids, Total Dissolved (TDS), Water | 1050 | | | 2.99 | 10 | 1 | mg/L | 102935 | | 06/14/04 1800 | sur |
| EPA 300.0 | Chloride, Water | 195 | | | 0.70 | 4.0 | 10 | mg/L | 103052 | | 06/15/04 2044 | cas |

* In Description = Dry Wgt.



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SEVERN TRENT STL

## QUALITY CONTROL RESULTS

Job Number.: 275517 Report Date.: 07/08/2004

CUSTOMER: Brown and Caldwell PROJECT: KEY ENERGY ATTN: Madeline Mauk

Test Method.....: EPA 300.0 Analyst...: cas
Method Description.: Ion Chromatography Analysis Units.....: mg/L Test Code.: CHL
Parameter.....: Chloride Batch(s)...: 103052

| QC | Lab ID | Reagent | QC Result | QC Result | True Value | Orig. Value | Calc. Result * | Limits | F | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ICV | | WCS31126 | 19.932 | | 20.00 | | 99.7 | 90.0-110. | | 06/15/2004 | 1200 |
| ICB | | | 0 | | | | | | | 06/15/2004 | 1215 |
| MB | | | 0 | | | | | | | 06/15/2004 | 1230 |
| LCS | | WCS31126 | 19.729 | | 20.00 | | 98.6 | 90.0-110. | | 06/15/2004 | 1245 |
| CCV | | WCS31126 | 20.712 | | 20.00 | | 103.6 | 90.0-110. | | 06/15/2004 | 1501 |
| CCB | | | 0.2720 | | | | | | | 06/15/2004 | 1516 |
| DU | 275458-1 | | 5.6227 | | | 5.4458 | 3.2 | 20 | | 06/15/2004 | 1712 |
| MS | 275458-1 | WCS30882 | 15.894 | | 10.000000 | 5.4458 | 104.5 | 80-120 | | 06/15/2004 | 1727 |
| DU | 275590-1 | | 3.4219 | | | 3.4423 | 0.6 | 20 | | 06/15/2004 | 1757 |
| CCV | | WCS31126 | 19.725 | | 20.00 | | 98.6 | 90.0-110. | | 06/15/2004 | 1813 |
| CCB | | | 0.2434 | | | | | | | 06/15/2004 | 1828 |
| MS | 275590-1 | WCS30882 | 13.806 | | 10.000000 | 3.4423 | 103.6 | 80-120 | | 06/15/2004 | 1843 |
| CCV | | WCS31126 | 19.795 | | 20.00 | | 99.0 | 90.0-110. | | 06/15/2004 | 2114 |
| CCB | | | 0.2501 | | | | | | | 06/15/2004 | 2129 |
| DU | 275517-3 | | 5.1628 | | | 5.2670 | 2.0 | 20 | | 06/15/2004 | 2144 |
| MS | 275517-3 | WCS30882 | 15.791 | | 10.000000 | 5.2670 | 105.2 | 80-120 | | 06/15/2004 | 2159 |
| CCV | | WCS31126 | 20.097 | | 20.00 | | 100.5 | 90.0-110. | | 06/16/2004 | 0015 |
| CCB | | | 0.2435 | | | | | | | 06/16/2004 | 0031 |
| MB | | | 0 | | | | | | | 06/16/2004 | 0046 |
| LCS | | WCS31126 | 19.804 | | 20.00 | | 99.0 | 90.0-110. | | 06/16/2004 | 0101 |
| DU | 275334-2 | | 7.5941 | | | 7.2345 | 4.9 | 20 | | 06/16/2004 | 0146 |
| MS | 275334-2 | WCS30882 | 18.024 | | 10.000000 | 7.2345 | 107.9 | 80-120 | | 06/16/2004 | 0201 |
| CCV | | WCS31126 | 19.584 | | 20.00 | | 97.9 | 90.0-110. | | 06/16/2004 | 0317 |
| CCB | | | 0 | | | | | | | 06/16/2004 | 0332 |
| DU | 275407-2 | | 4.2093 | | | 4.1746 | 0.8 | 20 | | 06/16/2004 | 0533 |
| MS | 275407-2 | WCS30882 | 14.703 | | 10.000000 | 4.1746 | 105.3 | 80-120 | | 06/16/2004 | 0548 |
| CCV | | WCS31126 | 19.758 | | 20.00 | | 98.8 | 90.0-110. | | 06/16/2004 | 0618 |
| CCB | | | 0.2345 | | | | | | | 06/16/2004 | 0633 |
| CCV | | WCS31126 | 19.904 | | 20.00 | | 99.5 | 90.0-110. | | 06/16/2004 | 0704 |
| CCB | | | 0.2642 | | | | | | | 06/16/2004 | 0719 |

Test Method.....: EPA 160.1 Analyst...: sur
Method Description.: Solids, Total Dissolved (TDS) Units.....: mg/L Test Code.: TDS
Parameter.....: Solids, Total Dissolved (TDS) Batch(s)...: 102935

| QC | Lab ID | Reagent | QC Result | QC Result | True Value | Orig. Value | Calc. Result * | Limits | F | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DU | 275338-10 | | 1359.00 | | | 1388.00 | 2.1 | 10.0 | | 06/14/2004 | 1800 |
| DU | 275487-6 | | 1311.00 | | | 1256.00 | 4.3 | 10.0 | | 06/14/2004 | 1800 |
| MB | | | 1.00 | | | | | | | 06/14/2004 | 1800 |
| LCS | | WCS31351 | 3506.00 | | 3600 | | 97.4 | 90.0-110. | | 06/14/2004 | 1800 |
| DU | 275517-2 | | 1052.00 | | | 1012.00 | 3.9 | 10.0 | | 06/14/2004 | 1800 |
| LCS | | WCS31351 | 3520.00 | | 3600 | | 97.8 | 90.0-110. | | 06/14/2004 | 1800 |
| MB | | | 1.00 | | | | | | | 06/14/2004 | 1800 |



* %=% REC, R=RPD, A=ABS Diff., D=% Diff.

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# QUALITY ASSURANCE METHODS

## REFERENCES AND NOTES

Report Date: 07/08/2004

### REPORT COMMENTS

1) All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.
2) Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.
3) According to 40CFR Part 136.3, pH, Chlorine Residual, and Dissolved Oxygen analyses are to be performed immediately after aqueous sample collection. When these parameters are not indicated as field,(e.g. pH Field) they were not analyzed immediately, but as soon as possible on laboratory receipt.
4) For all USACE projects, the QC limits are based on "mean +/- 2 sigma", which are the warning limits.

General Information:

- Cresylic Acid is the combination of o,m and p-Cresol. The combination is reportesd as the final result.
- m-Cresol and p-Cresol co-elute. The result of the two is reported as either m&p-cresol or as p-cresol.
- m-Xylene and p-Xylene co-elute. The result of the two is reported as m,p-Xylene.
- N-Nitrosodiphenylamine decomposes in the gas chromatograph inlet forming dipheylamine and, consequently, may be detected as diphenylamine.
- Methylene Chloride and Acetone are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
- Trimethysilyl(Diazomethane) is used to esterify acid herbicides in Method SW-846 8151A.
- For Inorganic analyses, duplicate QC limits are determined as follows: If the sample result is less than or equal to 5 times the reporting limit, the RPD limit is equal to the reporting limit. If the sample result is greater than 5 times the reporting limit, the RPD limit is the method defined RPD.

Explanation of Qualifiers:

U - This qualifier indicates that the analyte was analyzed but not detected.
J - (Organics only) This qualifier indicates that the analyte is an estimated value between the RL and the MDL.
B - (Inorganics only) This Qualifier indicates that the analyte is an estimated value between the RL and the MDL.
N - (Organics only) This flag indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds (TICs), where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic charachterization of a TIC, such as "chlorinated hydrocarbon", the "N" flag is not used.

Explanation of General QC Outliers:

A - Matrix interference present in sample.
a - MS/MSD analyses yielded comparable poor recoveries, indicating a possible matrix interference. Method performance is demonstrated by acceptable LCS recoveries.
b - Target analyte was found in the method blank.
M - QC sample analysis yielded recoveries outside QC acceptance criteria. This sample was reanalyzed.
L - LCS analysis yielded high recoveries, indicating a potential high bias. No target analytes were observed above the RL in the associated samples.
G - Marginal outlier within 1% of acceptance criteria.
r - RPD value is outside method acceptance criteria.
C - Poor RPD values observed due to the non-homogenous nature of the sample.
O - Sample required dilution due to matrix interference.
D - Sample reported from a dilution.
d - Spike and/or surrogate diluted.
P - The recovery of this analyte is outside default QC limits. The data is accepted and will be used to calculate in-house statistical limits.
E - The reported concentration exceeds the instrument calibration.
F - The analyte is outside QC limits. The sample data is accepted since this analyte is not reported in associated samples.
H - Continuing Calibration Verification (CCV) standard is not associated with the samples reported.
q - See the subcontract final report for qualifier explanation.



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## QUALITY ASSURANCE METHODS

## REFERENCES AND NOTES

Report Date: 07/08/2004

W - The MS/MSD recoveries are outside QC acceptance criteria because the amount spiked is much less than the amount found in the sample.
K - High recovery will not affect the quality of reported results.
Z - See case narrative.

Explanation of Organic QC Outliers:

e - Method blank analysis yielded phthalate concentrations above the RL. Phthlates are recognized potential laboratory contaminants. Its presence in the sample up to five times the amount reported in the blank may be attributed to laboratory contamination.
S - Sample reanalyzed/reextracted due to poor surrogate recovery. Reanalysis confirmed original analysis indicating a possible matrix interference.
T - Sample analysis yielded poor surrogate recovery.
R - The RPD between the two GC columns is greater than 40% and no anomalies are present. The higher result is reported as per EPA Method 8000B.
I - The RPD between the two GC columns is greater than 40% and anomalies are present. The lower of the two results has been reported.
X - Gaseous compound. In-house QC limits are advisory.
Y - Ketone compounds have poor purge efficiency. In-house QC limits are advisory.
f - Surrogate not associated with reported analytes.

Explanation of Inorganic QC Outliers:

Q - Method blank analysis yielded target analytes above the RL. Associated sample results are greater than 10 times the concentrations observed in the method blank.
V - The RPD control limit for sample results less than 5 times the RL is +/- the RL value. Sample and duplicate results are within method acceptance criteria.
e - Serial dilution failed due to matrix interference.
g - Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery being below 85 percent. The correlation coefficent for the MSA is greater than or equal to 0.995.
s - BOD/cBOD seed value is not within method acceptance criteria. Due to the nature of the test method, the sample cannot be reanalyzed.
l - BOD/cBOD LCS value is not within method acceptance criteria. Due to the nature of the test method, sample cannot be reanalyzed.
n - Sample result quantitated by Method of Standard Additions (MSA) due to the analytical spike recovery being below 85 percent. The correlation coefficient for the MSA is less than 0.995.

Abbrevi ations:

Batch - Designation given to identify a specific extraction, digestion, preparation, or analysis set.
CCV - Continuing Calibration Verification
CRA - Low level standard check - GFAA, Mercury
CRI - Low level standard check - ICP
Dil Fac - Dilution Factor - Secondary dilution analysis
DLFac - Detection Limit Factor
EB - Extraction Blank (TCLP, SPLP, etc.)
ICAL - Initial Calibration
ICB - Initial Calibration Blank
ICV - Initial Calibration Verification
ISA - Interference Check Sample A - ICP
ISB - Interference Check Sample B - ICP
LCD - Laboratory Control Duplicate
LCS - Laboratory Control Sample
MB - Method Blank
MD - Method Duplicate
MDL - Method Detection Limit
MS - Matrix Spike



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## QUALITY ASSURANCE METHODS

## REFERENCES AND NOTES

Report Date: 07/08/2004

MSD - Matrix Spike Duplicate
ND - Not Detected
PB - Preparation Blank
PREPF - Preparation Factor
RL - Reporting Limit
RPD - Relative Percent Difference
RRF - Relative Response Factor
RT - Retention Time
DU - Duplicate

Method References:

(1) EPA 600/4-79-020 Methods for the Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-94-111 Methods for the Determination of METals in Environmental Samples, Supplement I, May 1994.
(3) EPA SW846 Test Methods for Evaluating Solid Waste, Third Edition, September 1986; Update I July 1992; Update II, September 1994, Update IIA August 1993; Update IIB, January 1995; Update III, December 1996, Update IVA January 1998, Update IVB November 2000.
(4) Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985), 17th Edition (1989), 18th Edition (1992), 19th Edition (1995), 20th Edition (1998).
(5) HACH Water Analysis Handbook 3rd Edition (1997).
(6) Federal Register, July 1, 1990 (40 CFR Part 136 Appendix A).
(7) Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, 2nd Edition, January 1997.
(8) ASTM Annual Book of Methods (Various Years)
(9) Diagnosis and Improvement of Saline and Alkali Soils, Agriculture Handbook No. 60, United States Department of Agriculture, 1954.



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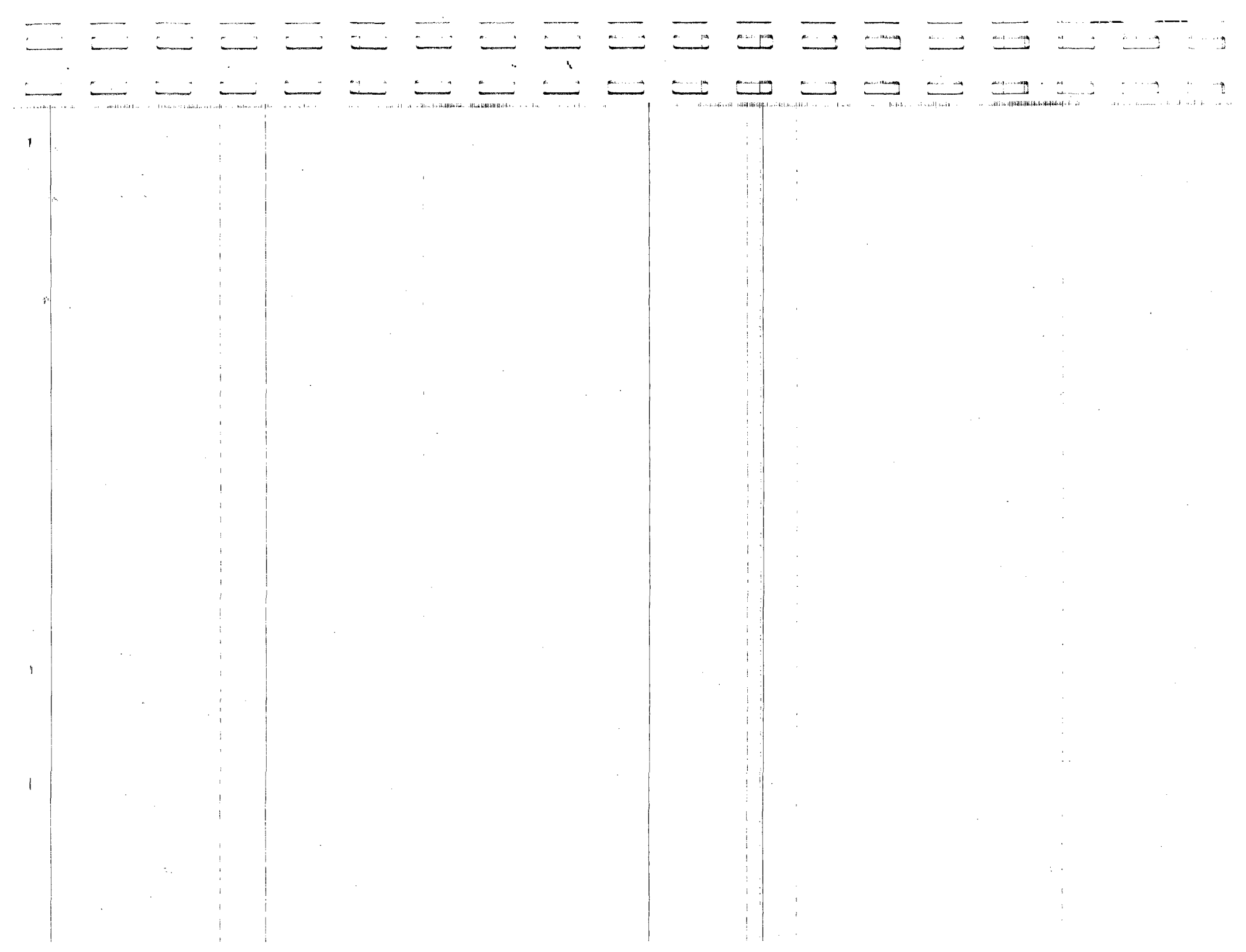


# APPENDIX III

ARCADIS

# Key Energy Eunice Truck Sump Report

PREPARED FOR

Key Energy Services
2625 W. Marland
Hobbs, New Mexico 88241

ARCADIS
*Infrastructure, buildings, environment, communications*

ARCADIS G&M, Inc.
1004 N. Big Spring Street.
Suite 300
Midland Texas 79701
Tel 915-687-5400
Fax 915-687-5401
www.arcadis-us.com

Mr. Royce Crowell
Key Energy Services
2625 W. Marland
Hobbs, New Mexico 88241

ENVIRONMENT

Subject:
Findings and Recommendations from a Soil Investigation of the Truck Wash Sump
Key Energy Services, Eunice, New Mexico Facility
Lea County, New Mexico

Date:
January 20, 2003

Contact:
Ralph Lang

Phone:
(915) 687-5400

Email:
rlang@arcadis-us.com

Our ref:
G:/Aproject/Key Energy Services/MT0764.01 Eunice/reports/Key Energy Eunice Truck Sump Report

Dear Mr. Crowell:

On November 19, 2002, ARCADIS G&M, Inc. (ARCADIS) performed an investigation into the potential soil impact associated with the Key Energy Services truck washing facility pad and sump located in Eunice, New Mexico. The sump and pad are contiguous to the main shop and office building and are directly south of the building. A total of four soil borings were advanced using air rotary drilling.

The Key Energy Services facility is located at 2105 Avenue O (New Mexico Highway 176) in Eunice, New Mexico. The sump is located at approximately North 32 Degrees, 26 Minutes, 29.6 seconds longitude and West 103 degrees, 10 minutes, 7.3 seconds latitude. Figure 1 is a map of the site.

Mr. Wayne Price of the New Mexico Oil Conservation Commission (NMOCD) inspected the site before work began and verified compliance with NMOCD regulations.

## FIELD METHODS

Four soil borings were drilled around the truck washing facility sump and pad. A direct-push sampling device was used to collect soil samples for analysis. The sampling device was thoroughly cleaned between each sample using laboratory-grade soap and water. Soil samples were caught at intervals of 0-0.5 feet, 2 feet, 5 feet, and at 5-foot intervals thereafter, to total depth.

The samples were sealed in 4-ounce glass jars and in plastic zip-lock bags. The headspace in the zip-lock bags was analyzed using a photo-ionization detector (PID) that was previously calibrated using 100 parts per million (ppm) isobutane. A scintillator was used to screen for the potential of naturally occurring radioactive material (NORM).

The two borings closest to the sump, SB-1 and SB-2, were drilled to 25 feet and 21 feet, respectively. Soil borings SB-3 and SB-4 were drilled until no impacted soil was evident by field inspection and screening (13 feet and 15 feet, respectively). All soil borings were plugged to the surface with bentonite chips that were hydrated with fresh water.

Two soil samples from each borehole were submitted to the laboratory for analysis. One sample was taken from the sample with the highest headspace reading; the other sample was taken from either the base of the boring or when field observation indicated that there was no other soil impact. Samples were collected according to standard procedures in containers supplied by the laboratory. They were placed on ice soon after they were taken and kept on ice until they were turned over to laboratory personnel.

PID readings, scintillator readings, and the soil descriptions are summarized on the boring logs in Appendix A. Using appropriate chain-of-custody protocol, the soil samples were hand-delivered by ARCADIS personnel to Environmental Lab of Texas I, LTD.

The samples were analyzed for total petroleum hydrocarbons (TPH) by method 8015M and for benzene, toluene, ethylbenzene and xylenes (BTEX) by method 8021B/5030. The samples were also examined for the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, selenium, silver, mercury) and for chloride.

## FIELD AND ANALYTICAL RESULTS

The highest PID readings observed were 220 ppm and 299 ppm in soil boring SB-1 from 10 feet and 20 feet, respectively. Field readings for NORM did not exceed measured background levels.

Analytical results were examined for completeness and procedural errors and none were observed. The complete laboratory analytical report is included in Appendix B.

No BTEX was detected in any of the samples analyzed. TPH was found in the diesel range (>C12-C35). TPH and BTEX analytical results are summarized Table A. Chloride and RCRA 8 metals analytical results are summarized in Table B.

## CONCLUSIONS

There were four types of potential soil impact addressed by this investigation. These potential impacts were NORM, hydrocarbon, metals, and chloride. No groundwater investigation was conducted at this site. Field and laboratory analysis indicated the following:

1. No NORM impact was found at this site.
2. Hydrocarbon impact was addressed by the PID readings and the laboratory analysis of soil samples.
   2a. Laboratory analysis indicates that there is no BTEX impact.
   2b. The only TPH impact that was encountered was from diesel range organics (DRO>C12-C35) and only one sample exceeded the 100-ppm regulatory limit. This sample was taken in SB-3 (2'). The DRO was 110 ppm and the sample below SB-3 (5') had no detectable hydrocarbon impact.
3. Laboratory analysis of the soil samples for RCRA metals indicated that there was no selenium, silver or mercury detected in any of the samples.
   3a. Barium was encountered, but is felt that this was a natural occurrence.
   3b. Small amounts of arsenic, cadmium, chromium, and lead were encountered in the soils and their source is unclear.
4. Moderately high concentrations of chlorides were encountered in each of the soil borings and these appear to decrease with depth.
   4a. The highest chloride concentrations appear to be associated with the shallow borings (SB-1 & SB-2) around the cement pad.
   4b. The chlorides were in the 1,060 milligrams per kilogram (mg/Kg) to 4,520 mg/Kg (equivalent to ppm) range.

## RECOMMENDATIONS

ARCADIS proposes the following recommendations for consideration:

1. A groundwater assessment should be performed to determine the depth and quality of the groundwater. A monitor well drilled southeast of the pad and sump will evaluate potential chloride impact.
2. A shallow soil sample in another area removed from the pad should be taken and analyzed for RCRA total metals and chlorides to be used as a background control sample.
3. Excavation of the shallow impacted soil associated with the cement pad should be removed and replaced.
4. It is required that the soils at the base of an excavation be sampled to comply with NMOCD regulations.

ARCADIS appreciates the opportunity to investigate this property for Key Energy Services. If you should have any questions regarding this report of activities at the site, please do not hesitate to contact us at (915) 687-5400.

Very truly yours,

ARCADIS G&M, Inc.

Ralph Lang

Ralph Lang
Scientist

Steven P. Tischer
Remediation Department Manager

copies: Mr. Gene Butler
Key Energy Services
6 Desta Drive #5900
Midland, TX 79705

# Key Energy Services

## Eunice, New Mexico

ARCADIS

## Truck Washing Facility Pad and Sump

Samples collected November 19, 2002

## Table A

Organic Compounds
in mg/Kg (ppm)

| Soil Borings | TPH | | BTEX | | | | |
|---|---|---|---|---|---|---|---|
| | GRO, C6-C12 | DRO, >C12-C35 | Benzene | Ethylbenzene | Toluene | p/m-Xylene | o-Xylene |
| SB-1 (20') | <10.0 | 20.7 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| SB-1 (25') | <10.0 | 60.8 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| | | | | | | | |
| SB-2 (10') | <10.0 | <10.0 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| SB-2 (15') | <10.0 | 16.8 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| | | | | | | | |
| SB-3 (2') | <10.0 | 110 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| SB-3 (5') | <10.0 | <10.0 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| | | | | | | | |
| SB-4 (2') | <10.0 | 33.3 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |
| SB-4 (5') | <10.0 | <10.0 | <0.025 | <0.025 | <0.025 | <0.025 | <0.025 |

# Key Energy Services
## Eunice, New Mexico
## Truck Washing Facility Pad and Sump

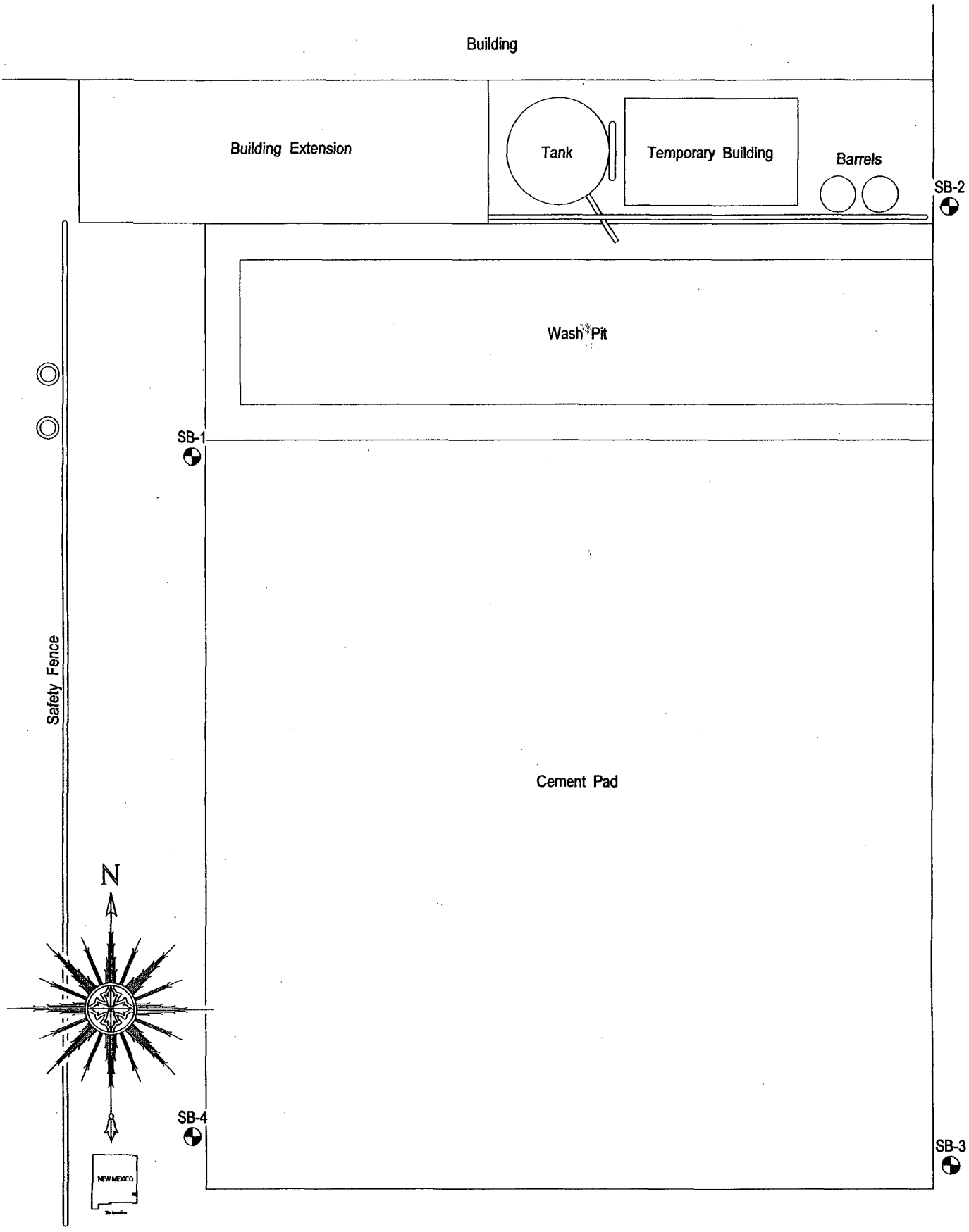
ARCADIS

Samples collected November 19, 2002

## Table B

Eight RCRA Metals and Chloride
in mg/Kg (ppm)

| Soil Borings | Chloride | Arsenic | Barium | Cadmium | Chromium | Lead | Selenium | Silver | Mercury |
|---|---|---|---|---|---|---|---|---|---|
| SB-1 (20') | 1060 | <0.40 | 196 | 0.677 | 4.35 | <0.550 | <0.20 | <0.10 | <0.10 |
| SB-1 (25') | | <0.40 | 98.3 | 0.652 | 4.29 | 1.09 | <0.20 | <0.10 | <0.10 |
| | | | | | | | | | |
| SB-2 (10') | | 1.72 | 130 | 0.431 | 2.48 | <0.550 | <0.20 | <0.10 | <0.10 |
| SB-2 (15') | 1660 | 1.41 | 559 | 0.543 | 3.42 | 0.76 | <0.20 | <0.10 | <0.10 |
| | | | | | | | | | |
| SB-3 (2') | | 1.32 | 522 | 0.606 | 3.58 | 4.57 | <0.20 | <0.10 | <0.10 |
| SB-3 (5') | 2390 | 2.92 | 216 | 0.758 | 3.5 | 0.7 | <0.20 | <0.10 | <0.10 |
| | | | | | | | | | |
| SB-4 (2') | | 0.945 | 169 | 0.682 | 3.88 | 6.14 | <0.20 | <0.10 | <0.10 |
| SB-4 (5') | 4520 | 2.06 | 169 | 0.433 | 1.95 | 1.68 | <0.20 | <0.10 | <0.10 |




Note: Drawing not to scale



ARCADIS
1004 N. Big Spring Street, Suite 300
Midland, TX 79701-3383
Tel 915 687 5400 Fax 915 687 5401

| Drawing Date | File Name | File Location | Task Manager | Project Director | Area Manager |
|---|---|---|---|---|---|
| 21 January 2003 | MT764101.dwg | \AutoCAD\DWG\Key Energy Services | R. Lang | S. Tischer | A. Schmidt |

Key Energy Services, Inc.
Eunice Yard Wash Basin Soil Borings

Site Plan

Lea County, New Mexico

| Technical Review | Unique Number |
|---|---|
| S. Tischer | 31-014-00420 |
| **Project Number** | **Figure** |
| MT000764.0001 | 1 |

# Appendix A

*Soil Boring Logs*

# BORING LOG

BORING NO.: SB-1

ARCADIS
1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 915 687-5400 Fax: 915 687-5401



PROJECT NUMBER: MT000764.0001
CLIENT NAME: Key Energy Services, Inc.
PROJECT NAME: Eunice Yard Wash Basin Soil Borings
SITE LOCATION: Lea County, New Mexico
UNIQUE NUMBER: FILE NAME: SB-1.dat

DRILLING CO: Environmental Plus
DRILLING METHOD: Geoprobe
DRILLER: —
LOGGER: D. McNeese
DATE BEGUN: 11/19/02 DATE COMPLETED: 11/19/02

| DEPTH | SAMPLED | SAMPLING METHOD | ANALYZED | MOISTURE | RECOVERY | OVM READING | U.S.C.S. CLASS | LITHOLOGY | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | Push | | | | 14.2 | | | SAND: brown, very fine grained, rounded, well sorted. Dark brown stain with strong hydrocarbon odor. |
| | | | | | | 145 | | | SAND: reddish brown, very fine grained, rounded to subrounded, well sorted, slight odor. |
| -5 | | Push | | | | 33 | | | SAND: pale yellow, very fine grained, rounded to subrounded, well sorted, slight odor. |
| -10 | | Push | | | | 122 | | | SAND: light red to pink, very fine grained, rounded, well sorted, trace of CALICHE. |
| -15 | | Shovel | | | | 220 | | | SANDY CALICHE: pale yellow, chalky SAND, rounded, quartz grains (hard drilling). |
| -20 | | Push | | | | 299 | | | SAND: light pink, very fine grained, rounded to subrounded, fairly sorted (very hard drilling between 20' and 25'). |
| -25 | | Push/ Shovel | | | | 8 | | | SANDY CALICHE: pale tan to buff, slightly chalky; SAND—very fine grained. (Note:25' sample was not very representative. The push tube only yielded about 2 oz. The remainder was from shovel sample off the augers.) |

# BORING LOG

BORING NO.: SB-2

ARCADIS
1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 915 687-5400 Fax: 915 687-5401



PROJECT NUMBER: MT000764.0001
CLIENT NAME: Key Energy Services, Inc.
PROJECT NAME: Eunice Yard Wash Basin Soil Borings
SITE LOCATION: Lea County, New Mexico
UNIQUE NUMBER: FILE NAME: SB-2.dat

DRILLING CO: Environmental Plus
DRILLING METHOD: Geoprobe
DRILLER: —
LOGGER: D. McNeese
DATE BEGUN: 11/19/02 DATE COMPLETED: 11/19/02

| DEPTH | SAMPLED | SAMPLING METHOD | ANALYZED | MOISTURE | RECOVERY | OVM READING | U.S.C.S. CLASS | LITHOLOGY | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | Push | | | | 165 | | | SAND: pale red to buff, very fine grained. Some brown stain with strong hydrocarbon odor. |
| | | Push | | | | 10 | | | SAND: red brown, very fine to fine grained, rounded, well sorted, trace stain, moderate odor. |
| -5 | | Push | | | | 15 | | | SAND: light red, very fine to fine grained, trace CALICHE, some pink. |
| -10 | | Push/ Shovel | | | | 146 | | | SAND: light red, very fine grained, rounded to subrounded, well sorted; CALICHE—buff, firm to hard. |
| -15 | | Shovel | | | | 0 | | | CALICHE: Note: CALICHE loaded up probe; no sample (sample collected from shovel). Very hard to 18', pushed probe from 19' to 20.5'. |
| -20 | | | | | | 36 | | | SANDY CALICHE: light pink, some limestone nodules, slightly chalky. Refusal at 21'. |

# BORING LOG

BORING NO.: SB-3

ARCADIS
1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 915 687-5400 Fax: 915 687-5401



PROJECT NUMBER: MT000764.0001
CLIENT NAME: Key Energy Services, Inc.
PROJECT NAME: Eunice Yard Wash Basin Soil Borings
SITE LOCATION: Lea County, New Mexico
UNIQUE NUMBER: FILE NAME: SB-3.dat

DRILLING CO: Environmental Plus
DRILLING METHOD: Geoprobe
DRILLER: —
LOGGER: D. McNeese
DATE BEGUN: 11/19/02 DATE COMPLETED: 11/19/02

| DEPTH | SAMPLED | SAMPLING METHOD | ANALYZED | MOISTURE | RECOVERY | OVM READING | U.S.C.S. CLASS | LITHOLOGY | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 2.1<br>2.4 | | | SAND: pale yellow to buff tan, very fine grained, well sorted, rounded, trace brown stain.<br>SAND: light red brown, very fine grained, fairly sorted, trace CALICHE. |
| -5 | | | | | | 0 | | | SAND: red brown, very fine grained, well sorted, trace CALICHE. |
| -10 | | | | | | 0 | | | SAND: light pink red, very fine grained, well sorted, clean. Refusal at 13'. Stopped drilling because clean hole. |

# BORING LOG

BORING NO.: SB-4

ARCADIS
1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 915 687-5400 Fax: 915 687-5401



PROJECT NUMBER: MT000764.0001
CLIENT NAME: Key Energy Services, Inc.
PROJECT NAME: Eunice Yard Wash Basin Soil Borings
SITE LOCATION: Lea County, New Mexico
UNIQUE NUMBER: FILE NAME: SB-4.dat

DRILLING CO: Environmental Plus
DRILLING METHOD: Geoprobe
DRILLER: —
LOGGER: D. McNeese
DATE BEGUN: 11/19/02 DATE COMPLETED: 11/19/02

| DEPTH | SAMPLED | SAMPLING METHOD | ANALYZED | MOISTURE | RECOVERY | OVM READING | U.S.C.S. CLASS | LITHOLOGY | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 5.2 | | | SAND: red brown, very fine grained, rounded, well sorted, trace CALICHE. |
| | | | | | | 42 | | | SAND: red to red brown, very fine grained, rounded, well sorted, slightly moist, trace CALICHE. |
| -5 | | | | | | 0 | | | SAND: light red to pink, very fine grained, subrounded, fairly sorted, trace CALICHE. |
| -10 | | | | | | 0 | | | SAND: red orange, very fine grained, rounded, well sorted, clean |
| | | | | | | | | | CALICHE |
| | | | | | | | | | SAND |
| | | | | | | | | | CALICHE |
| -15 | | | | | | 8.2 | | | SANDY CALICHE: pale yellow to light pink, very fine grained SAND. |

# Appendix B

*Laboratory Analyses*

# ANALYTICAL REPORT

## Prepared for:

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

**Project:** MT000764.0001

**PO#:**

**Order#:** G0205083

**Report Date:** 11/27/2002

**Certificates**
**US EPA Laboratory Code TX00158**

# ENVIRONMENTAL LAB OF TEXAS

## SAMPLE WORK LIST

ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701
687-5401

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

| Lab ID: | Sample : | Matrix: | Date / Time Collected | Date / Time Received | Container | Preservative |
|---|---|---|---|---|---|---|
| 0205083-06 | SB-1 (20') | SOIL | 11/19/02 10:30 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M<br>8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Chloride<br>Mercury, Total | | | | | |
| 0205083-07 | SB-1 (25') | SOIL | 11/19/02 10:50 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M<br>8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Mercury, Total | | | | | |
| 0205083-11 | SB-2 (10') | SOIL | 11/19/02 13:13 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M<br>8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Mercury, Total | | | | | |
| 0205083-12 | SB-2 (15') | SOIL | 11/19/02 14:35 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M<br>8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Chloride<br>Mercury, Total | | | | | |
| 0205083-15 | SB-3 (2') | SOIL | 11/19/02 15:05 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M | | | | | |

# ENVIRONMENTAL LAB OF TEXAS

## SAMPLE WORK LIST

ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701
687-5401

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

| Lab ID: | Sample: | Matrix: | Date / Time Collected | Date / Time Received | Container | Preservative |
|---|---|---|---|---|---|---|
| | 8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Mercury, Total | | | | | |
| 0205083-16 | SB-3 (5') | SOIL | 11/19/02 15:10 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M<br>8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Chloride<br>Mercury, Total | | | | | |
| 0205083-19 | SB-4 (2') | SOIL | 11/19/02 16:20 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M<br>8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Mercury, Total | | | | | |
| 0205083-20 | SB-4 (5') | SOIL | 11/19/02 16:25 | 11/20/02 16:50 | 4 oz Glass | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8015M<br>8021B/5030 BTEX<br>METALS RCRA 7 Total<br>Chloride<br>Mercury, Total | | | | | |
| 0205083-23 | TRIP BLANK | LIQUID | 11/19/02 | 11/20/02 16:50 | 40 mL VOA | Ice |
| | *Lab Testing:* | Rejected: No | | Temp: 0.5 C | | |
| | 8021B/5030 BTEX | | | | | |

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-06
Sample ID: SB-1 (20')

### 8015M

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/23/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | 20.7 | 10.0 |
| TOTAL, C6-C35 | 20.7 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 104% | 70 | 130 |
| 1-Chlorooctadecane | 99% | 70 | 130 |

### 8021B/5030 BTEX

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 1:17 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 90% | 80 | 120 |
| Bromofluorobenzene | 96% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-07
Sample ID: SB-1 (25')

### 8015M

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/23/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | 60.8 | 10.0 |
| TOTAL, C6-C35 | 60.8 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 98% | 70 | 130 |
| 1-Chlorooctadecane | 93% | 70 | 130 |

### 8021B/5030 BTEX

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 1:36 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 88% | 80 | 120 |
| Bromofluorobenzene | 93% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: C0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-11
Sample ID: SB-2 (10')

### *8015M*

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/23/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | <10.0 | 10.0 |
| TOTAL, C6-C35 | <10.0 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 126% | 70 | 130 |
| 1-Chlorooctadecane | 116% | 70 | 130 |

### *8021B/5030 BTEX*

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 1:55 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 82% | 80 | 120 |
| Bromofluorobenzene | 88% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

**Lab ID:** 0205083-12
**Sample ID:** SB-2 (15')

### 8015M

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/23/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | 16.8 | 10.0 |
| TOTAL, C6-C35 | 16.8 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 100% | 70 | 130 |
| 1-Chlorooctadecane | 95% | 70 | 130 |

### 8021B/5030 BTEX

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 2:14 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 83% | 80 | 120 |
| Bromofluorobenzene | 91% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-15
Sample ID: SB-3 (2')

### 8015M

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/23/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | 110 | 10.0 |
| TOTAL, C6-C35 | 110 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 103% | 70 | 130 |
| 1-Chlorooctadecane | 94% | 70 | 130 |

### 8021B/5030 BTEX

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 2:33 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 86% | 80 | 120 |
| Bromofluorobenzene | 94% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-16
Sample ID: SB-3 (5')

### 8015M

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/23/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | <10.0 | 10.0 |
| TOTAL, C6-C35 | <10.0 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 105% | 70 | 130 |
| 1-Chlorooctadecane | 98% | 70 | 130 |

### 8021B/5030 BTEX

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 2:52 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 88% | 80 | 120 |
| Bromofluorobenzene | 94% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-19
Sample ID: SB-4 (2')

### 8015M

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/23/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | 33.3 | 10.0 |
| TOTAL, C6-C35 | 33.3 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 100% | 70 | 130 |
| 1-Chlorooctadecane | 94% | 70 | 130 |

### 8021B/5030 BTEX

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 3:11 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 84% | 80 | 120 |
| Bromofluorobenzene | 94% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-20
Sample ID: SB-4 (5')

### 8015M

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| | | 11/22/02 | 1 | 1 | CK | 8015M |

| Parameter | Result mg/kg | RL |
|---|---|---|
| GRO, C6-C12 | <10.0 | 10.0 |
| DRO, >C12-C35 | <10.0 | 10.0 |
| TOTAL, C6-C35 | <10.0 | 10.0 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| 1-Chlorooctane | 112% | 70 | 130 |
| 1-Chlorooctadecane | 104% | 70 | 130 |

### 8021B/5030 BTEX

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003876-02 | | 11/25/02 3:30 | 1 | 25 | CK | 8021B |

| Parameter | Result mg/kg | RL |
|---|---|---|
| Benzene | <0.025 | 0.025 |
| Ethylbenzene | <0.025 | 0.025 |
| Toluene | <0.025 | 0.025 |
| p/m-Xylene | <0.025 | 0.025 |
| o-Xylene | <0.025 | 0.025 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 82% | 80 | 120 |
| Bromofluorobenzene | 88% | 80 | 120 |

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MTU00764.0001
Location: Key Eunice / NM

Lab ID: 0205083-23
Sample ID: TRIP BLANK

### *8021B/5030 BTEX*

| Method Blank | Date Prepared | Date Analyzed | Sample Amount | Dilution Factor | Analyst | Method |
|---|---|---|---|---|---|---|
| 0003877-02 | | 11/23/02 14:51 | 1 | 1 | CK | 8021B |

| Parameter | Result mg/L | RL |
|---|---|---|
| Benzene | <0.001 | 0.001 |
| Ethylbenzene | <0.001 | 0.001 |
| Toluene | <0.001 | 0.001 |
| p/m-Xylene | <0.001 | 0.001 |
| o-Xylene | <0.001 | 0.001 |

| Surrogates | % Recovered | QC Limits (%) | |
|---|---|---|---|
| aaa-Toluene | 86% | 80 | 120 |
| Bromofluorobenzene | 87% | 80 | 120 |

Approval: Raland K Tuttle 12-02-02
Raland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

**Lab ID:** 0205083-06
**Sample ID:** SB-1 (20')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | < 0.40 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 196 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.677 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 4.35 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | < 0.550 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

### *Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

**Lab ID:** 0205083-07
**Sample ID:** SB-1 (25')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | < 0.40 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 98.3 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.652 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 4.29 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | 1.09 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

### *Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

**Lab ID:** 0205083-11
**Sample ID:** SB-2 (10')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 1.72 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 130 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.431 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 2.48 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | < 0.550 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

Lab ID: 0205083-11
Sample ID: SB-2 (10')

### *Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

Lab ID: 0205083-12
Sample ID: SB-2 (15')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 1.41 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 559 | mg/kg | 500 | 0.50 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.543 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 3.42 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | 0.760 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

### *Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

Lab ID: 0205083-15
Sample ID: SB-3 (2')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 1.32 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 522 | mg/kg | 500 | 0.50 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.606 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 3.58 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | 4.57 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

### *Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

**Lab ID:** 0205083-16
**Sample ID:** SB-3 (5')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 2.92 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 216 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.758 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 3.5 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | 0.70 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

### *Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

**Lab ID:** 0205083-19
**Sample ID:** SB-4 (2')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 0.945 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 169 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.682 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 3.88 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | 6.14 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

### *Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

**Lab ID:** 0205083-20
**Sample ID:** SB-4 (5')

### *METALS RCRA 7 Total*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic | 2.06 | mg/kg | 50 | 0.40 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Barium | 169 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Cadmium | 0.433 | mg/kg | 50 | 0.050 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Chromium | 1.95 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Lead | 1.68 | mg/kg | 50 | 0.550 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Selenium | < 0.20 | mg/kg | 50 | 0.20 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |
| Silver | < 0.10 | mg/kg | 50 | 0.10 | 3050/6010B | 11/24/2002 | 11/26/02 | SM |

N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

| | | | |
|---|---|---|---|
| MR. STEVE TISCHER | | Order#: | G0205083 |
| ARCADIS GERAGHTY & MILLER, INC. | | Project: | None Given |
| 1004 N. BIG SPRING STREET | | Project Name: | MT000764.0001 |
| MIDLAND, TX 79701 | | Location: | Key Eunice / NM |

**Lab ID:** 0205083-20
**Sample ID:** SB-4 (5')

*Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, Total | < 0.10 | mg/kg | 50 | 0.10 | 7470 | 11/23/2002 | 11/24/02 | SM |

Approval: Raland K Tuttle 12-02-02
Raland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

N/A = Not Applicable RL = Reporting Limit

# ENVIRONMENTAL LAB OF TEXAS

## ANALYTICAL REPORT

MR. STEVE TISCHER
ARCADIS GERAGHTY & MILLER, INC.
1004 N. BIG SPRING STREET
MIDLAND, TX 79701

Order#: G0205083
Project: None Given
Project Name: MT000764.0001
Location: Key Eunice / NM

**Lab ID:** 0205083-06
**Sample ID:** SB-1 (20')

*Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|
| Chloride | 1060 | mg/kg | 1 | 20 | 9253 | 11/25/02 | SB |

**Lab ID:** 0205083-12
**Sample ID:** SB-2 (15')

*Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|
| Chloride | 1660 | mg/kg | 1 | 20 | 9253 | 11/25/02 | SB |

**Lab ID:** 0205083-16
**Sample ID:** SB-3 (5')

*Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|
| Chloride | 2390 | mg/kg | 1 | 20 | 9253 | 11/25/02 | SB |

**Lab ID:** 0205083-20
**Sample ID:** SB-4 (5')

*Test Parameters*

| Parameter | Result | Units | Dilution Factor | RL | Method | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|
| Chloride | 4520 | mg/kg | 1 | 20 | 9253 | 11/25/02 | SB |

Approval: Raland K Tuttle 12-02-02
Raland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

RL = Reporting Limit N/A = Not Applicable

# ENVIRONMENTAL LAB OF TEXAS

## QUALITY CONTROL REPORT

### 8015M

Order#: G0205083

| *BLANK* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
|---|---|---|---|---|---|---|
| TOTAL, C6-C35-mg/kg | 0003857-02 | | | <10.0 | | |
| TOTAL, C6-C35-mg/kg | 0003870-02 | | | <10.0 | | |
| *CONTROL* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| TOTAL, C6-C35-mg/kg | 0003870-03 | | 952 | 1160 | 121.8% | |
| *CONTROL DUP* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| TOTAL, C6-C35-mg/kg | 0003870-04 | | 952 | 1240 | 130.3% | 6.7% |
| *MS* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| TOTAL, C6-C35-mg/kg | 0205083-20 | 0 | 952 | 1020 | 107.1% | |
| *MSD* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| TOTAL, C6-C35-mg/kg | 0205083-20 | 0 | 952 | 1020 | 107.1% | 0.% |
| *SRM* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| TOTAL, C6-C35-mg/kg | 0003857-05 | | 1000 | 983 | 98.3% | |
| TOTAL, C6-C35-mg/kg | 0003870-05 | | 1000 | 956 | 95.6% | |

# ENVIRONMENTAL LAB OF TEXAS

## QUALITY CONTROL REPORT

### 8021B/5030 BTEX

Order#: G0205083

| *BLANK* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
|---|---|---|---|---|---|---|
| Benzene-mg/kg | 0003876-02 | | | <0.025 | | |
| Benzene-mg/L | 0003877-02 | | | <0.001 | | |
| Ethylbenzene-mg/kg | 0003876-02 | | | <0.025 | | |
| Ethylbenzene-mg/L | 0003877-02 | | | <0.001 | | |
| Toluene-mg/kg | 0003876-02 | | | <0.025 | | |
| Toluene-mg/L | 0003877-02 | | | <0.001 | | |
| p/m-Xylene-mg/kg | 0003876-02 | | | <0.025 | | |
| p/m-Xylene-mg/L | 0003877-02 | | | <0.001 | | |
| o-Xylene-mg/kg | 0003876-02 | | | <0.025 | | |
| o-Xylene-mg/L | 0003877-02 | | | <0.001 | | |
| *CONTROL* LIQUID | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Benzene-mg/L | 0003877-03 | | 0.1 | 0.096 | 96.% | |
| Ethylbenzene-mg/L | 0003877-03 | | 0.1 | 0.101 | 101.% | |
| Toluene-mg/L | 0003877-03 | | 0.1 | 0.099 | 99.% | |
| p/m-Xylene-mg/L | 0003877-03 | | 0.2 | 0.214 | 107.% | |
| o-Xylene-mg/L | 0003877-03 | | 0.1 | 0.102 | 102.% | |
| *CONTROL DUP* LIQUID | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Benzene-mg/L | 0003877-04 | | 0.1 | 0.096 | 96.% | 0.% |
| Ethylbenzene-mg/L | 0003877-04 | | 0.1 | 0.099 | 99.% | 2.% |
| Toluene-mg/L | 0003877-04 | | 0.1 | 0.098 | 98.% | 1.% |
| p/m-Xylene-mg/L | 0003877-04 | | 0.2 | 0.21 | 105.% | 1.9% |
| o-Xylene-mg/L | 0003877-04 | | 0.1 | 0.101 | 101.% | 1.% |
| *MS* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Benzene-mg/kg | 0205083-20 | 0 | 0.1 | 0.106 | 106.% | |
| Ethylbenzene-mg/kg | 0205083-20 | 0 | 0.1 | 0.112 | 112.% | |
| Toluene-mg/kg | 0205083-20 | 0 | 0.1 | 0.112 | 112.% | |
| p/m-Xylene-mg/kg | 0205083-20 | 0 | 0.2 | 0.229 | 114.5% | |
| o-Xylene-mg/kg | 0205083-20 | 0 | 0.1 | 0.112 | 112.% | |
| *MSD* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Benzene-mg/kg | 0205083-20 | 0 | 0.1 | 0.103 | 103.% | 2.9% |
| Ethylbenzene-mg/kg | 0205083-20 | 0 | 0.1 | 0.111 | 111.% | 0.9% |
| Toluene-mg/kg | 0205083-20 | 0 | 0.1 | 0.108 | 108.% | 3.6% |
| p/m-Xylene-mg/kg | 0205083-20 | 0 | 0.2 | 0.225 | 112.5% | 1.8% |
| o-Xylene-mg/kg | 0205083-20 | 0 | 0.1 | 0.111 | 111.% | 0.9% |
| *SRM* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Benzene-mg/kg | 0003876-05 | | 0.1 | 0.101 | 101.% | |

# ENVIRONMENTAL LAB OF TEXAS

## QUALITY CONTROL REPORT

### 8021B/5030 BTEX

Order#: G0205083

| *SRM* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
|---|---|---|---|---|---|---|
| Benzene-mg/L | 0003877-05 | | 0.1 | 0.096 | 96.% | |
| Ethylbenzene-mg/kg | 0003876-05 | | 0.1 | 0.106 | 106.% | |
| Ethylbenzene-mg/L | 0003877-05 | | 0.1 | 0.099 | 99.% | |
| Toluene-mg/kg | 0003876-05 | | 0.1 | 0.104 | 104.% | |
| Toluene-mg/L | 0003877-05 | | 0.1 | 0.097 | 97.% | |
| p/m-Xylene-mg/kg | 0003876-05 | | 0.2 | 0.226 | 113.% | |
| p/m-Xylene-mg/L | 0003877-05 | | 0.2 | 0.213 | 106.5% | |
| o-Xylene-mg/kg | 0003876-05 | | 0.1 | 0.108 | 108.% | |
| o-Xylene-mg/L | 0003877-05 | | 0.1 | 0.1 | 100.% | |

# ENVIRONMENTAL LAB OF TEXAS

## QUALITY CONTROL REPORT

## METALS RCRA 7 Total

Order#: G0205083

| *BLANK* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
|---|---|---|---|---|---|---|
| Arsenic-mg/kg | 0003899-02 | | | < 0.40 | | |
| Barium-mg/kg | 0003899-02 | | | < 0.050 | | |
| Cadmium-mg/kg | 0003899-02 | | | < 0.050 | | |
| Chromium-mg/kg | 0003899-02 | | | < 0.10 | | |
| Lead-mg/kg | 0003899-02 | | | < 0.55 | | |
| Selenium-mg/kg | 0003899-02 | | | < 0.20 | | |
| Silver-mg/kg | 0003899-02 | | | < 0.10 | | |
| *CONTROL* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Arsenic-mg/kg | 0003899-03 | | 40 | 35.7 | 89.3% | |
| Barium-mg/kg | 0003899-03 | | 10 | 10.8 | 108.% | |
| Cadmium-mg/kg | 0003899-03 | | 10 | 9.74 | 97.4% | |
| Chromium-mg/kg | 0003899-03 | | 10 | 10.3 | 103.% | |
| Lead-mg/kg | 0003899-03 | | 50 | 52.1 | 104.2% | |
| Selenium-mg/kg | 0003899-03 | | 20 | 20.3 | 101.5% | |
| Silver-mg/kg | 0003899-03 | | 2.5 | 2.64 | 105.6% | |
| *CONTROL DUP* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Arsenic-mg/kg | 0003899-04 | | 40 | 35.5 | 88.7% | 0.6% |
| Barium-mg/kg | 0003899-04 | | 10 | 10.8 | 108.% | 0.% |
| Cadmium-mg/kg | 0003899-04 | | 10 | 9.74 | 97.4% | 0.% |
| Chromium-mg/kg | 0003899-04 | | 10 | 10.3 | 103.% | 0.% |
| Lead-mg/kg | 0003899-04 | | 50 | 52.0 | 104.% | 0.2% |
| Selenium-mg/kg | 0003899-04 | | 20 | 20.3 | 101.5% | 0.% |
| Silver-mg/kg | 0003899-04 | | 2.5 | 2.34 | 93.6% | 12.% |
| *SRM* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Arsenic-mg/kg | 0003899-05 | | 1 | 1.05 | 105.% | |
| Barium-mg/kg | 0003899-05 | | 1 | 1.08 | 108.% | |
| Cadmium-mg/kg | 0003899-05 | | 1 | 1.07 | 107.% | |
| Chromium-mg/kg | 0003899-05 | | 1 | 1.04 | 104.% | |
| Lead-mg/kg | 0003899-05 | | 1 | 1.04 | 104.% | |
| Selenium-mg/kg | 0003899-05 | | 1 | 1.04 | 104.% | |
| Silver-mg/kg | 0003899-05 | | 0.5 | 0.546 | 109.2% | |

# ENVIRONMENTAL LAB OF TEXAS

## QUALITY CONTROL REPORT

### Test Parameters

**Order#: G0205083**

| *BLANK* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
|---|---|---|---|---|---|---|
| Chloride-mg/kg | 0003885-01 | | | <20.0 | | |
| Mercury, Total-mg/kg | 0003864-01 | | | < 0.10 | | |
| *MS* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Chloride-mg/kg | 0205083-06 | 1060 | 1250 | 2300 | 99.2% | |
| Mercury, Total-mg/kg | 0204993-20 | 0.109 | 1 | 1.10 | 99.1% | |
| *MSD* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Chloride-mg/kg | 0205083-06 | 1060 | 1250 | 2280 | 97.6% | 0.9% |
| Mercury, Total-mg/kg | 0204993-20 | 0.109 | 1 | 1.14 | 103.1% | 3.6% |
| *SRM* SOIL | LAB-ID # | Sample Concentr. | Spike Concentr. | QC Test Result | Pct (%) Recovery | RPD |
| Chloride-mg/kg | 0003885-04 | | 5000 | 4960 | 99.2% | |
| Mercury, Total-mg/kg | 0003864-04 | | 0.75 | 0.700 | 93.3% | |

# ARCADIS

Laboratory Task Order No./P.O. No. _____ **CHAIN-OF-CUSTODY RECORD** Page 1 of 2

Project Number/Name MT000764.0001

Project Location KEY EUNICE / NM

Laboratory ENVIRONMENTAL LABS of TEXAS

Project Manager S. TISCHER

Sampler(s)/Affiliation D. McNEESE

0205083

| | Sample ID/Location | Matrix | Date Sampled | ~~Time~~ Lab ID | TIME | ANALYSIS / METHOD / SIZE: BTEX 8021B | pres. Ice | TPH 8015 Modified GRO / DRO | pres. Ice | RCRA 8 METALS | pres. Ice | Chlorides | pres. Ice | Remarks | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | SB-1 (0-6") | S | 11-19-02 | | 0940 | HOLD | | HOLD | | HOLD | | → | | | 1 |
| 02 | SB-1 (2') | | | | 0945 | HOLD | | → | | → | | → | | | 1 |
| 03 | SB-1 (5') | | | | 0950 | HOLD | | → | | → | | → | | | 1 |
| 04 | SB-1 (10') | | | | 0955 | HOLD | | → | | → | | → | | | 1 |
| 05 | SB-1 (15') | | | | 1000 | HOLD | | → | | → | | → | | | 1 |
| 06 | SB-1 (20') | | | | 1030 | ✓ | | ✓ | | ✓ | | ✓ | | | 1 |
| 07 | SB-1 (25') | | | | 1050 | ✓ | | ✓ | | ✓ | | HOLD | | | 1 |
| 08 | SB-2 (0-6") | | | | 1245 | HOLD | | → | | → | | → | | | 1 |
| 09 | SB-2 (2') | | | | 1252 | HOLD | | → | | → | | → | | | 1 |
| 10 | SB-2 (5') | | | | 1308 | HOLD | | → | | → | | → | | | 1 |
| 11 | SB-2 (10') | | | | 1313 | ✓ | | ✓ | | ✓ | | | | | 1 |
| 12 | SB-2 (15') | | | | 1435 | ✓ | | ✓ | | ✓ | | ✓ | | | 1 |
| 13 | SB-2 (19-20.5') | | | | 1440 | HOLD | | → | | → | | → | | | 1 |
| 14 | SB-3 (0-6") | ↓ | ↓ | | 1500 | HOLD | | → | | → | | → | | | 1 |
| 15 | SB-3 (2') | S | 11-19-02 | | 1505 | ✓ | | ✓ | | ✓ | | HOLD | | | 1 |

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers: 15

| | | | | | |
|---|---|---|---|---|---|
| Relinquished by: Deborah Dann | Organization: ARCADIS | Date 11/20/02 | Time 1700 | Seal Intact? | |
| Received by: Lawrence Campbell | Organization: ENV. LABS OF TX | Date 11/20/02 | Time 1650 | (Yes) No N/A | |
| Relinquished by: _____ | Organization: _____ | Date / / | Time _____ | Seal Intact? | |
| Received by: _____ | Organization: _____ | Date / / | Time _____ | Yes No N/A | |

Special Instructions/Remarks: 0.5 C 4oz GLASS Run BTEX as per Steve Tischer 11/21/02 RBW

Delivery Method: ☒ In Person ☐ Common Carrier _____ SPECIFY ☐ Lab Courier ☐ Other _____ SPECIFY

AG 05-12/01

**ARCADIS** Laboratory Task Order No./P.O. No. _____ **CHAIN-OF-CUSTODY RECORD** Page 2 of 2

Project Number/Name MT000764.0001

Project Location KEY ENERGY / NM

Laboratory ENVIRONMENTAL LABS of TEXAS

Project Manager S. TISCHER

Sampler(s)/Affiliation D. McNEESE

0205083

| | Sample ID/Location | Matrix | Date/~~Time~~ Sampled | ~~TIME~~ Lab ID | ANALYSIS / METHOD / SIZE: BTEX 8021B | pres. Ice TPH 8015 Modified GRO / DRO | pres. Ice RCRA 8 Metals | pres. Ice Chlorides | pres. Ice | | | Remarks | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | SB-3 (5') | S | 11-19-02 | 1510 | ✓ | ✓ | ✓ | ✓ | | | | | 1 |
| 17 | SB-3 (10-12') | S | | 1515 | HOLD | → | → | → | | | | | 1 |
| 18 | SB-4 (0-6") | S | | 1615 | HOLD | → | → | → | | | | | 1 |
| 19 | SB-4 (2') | S | | 1620 | ✓ | ✓ | ✓ | HOLD | | | | | 1 |
| 20 | SB-4 (5') | S | | 1625 | ✓ | ✓ | ✓ | ✓ | | | | | 1 |
| 21 | SB-4 (10') | S | ↓ | 1630 | HOLD | → | → | → | | | | | 1 |
| 22 | SB-4 (15') | S | 11-19-02 | 1650 | HOLD | → | → | → | | | | | 1 |
| 23 | TRIP BLANK | L | — | — | ✓ | | | | | | | | 1 |
| ~~24~~ | TEMP BLANK | L | — | — | — | | | | | | | | 1 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Sample Matrix: L = Liquid; S = Solid; A = Air — Total No. of Bottles/Containers

| | | | | | |
|---|---|---|---|---|---|
| Relinquished by: Sharon Gamm | Organization: ARCADIS | Date 11/20/02 | Time 1700 | Seal Intact? | |
| Received by: Maurice L. Caudell | Organization: ENV. LAB of TX | Date 11/20/02 | Time 1650 | Yes | No N/A |
| Relinquished by: _____ | Organization: _____ | Date / / | Time _____ | Seal Intact? | |
| Received by: _____ | Organization: _____ | Date / / | Time _____ | Yes | No N/A |

Special Instructions/Remarks: 0.5 C 4oz GLASS BLANK 40 ml VOA

Delivery Method: ☒ In Person ☐ Common Carrier _____ SPECIFY ☐ Lab Courier ☐ Other _____ SPECIFY

AG 05-12/01