



October 15, 2019

NMOCD District 2

811 S. First St

Artesia, NM 88210

Re: Remediation Plan

Apache Corporation – Empire Abo Unit K-14

LYCB0-191203-C-1410

To Robert Hamlet and Victoria Venegas

RXSoil, Inc. is pleased to submit the remediation plan for the on-site remediation of impacted soil for the above release in Eddy County, New Mexico.

Sincerely,

A stylized, handwritten signature in black ink, likely belonging to Jace Caraway.

Jace Caraway  
Chief Operating Officer  
RXSoil, Inc.  
(940) 210-2051

A stylized, handwritten signature in black ink, likely belonging to Zach Robbins.

Zach Robbins  
Technical and Engineering Analyst  
RXSoil, Inc.  
(210) 400-7645

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## I. Introduction

On behalf of Apache Corporation, RXSoil, Inc. ("RXSoil") has prepared this work plan that describes remediation of the release of produced water and crude oil.

The release occurred on 5/31/2019 in Unit Letter K, Section 02, Township 18S, Range 27E (see *Figure 1* for Vicinity Map) at approximate coordinates 32.77505, -104.25316. It was reported that six (6) barrels of crude oil and 11 barrels of produced water were released, and two (2) barrels of crude oil and three (3) barrels of produced water were recovered during the initial response.

## II. Site Assessment/Characterization

1. **Site Map** – See *Figure 2*
2. **Depth to ground water** – USGS 324603104155001 is the nearest water well (listed in *Appendix B*) and has a reported depth to water of 32', recorded in January of 1999. This well is approximately 0.79 miles from the spill area. Remediation standards will follow the strictest thresholds stated in Table I, ≤50 feet.
3. **Wellhead protection area** – There are no known water sources within a half mile of the release (see *Figure 3*).
4. **Distance to nearest significant watercourse** – The nearest water way per the New Mexico OCD Oil and Gas Map GIS Service, Scoggin Draw, is approximately 530' away from the release area at its closest point (see *Figure 3*). This is a draw connecting to the Pecos River approximately 28,000' downstream.
5. **Soil/waste characteristics** – An initial delineation was completed on July 29 and August 8, 2019. Sample points are shown in *Figure 2* with results summarized in *Appendix C*. Lab data is displayed in *Appendix D*. Horizontal excavation will consist of sampling sidewalls (composites representing <200 square feet) to verify each wall is below thresholds listed in NMAC 19.15.29.13.D.1 (600 mg/kg chloride) and Table I (100 mg/kg TPH, 50 mg/kg BTEX, 10 mg/kg benzene). Vertical delineation will continue throughout the spill area to clean material per Table I. Excavation will be guided by field data.

## III. Remediation Plan

The delineation points can be seen in *Figure 2* with results in *Appendix C*. As stated in Section II, further delineation will be conducted throughout excavation.

RXSoil's core process of on-site remediation will be used to address the contamination. RXSoil will supervise all excavation with approval from area utilities owners via NM 811.

RXSoil will construct an above-ground treatment cell adjacent to the contaminated area (see *Figure 2* for projected placement). Berms will be placed around the perimeter of the cell area. A 20-mil reinforced poly liner will be placed on the surface and up the sides of the berms to contain treatment. A proprietary drainage and collection system will be installed prior to filling the cells with the estimated 2,500 cubic yards of contaminated soils.

Once all contaminated material is in the treatment cell, chemical and biological treatment will begin. To confirm successful treatment, a grid of confirmation samples will be gathered at depth 36"-48" with one sample representing no more than 100 cubic yards. All samples will be field screened using Quantab Chloride Test Strips and a RAE Systems MiniRAE 3000 PID Monitor. If a sample tests above threshold, treatment will continue in that area until the soil tests clean, per strictest Table I guidelines for impacted soils. At least 50% of total samples will be transferred on ice to a third-party lab for confirmation testing using NMOCD approved testing methods. The 50% chosen will contain an approximately even distribution of the lowest, middle and highest contaminated samples based on field testing data.

Sidewall and bottom samples will be taken using a stainless-steel hand shovel while remediation samples will be taken using a stainless-steel bucket auger. All tools are to be decontaminated before each sample, as specified in *Field Equipment Cleaning and Decontamination* (EPA, 2015). This includes wiping the equipment clean, water-rinsing the equipment, washing the equipment in detergent and water, and rinsing the equipment in water.

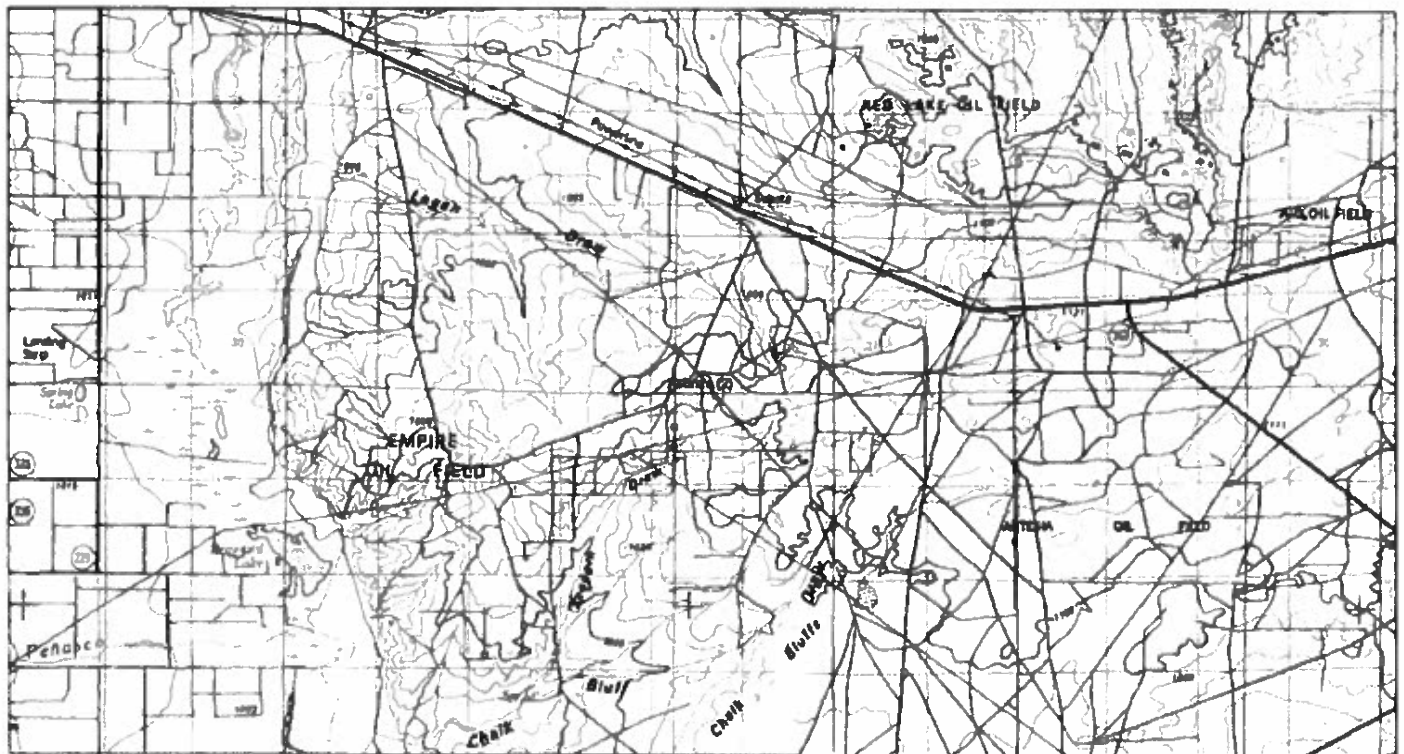
Samples will temporarily be transferred to a new plastic bag in the field. Once in a location safer for handling glass, the samples will be transferred to glass jars, supplied by an approved laboratory. The threads on all jars will be wiped clean to allow an air-tight seal. Samples will be transferred on ice to a third-party laboratory to ensure tests are completed within 14 days (as recommended for EPA methods 8021B and 8015M).

Remediation efforts will commence following the approval of this remediation plan and are estimated to take approximately 30 days.

#### **IV. Restoration, Reclamation and Re-Vegetation**

Following remediation, RXSoil will drill in seed at the discretion of the appropriate surface owner (SLO). RXSoil will continue to monitor this area to ensure growth.

### Figure 1. Vicinity Map



10/14/2019, 4:43:24 PM

**Release Point**

 **OCD Districts**

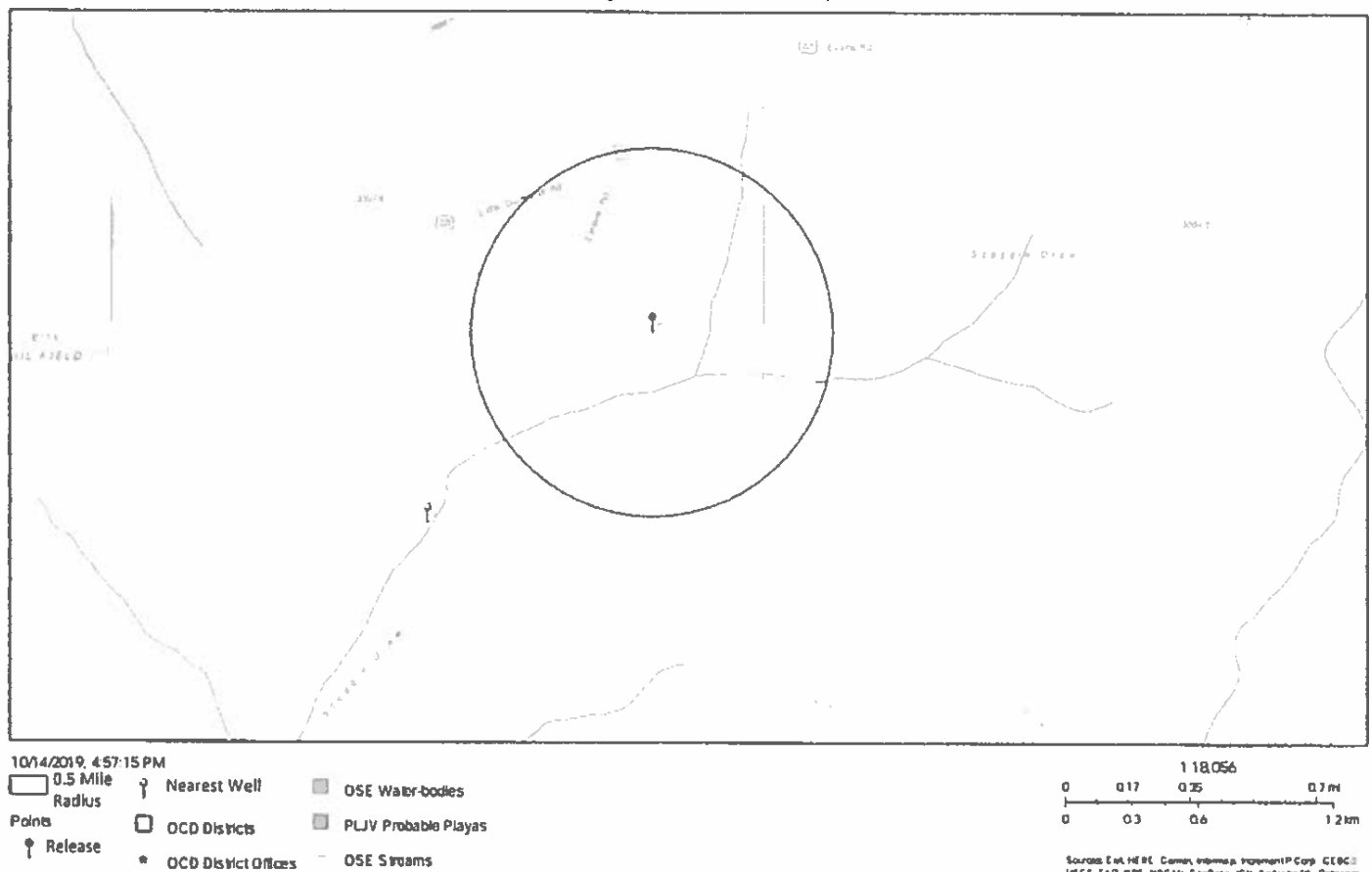
★ **OCO District Offices**

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### Figure 3. Water Map



## **APPENDIX A**

**C-141**



District I  
1625 N. French Dr., Hobbs, NM 88240  
District II  
811 S. First St., 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 Department

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

Form C-141  
Revised August 24, 2018  
Submit to appropriate OCD District office

Incident ID	
District RP	
Facility ID	
Application ID	

## Release Notification

### Responsible Party

Responsible Party: Apache Corporation	OGRID 873
Contact Name: Bruce Baker	Contact Telephone: (432) 631-6982
Contact email: Larry.Baker@apachecorp.com	Incident # (assigned by OCD)
Contact Mailing Address: 2350 W. Marland Blvd, Hobbs, NM 88240	

### Location of Release Source

Latitude: W 32.77505 Longitude: N -104.25316

(NAD 83 in decimal degrees to 5 decimal places)

Site Name: Empire Abo Unit K-14	Site Type: Well
Date Release Discovered: May 31, 2019	API# (if applicable)

Unit Letter	Section	Township	Range	County
K	02	18S	27E	Eddy

Surface Owner: ☒ State ☐ Federal ☐ Tribal ☐ Private (Name: Not Applicable)

### Nature and Volume of Release

Material(s) Released (Select all that apply and attach calculations or specific justification for the volumes provided below)

<input checked="" type="checkbox"/> Crude Oil	Volume Released (6 bbls)	Volume Recovered (2bbls)
<input checked="" type="checkbox"/> Produced Water	Volume Released (11 bbls)	Volume Recovered (3 bbls)
	Is the concentration of dissolved chloride in the produced water >10,000 mg/l?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Condensate	Volume Released (bbls)	Volume Recovered (bbls)
<input type="checkbox"/> Natural Gas	Volume Released (Mcf)	Volume Recovered (Mcf)
<input type="checkbox"/> Other (describe)	Volume/Weight Released (provide units)	Volume/Weight Recovered (provide units)

Cause of Release

Corrosion on flow line.

Form C-141

Page 2

State of New Mexico  
Oil Conservation Division

Incident ID	
District RP	
Facility ID	
Application ID	

Was this a major release as defined by 19.15.29.7(A) NMAC?

☐ Yes ☒ No

If YES, for what reason(s) does the responsible party consider this a major release?

If YES, was immediate notice given to the OCD? By whom? To whom? When and by what means (phone, email, etc)?  
Via email given to NM OCD by Bruce Baker, Senior Environmental Technician, Apache Corporation

**Initial Response**

*The responsible party must undertake the following actions immediately unless they could create a safety hazard that would result in injury*

- ☒ The source of the release has been stopped.
- ☒ The impacted area has been secured to protect human health and the environment.
- ☒ Released materials have been contained via the use of berms or dikes, absorbent pads, or other containment devices.
- ☒ All free liquids and recoverable materials have been removed and managed appropriately.

If all the actions described above have not been undertaken, explain why:

Per 19.15.29.8 B. (4) NMAC the responsible party may commence remediation immediately after discovery of a release. If remediation has begun, please attach a narrative of actions to date. If remedial efforts have been successfully completed or if the release occurred within a lined containment area (see 19.15.29.11(A)(5)(a) NMAC), please attach all information needed for closure evaluation.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Printed Name: Bruce Baker

Title: Senior Environmental Technician

Signature: Bruce Baker Date: 12/03/2019

Email: Larry.Baker@apachecorp.com

Telephone: (432) 631-6982

**OCD Only**

Received by: \_\_\_\_\_ Date: \_\_\_\_\_

Form C-141

Page 3

State of New Mexico  
Oil Conservation Division

Incident ID	
District RP	
Facility ID	
Application ID	

**Site Assessment/Characterization***This information must be provided to the appropriate district office no later than 90 days after the release discovery date*

What is the shallowest depth to groundwater beneath the area affected by the release?	<u>32</u> (ft bgs)
Did this release impact groundwater or surface water?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release within 500 horizontal feet of a spring or a private domestic fresh water well used by less than five households for domestic or stock watering purposes?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release within 300 feet of a wetland?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release overlying a subsurface mine?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are the lateral extents of the release overlying an unstable area such as karst geology?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Are the lateral extents of the release within a 100-year floodplain?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Did the release impact areas not on an exploration, development, production, or storage site?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Attach a comprehensive report (electronic submittals in .pdf format are preferred) demonstrating the lateral and vertical extents of soil contamination associated with the release have been determined. Refer to 19.15.29.11 NMAC for specifics.

**Characterization Report Checklist:** *Each of the following items must be included in the report.*

- ☒ Scaled site map showing impacted area, surface features, subsurface features, delineation points, and monitoring wells.
- ☐ Field data
- ☒ Data table of soil contaminant concentration data
- ☒ Depth to water determination
- ☒ Determination of water sources and significant watercourses within 1/2-mile of the lateral extents of the release
- ☒ Boring or excavation logs
- ☒ Photographs including date and GIS information
- ☒ Topographic/Aerial maps
- ☒ Laboratory data including chain of custody

If the site characterization report does not include completed efforts at remediation of the release, the report must include a proposed remediation plan. That plan must include the estimated volume of material to be remediated, the proposed remediation technique, proposed sampling plan and methods, anticipated timelines for beginning and completing the remediation. The closure criteria for a release are contained in Table 1 of 19.15.29.12 NMAC, however, use of the table is modified by site- and release-specific parameters.

Form C-141

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State of New Mexico  
Oil Conservation Division

Incident ID	
District RP	
Facility ID	
Application ID	

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Printed Name: Bruce Baker Title: Environmental Tech SR.  
Signature: Bruce Baker Date: 10-15-19  
email: larry.baker@apacotecorp.com Telephone: 432-631-6982

OCD Only

Received by: \_\_\_\_\_ Date: \_\_\_\_\_

Form C-141

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State of New Mexico  
Oil Conservation Division

Incident ID	
District RP	
Facility ID	
Application ID	

**Remediation Plan****Remediation Plan Checklist:** Each of the following items must be included in the plan.

- ☒ Detailed description of proposed remediation technique
- ☒ Scaled sitemap with GPS coordinates showing delineation points
- ☒ Estimated volume of material to be remediated
- ☒ Closure criteria is to Table 1 specifications subject to 19.15.29.12(C)(4) NMAC
- ☒ Proposed schedule for remediation (note if remediation plan timeline is more than 90 days OCD approval is required)

**Deferral Requests Only:** Each of the following items must be confirmed as part of any request for deferral of remediation.

- ☐ Contamination must be in areas immediately under or around production equipment where remediation could cause a major facility deconstruction.
- ☐ Extents of contamination must be fully delineated.
- ☐ Contamination does not cause an imminent risk to human health, the environment, or groundwater.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Printed Name: Bruce Baker Title: Environmental Tech SR.  
Signature: Bruce Baker Date: 10-15-19  
email: larry.baker@apachecorp.com Telephone: 482-631-6982

**OCD Only**

Received by: \_\_\_\_\_ Date: \_\_\_\_\_

☐ Approved ☐ Approved with Attached Conditions of Approval ☐ Denied ☐ Deferral Approved

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**APPENDIX B**  
**NEAREST WATER WELL DATA**



10/14/2019

USGS Groundwater for USA: Water Levels -- 1 sites



USGS Home  
Contact USGS  
Search USGS

## National Water Information System: Web Interface

USGS Water Resources

Data Category: **Groundwater** Geographic Area: **United States** **GO**

Click to hide News Bulletins

- [Introducing The Next Generation of USGS Water Data for the Nation](#)
- [Full News](#)

Groundwater levels for the Nation

## Search Results -- 1 sites found

Agency code = usgs

site\_no list =

- 324603104155001

Minimum number of levels = 1

[Save file of selected sites](#) to local disk for future upload

## USGS 324603104155001 18S.27E.10.213223

Eddy County, New Mexico

Latitude 32°46'03", Longitude 104°15'50" NAD27

Land-surface elevation 3,479 feet above NAVD88

The depth of the well is 130 feet below land surface.

This well is completed in the Artesia Group (313ART5) local aquifer.

## Output formats

<a href="#">Table of data</a>
<a href="#">Tab-separated data</a>
<a href="#">Graph of data</a>
<a href="#">Reselect period</a>

Date	Time	Water-level date-time accuracy	Water level, feet below land surface	Water level, feet above specific vertical datum	Referenced vertical datum	Water-level accuracy	Status	Method of measurement	Measuring agency	Source of measureme
1999-01-19		D	31.73				2		S	USGS
1994-02-24		D	32.67				2		S	
1989-02-02		D	19.41				2		U	
1984-03-01		D	21.36				2		U	
1984-02-09		D	22.16				2		U	
1966-01-24		D	41.29				2		U	
1964-01-09		D	46.92				2		U	
1963-11-22		D	46.16				2		U	
1963-10-01		D	45.73				2		U	
1963-09-04		D	45.59				2		U	
1963-08-30		D	48.28				2		U	
1963-07-23		D	48.21				2		U	
1963-01-07		D	48.75				2		U	
1962-01-04		D	47.31				2		U	
1961-12-28		D	47.28				2		U	

## Explanation

Section	Code	Description
Water-level date-time accuracy	D	Date is accurate to the Day
13		

[https://nwis.waterdata.usgs.gov/nwis/gwlevels?site\\_no=324603104155001&agency\\_cd=USGS&format=html](https://nwis.waterdata.usgs.gov/nwis/gwlevels?site_no=324603104155001&agency_cd=USGS&format=html)

1/2

10/14/2019

## USGS Groundwater for USA: Water Levels -- 1 sites

Section	Code	Description
Water-level accuracy	2	Water level accuracy to nearest hundredth of a foot
Status		The reported water-level measurement represents a static level.
Method of measurement	S	Steel-tape measurement.
Method of measurement	U	Unknown method.
Measuring agency		Not determined
Measuring agency	USGS	U.S. Geological Survey
Source of measurement	S	Measured by personnel of reporting agency.
Source of measurement	U	Source is unknown.
Water-level approval status	A	Approved for publication -- Processing and review completed.

[Questions about sites/data?](#)[Feedback on this web site](#)[Automated retrievals](#)[Help](#)[Data Tips](#)[Explanation of terms](#)[Subscribe for system changes](#)[News](#)
[Accessibility](#)
[Plug-ins](#)
[FOIA](#)
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[Policies and Notices](#)

U.S. Department of the Interior | U.S. Geological Survey

Title: Groundwater for USA: Water Levels

URL: <https://nwis.waterdata.usgs.gov/nwis/gwlevels?>Page Contact Information: [USGS Water Data Support Team](#)

Page Last Modified: 2019-10-14 17:52:10 EDT

0.46 0.42 nadwv02



### DELINEATION SUMMARY TABLE

Appendix C: Delineation Data													
Borehole	Depth (ft)	Sample Date	Analysis Date (Latest)	Chloride (4500)	BTEX (8021B)					TPH (8015M)			
					Benzene	Toluene	o-xylene	m-xylene	p-xylene	GRD	DRD	EXT DRD	C6-C15
1	5	7/29/2019	8/1/2019	16,000	0.785	10.4	21.5	28.8	61.5	762	12,200	2,580	15,842
1	4	7/29/2019	8/1/2019	13,600	<0.500	2.05	5.74	19.2	27.0	270	1,670	224	2,164
1	6	7/29/2019	8/2/2019	240	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	<10.0	<10.0
2	1	7/29/2019	8/1/2019	5,440	<1.00	37.4	66.7	194	299	4,870	27,900	4,530	37,300
2	3	7/29/2019	8/1/2019	1,230	2.28	58.6	79.4	223	364	5,030	25,900	4,300	35,230
2	4	7/29/2019	8/1/2019	208	<1.00	11.1	21.8	63.5	96.5	1,650	9,260	1,310	12,220
2	5	8/8/2019	8/14/2019	-	<0.500	1.62	6.13	21.0	28.8	568	4,920	723	6,211
2	6	8/8/2019	8/14/2019	-	<0.200	0.685	2.94	9.8	13.4	301	2,840	375	3,516
2	7	8/8/2019	8/14/2019	-	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	30.0	<10.0	30.0
3	5	7/29/2019	8/1/2019	1,980	0.155	5.77	10.5	30.2	46.7	1,140	47,400	10,600	59,140
3	2	7/29/2019	8/1/2019	192	<0.050	<0.050	0.094	0.300	0.394	<10.0	<10.0	<10.0	<10.0
3	4	7/29/2019	8/1/2019	400	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	<10.0	<10.0
4	5	7/29/2019	8/2/2019	7,330	5.40	63.3	58.8	155	283	2,870	8,090	1,120	12,060
4	6	7/29/2019	8/2/2019	208	0.053	0.648	1.78	4.55	7.04	91.7	916	169	1,177
4	7	8/8/2019	8/14/2019	-	0.205	3.18	5.05	13.8	22.2	195	1,940	243	2,378
4	8	8/8/2019	8/14/2019	-	<0.050	<0.050	0.086	0.306	0.392	<10.0	153	14.9	168
4	9	8/8/2019	8/14/2019	-	<0.050	<0.050	<0.050	<0.150	<0.300	<10.0	<10.0	<10.0	<10.0
NMOC Thresholds				600	10				50				100

BOLD results indicate results above RRAL

• indicates tests were not ran

All units in mg/kg unless otherwise noted

**APPENDIX D**

**LABORATORY REPORTS**

**RXSoil, Inc.**  
**201 Main St. Ste. 1360, Fort Worth, TX 76102**



PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

August 05, 2019

BRUCE BAKER

APACHE CORP - HOBBS

2350 W. MARLAND BLVD.

HOBBS, NM 88240

RE: EMPIRE ABO UNIT K-14

Enclosed are the results of analyses for samples received by the laboratory on 07/29/19 16:16.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-18-11. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (\*). For a complete list of accredited analytes and matrices visit the TCEQ website at [www.tceq.texas.gov/field/ga/lab/accred\\_certif.html](http://www.tceq.texas.gov/field/ga/lab/accred_certif.html).

Cardinal Laboratories is accredited through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Halocacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Lab Director/Quality Manager





PHONE (575) 393-2326 • 181 E. MARLAND • HOBBS, NM 88240

**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/29/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K 14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

**Sample ID: SP 1 @ SURFACE (H902590-01)**

BTX 80218		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	0.785	0.500	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	10.4	0.500	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	21.5	0.500	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	28.8	1.50	08/01/2019	ND	5.95	99.2	6.00	2.11	
Total BTX	61.5	3.00	08/01/2019	ND					

Surrogate 4-Bromofluorobenzene (PIE) 113 % 71.3-129

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	16000	16.0	07/30/2019	ND	432	108	400	3.77	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	762	50.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	12200	50.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	2580	50.0	08/01/2019	ND					

Surrogate 1-Chlorooctane 129 % 41-142

Surrogate 1-Chloroadecane 155 % 37.6-147

**Cardinal Laboratories**

\* = Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager



PHONE (575) 393-2326 • 301 E. MARLAND • HOBBS, NM 88240

**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/29/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

**Sample ID: SP 1 @ 4' (H902590-02)**

BTEX B0218		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.500	0.500	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	2.05	0.500	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	5.74	0.500	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	19.2	1.50	08/01/2019	ND	5.95	99.2	6.00	2.11	
Total BTEX	27.0	3.00	08/01/2019	ND					

Surrogate 4-Bromofluorobenzene (PIE) 111 % 73.3-129

Chloride, SM4580Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	13600	16.0	07/30/2019	ND	432	108	400	3.77	

TPH B015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	270	10.0	07/31/2019	ND	201	100	200	0.472	
DRO >C10-C28*	1670	10.0	07/31/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	224	10.0	07/31/2019	ND					

Surrogate 1-Chlorooctane 110 % 41-142

Surrogate 1-Chlorooctadecane 129 % 37.6-147

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Celey D. Keene, Lab Director/Quality Manager



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**Analytical Results For:**

APACHE CORP - HOBBS  
BRUCE BAKER  
2350 W. MARLAND BLVD.  
HOBBS NM, 88240  
Fax To: (575) 393-2432

Received: 07/29/2019  
Reported: 08/05/2019  
Project Name: EMPIRE ABO UNIT K-14  
Project Number: NONE GIVEN  
Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
Sampling Type: Soil  
Sampling Condition: Cool & Intact  
Sample Received By: Tamara Oldaker

**Sample ID: SP 2 @ 1' (H902590-03)**

BTEX 80218		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<1.00	1.00	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	37.4	1.00	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	66.7	1.00	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	194	3.00	08/01/2019	ND	5.95	99.2	6.00	2.11	
Total BTEX	299	6.00	08/01/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC	118%	73 3 129
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Chloride, 544500Cl-5		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	5440	16.0	07/30/2019	ND	432	108	400	3.77	

TPH 8015H	mg/kg		Analyzed By: MS					S-06	
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	4670	50.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	27900	50.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	4530	50.0	08/01/2019	ND					

Surrogate 1-Chlorooctane	1000%	41-142
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Surrogate 1-Chlorooctadecane	741%	376-147
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\*=Accredited Analyte

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**Celey D. Keene, Lab Director/Quality Manager**

Page 4 of 11



PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/29/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

Sample ID: SP 2 @ 3' (H902590-04)

BTEX 80218		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	2.28	1.00	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	58.6	1.00	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	79.4	1.00	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	223	3.00	08/01/2019	ND	5.95	99.2	6.00	2.11	
Total BTEX	364	6.00	08/01/2019	ND					

Surrogate 4-Bromofluorobenzene (PIL) 117 % 73.3-129

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1230	16.0	07/30/2019	ND	432	108	400	3.77	
TPH 8015M		mg/kg		Analyzed By: MS				S-06	
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier

GRO C6-C10*	5030	50.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	25900	50.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	4300	50.0	08/01/2019	ND					

Surrogate 1-Chlorooctane 1260 % 41-142

Surrogate 1-Chlorooctadecane 691 % 37.6-147

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Celey D. Keene, Lab Director/Quality Manager



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**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/29/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

**Sample ID: SP 2 @ 4' (H902590-05)**

BTX 80218			mg/kg		Analyzed By: MS				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<1.00	1.00	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	11.1	1.00	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	21.8	1.00	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	63.5	3.00	08/01/2019	ND	5.95	99.2	6.00	2.11	
Total BTX	96.5	6.00	08/01/2019	ND					

Surrogate 4-Bromofluorobenzene (PIL) 113 % 73.3-129

Chloride, SM4500Cl-B			mg/kg		Analyzed By: AC				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	208	16.0	07/30/2019	ND	432	108	400	3.77	
TPH 8015H			mg/kg		Analyzed By: MS				
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier

GRO C6-C10*	1650	10.0	07/31/2019	ND	201	100	200	0.472	
DRO >C10-C28*	9260	10.0	07/31/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	1310	10.0	07/31/2019	ND					

Surrogate 1-Chlorooctane 438 % 41-142

Surrogate 1-Chlorooctadecane 320 % 37.6-147

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Celey D. Keene, Lab Director/Quality Manager



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**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/29/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

Sample ID: SP 3 @ SURFACE (H902590-06)

BTX 8021B	mg/kg	Analyzed By: ms				S-04			
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	0.155	0.050	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	5.77	0.050	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	10.5	0.050	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	30.2	0.150	08/01/2019	ND	5.95	99.2	6.00	2.11	
Total BTX	46.7	0.300	08/01/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 130 % 73 3-129

Chloride, SM4500Cl-B	mg/kg	Analyzed By: AC							
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	1980	16.0	07/30/2019	ND	432	108	400	3.77	

TPH 8015M	mg/kg	Analyzed By: MS				S-06			
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	1140	50.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	47400	50.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	10600	50.0	08/01/2019	ND					

Surrogate 1-Chlorooctane 515 % 41-142

Surrogate 1-Chlorooctadecane 1700 % 37 6-147

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Celey D. Keene, Lab Director/Quality Manager





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**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/29/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

Sample ID: SP 3 @ 2' (H902590-07)

BTEX 80218		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	<0.050	0.050	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	0.094	0.050	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	0.300	0.150	08/01/2019	ND	5.95	99.2	6.00	2.81	
Total BTEX	0.394	0.300	08/01/2019	NO					

Surrogate 4-Bromofluorobenzene (PIC) 101 % 73.3-129

Chloride, SM4500Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	192	16.0	07/30/2019	ND	432	108	400	3.77	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	<10.0	10.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	<10.0	10.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	<10.0	10.0	08/01/2019	ND					

Surrogate 1-Chlorooctadecane 90.7 % 41-142

Surrogate 1-Chlorooctadecane 93.0 % 37.6-147

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**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/29/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

Sample ID: SP 3 @ 4' (H902590-08)

BTX 80218		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	08/01/2019	ND	1.94	97.0	2.00	0.844	
Toluene*	<0.050	0.050	08/01/2019	ND	2.04	102	2.00	2.80	
Ethylbenzene*	<0.050	0.050	08/01/2019	ND	1.97	98.4	2.00	1.37	
Total Xylenes*	<0.150	0.150	08/01/2019	ND	5.95	99.2	6.00	2.11	
Total BTX	<0.300	0.300	08/01/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 101 % 33.129

Chloride, SM4300Cl-B		mg/kg		Analyzed By: AC					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	400	16.0	07/30/2019	ND	432	108	400	3.77	

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	<10.0	10.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	<10.0	10.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	<10.0	10.0	08/01/2019	ND					

Surrogate 1-Chlorooctane 97.4 % 41.142

Surrogate 1-Chlorooctadecane 102 % 37.614\*

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## Notes and Definitions

- S-06 The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
- S-04 The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
- ND Analyte NOT DETECTED at or above the reporting limit.
- RPD Relative Percent Difference
- \*\* Samples not received at proper temperature of 6°C or below
- \*\*\* Insufficient time to reach temperature.
- Chloride by SM4500C B does not require samples be received at or below 5°C  
Samples reported on an as received basis (wet) unless otherwise noted on report

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Page 10 of 11



## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2476

Company Name: <u>Apache</u>		<b>BILL TO</b>		<b>ANALYSIS REQUEST</b>													
Project Manager: <u>Jessy Brown</u>		P.O. #:		<div style="display: flex; justify-content: space-around;"> <div> <p>HEALTH</p> <p>DECK</p> </div> </div>													
Address:		Company:															
City: <u>Hobbs</u> State: <u>NM</u> Zip: <u>88240</u>		Attn:															
Phone #: Fax #:		Address:															
Project #:		City:															
Project Name:		State: Zip:															
Project Location: <u>Empire ARD Unit 4-14</u>		Phone #:															
Sample Name: <u>Jose Quezada</u>		Fax #:															
Lab I.D.	Sample I.D.	MATRIX	PRESERV	SAMPLING													
		GROUNDWATER	SLUDGE	DATE	TIME												
14902590	1 SP1 Surface			7/29	15:42												
	2 SP1 mu'			7/29	15:44												
	3 SP2 @ 1'			7/29	15:46												
	4 SP2 @ 5'			7/29	15:48												
	5 SP2 @ 11'			7/29	15:50												
	6 SP3 Surface			7/29	15:52												
	7 SP3 @ 2'			7/29	15:54												
	8 SP3 @ 2'			7/29	15:56												

PLEASE USE THE Laboratory and Sample Chain of Custody and Sample Receipt forms for any chain custody transfer. These forms are provided to the client for the client's use. All data including these forms and any other data submitted will be treated as confidential and will be held in strict confidence by Cardinal Laboratories. No data shall be released to the public without the written consent of Cardinal Laboratories. No data shall be released to the public without the written consent of Cardinal Laboratories. No data shall be released to the public without the written consent of Cardinal Laboratories.

Received By: <u>Jose Quezada</u>	Date: <u>7/29/16</u>	Received By: <u>Amara Ollak</u>	Date: <u>7/29/16</u>
Delivered By: (Circle One) <u>5:42</u>	Sample Condition: <u>Good</u>	Checked By: <u>JP</u>	Date: <u>7/29/16</u>



PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

August 05, 2019

BRUCE BAKER

APACHE CORP - HOBBS

2350 W. MARLAND BLVD.

HOBBS, NM 88240

RE: EMPIRE ABO UNIT K-14

Enclosed are the results of analyses for samples received by the laboratory on 07/30/19 16:27.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-18-11. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (\*). For a complete list of accredited analytes and matrices visit the TCEQ website at [www.tceq.texas.gov/field/qa/lab\\_accord\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accord_certif.html).

Cardinal Laboratories is accredited through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Halooacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Lab Director/Quality Manager



PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/30/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

Sample ID: SP 1 @ 6' (H902599-01)

BTEX 80218		mg/kg	Analyzed By: ms						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	08/02/2019	ND	1.95	97.5	2.00	2.95	
Toluene*	<0.050	0.050	08/02/2019	ND	2.07	103	2.00	2.48	
Ethylbenzene*	<0.050	0.050	08/02/2019	ND	2.01	100	2.00	2.59	
Total Xylenes*	<0.150	0.150	08/02/2019	ND	6.03	100	6.00	2.35	
Total BTEX	<0.300	0.300	08/02/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 97.8 % 73.3-129

Chloride, SM4S00CI-B		mg/kg	Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	240	16.0	07/31/2019	ND	400	100	400	3.92	
TPH 8015M		mg/kg	Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier

GRO C6-C10*	<10.0	10.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	<10.0	10.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	<10.0	10.0	08/01/2019	ND					

Surrogate 1-Chlorooctane 92.5 % 41-142

Surrogate 1-Chlorooctadecane 98.0 % 37.6-147

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Celey D. Keene, Lab Director/Quality Manager





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**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/30/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

Sample ID: SP 4 @ 5' (H902599-02)

BTEX 8021B		mg/kg	Analyzed By: ms						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	5.40	1.00	08/02/2019	ND	1.95	97.5	2.00	2.95	
Toluene*	63.3	1.00	08/02/2019	ND	2.07	103	2.00	2.48	
Ethylbenzene*	58.8	1.00	08/02/2019	ND	2.01	100	2.00	2.59	
Total Xylenes*	155	3.00	08/02/2019	ND	6.03	100	6.00	2.35	
Total BTEX	283	6.00	08/02/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 112 % 73.3 129

Chloride, SM4580Cl-B		mg/kg	Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	7330	16.0	07/31/2019	ND	400	100	400	3.92	
TPH 8015M		mg/kg	Analyzed By: MS						
									S-06

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	2870	50.0	08/01/2019	ND	201	100	200	0.472	
DRO >C10-C28*	8090	50.0	08/01/2019	ND	201	100	200	3.79	
EXT DRO >C28-C36	1120	50.0	08/01/2019	ND					

Surrogate: 1-Chlorooctane 381 % 41-142

Surrogate: 1-Chlorooctadecane 280 % 37.6-147

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**Analytical Results For:**

APACHE CORP - HOBBS  
 BRUCE BAKER  
 2350 W. MARLAND BLVD.  
 HOBBS NM, 88240  
 Fax To: (575) 393-2432

Received: 07/30/2019  
 Reported: 08/05/2019  
 Project Name: EMPIRE ABO UNIT K-14  
 Project Number: NONE GIVEN  
 Project Location: NOT GIVEN

Sampling Date: 07/29/2019  
 Sampling Type: Soil  
 Sampling Condition: Cool & Intact  
 Sample Received By: Tamara Oldaker

Sample ID: SP 4 @ 6' (H902599-03)

BTX 80218		mg/kg	Analyzed By: ms						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	0.053	0.050	08/02/2019	ND	1.95	97.5	2.00	2.95	
Toluene*	0.648	0.050	08/02/2019	ND	2.07	103	2.00	2.48	
Ethylbenzene*	1.78	0.050	08/02/2019	ND	2.01	100	2.00	2.59	
Total Xylenes*	4.55	0.150	08/02/2019	ND	6.03	100	6.00	2.35	
Total BTX	7.04	0.300	08/02/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 121 % 73.3-129

Chloride, 5M4580CI-B		mg/kg	Analyzed By: AC						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	208	16.0	07/31/2019	ND	400	100	400	3.92	

TPH 8015M		mg/kg	Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRD C6-C10*	91.7	10.0	08/01/2019	ND	194	97.1	200	3.56	
DRO >C10-C28*	916	10.0	08/01/2019	ND	185	92.4	200	6.64	
EXT DRO >C28-C36	169	10.0	08/01/2019	ND					

Surrogate 1-Chlorooctane 103 % 41-142

Surrogate 1-Chlorodecane 109 % 17.6-147

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**Notes and Definitions**

- S-06 The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference
- \*\* Samples not received at proper temperature of 5°C or below.
- \*\*\* Insufficient time to reach temperature.
- Chloride by SM4500C-B does not require samples be received at or below 6°C
- Samples reported on an as received basis (wet) unless otherwise noted on report

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PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

August 15, 2019

JEFFREY BROOM

APACHE CORP - HOBBS

2350 W. MARLAND BLVD.

HOBBS, NM 88240

RE: EMPIRE ABO UNIT K-14

Enclosed are the results of analyses for samples received by the laboratory on 08/08/19 15:35.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-18-11. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (\*). For a complete list of accredited analytes and matrices visit the TCEQ website at [www.tceq.texas.gov/field/qa/lab\\_accred\\_certif.html](http://www.tceq.texas.gov/field/qa/lab_accred_certif.html).

Cardinal Laboratories is accredited through the State of Colorado Department of Public Health and Environment for:

Method EPA 551.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Lab Director/Quality Manager



PHONE (575) 393-2325 • 101 E. MARLAND • HOBBS, NM 88240

**Analytical Results For:**

APACHE CORP - HOBBS  
JEFFREY BROOM  
2350 W. MARLAND BLVD.  
HOBBS NM, 88240  
Fax To: (575) 393-2432

Received:	08/08/2019	Sampling Date:	08/08/2019
Reported:	08/15/2019	Sampling Type:	Soil
Project Name:	EMPIRE ABO UNIT K-14	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Tamara Oldaker
Project Location:	NOT GIVEN		

**Sample ID: SP 4 @ 7' (H902737-01)**

STEX 80210	mg/kg	Analyzed By: ms		S-04					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	0.205	0.100	08/14/2019	ND	1.99	99.6	2.00	3.60	
Toluene*	3.18	0.100	08/14/2019	ND	2.13	106	2.00	1.02	
Ethylbenzene*	5.05	0.100	08/14/2019	ND	2.09	104	2.00	2.93	
Total Xylenes*	13.8	0.300	08/14/2019	ND	6.25	104	6.00	2.25	
Total STEX	22.2	0.600	08/14/2019	ND					

Surrogate 4-Bromofluorobenzene (PIE) 148 % 73.3-129

TPH 8015H	mg/kg	Analyzed By: MS		S-06					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	195	50.0	08/10/2019	ND	189	94.3	200	2.56	
DRO >C10-C28*	1940	50.0	08/10/2019	ND	194	97.0	200	0.546	
EXT DRO >C28-C36	243	50.0	08/10/2019	ND					

Surrogate 1-Chlorooctane 122 % 41-142

Surrogate 1-Chlorooctadecane 169 % 37.6-147

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**Analytical Results For:**

APACHE CORP - HOBBS  
JEFFREY BROOM  
2350 W. MARLAND BLVD.  
HOBBS NM, 88240  
Fax To: (575) 393-2432

Received: 08/08/2019  
Reported: 08/15/2019  
Project Name: EMPIRE ABO UNIT K-14  
Project Number: NONE GIVEN  
Project Location: NOT GIVEN

Sampling Date: 08/08/2019  
Sampling Type: Soil  
Sampling Condition: Cool & Intact  
Sample Received By: Tamara Oldaker

Sample ID: SP 4 @ 8' (H902737-02)

BTEX 80218		mg/kg	Analyzed By: ms						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	08/14/2019	ND	1.99	99.6	2.00	3.60	
Toluene*	<0.050	0.050	08/14/2019	ND	2.13	106	2.00	1.02	
Ethylbenzene*	0.086	0.050	08/14/2019	ND	2.09	104	2.00	2.93	
Total Xylenes*	0.306	0.150	08/14/2019	ND	6.25	104	6.00	2.25	
Total BTEX	0.392	0.300	08/14/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 100 % 73.3-129

TPH 8015H		mg/kg	Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	<10.0	10.0	08/10/2019	ND	189	94.3	200	2.56	
DRO >C10-C28*	153	10.0	08/10/2019	ND	194	97.0	200	0.546	
EXT DRO >C28-C36	14.9	10.0	08/10/2019	ND					

Surrogate 1-Chlorooctane 95.6 % 41-142

Surrogate 1-Chlorononadecane 97.3 % 37.6-147

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Celey D. Keene, Lab Director/Quality Manager



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**Analytical Results For:**

APACHE CORP - HOBBS  
JEFFREY BROOM  
2350 W. MARLAND BLVD.  
HOBBS NM, 88240  
Fax To: (575) 393-2432

Received:	08/08/2019	Sampling Date:	08/08/2019
Reported:	08/15/2019	Sampling Type:	Soil
Project Name:	EMPIRE ABO UNIT K-14	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Tamara Oldaker
Project Location:	NOT GIVEN		

Sample ID: SP 4 @ 9' (H902737-03)

BTEX 8021B		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	08/14/2019	ND	1.99	99.6	2.00	3.60	
Toluene*	<0.050	0.050	08/14/2019	ND	2.13	106	2.00	1.02	
Ethylbenzene*	<0.050	0.050	08/14/2019	ND	2.09	104	2.00	2.93	
Total Xylenes*	<0.150	0.150	08/14/2019	ND	6.25	104	6.00	2.25	
Total BTEX	<0.300	0.300	08/14/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 98.0 % 71.3-129

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	<10.0	10.0	08/10/2019	ND	189	94.3	200	2.56	
DRO >C10-C28*	<10.0	10.0	08/10/2019	ND	194	97.0	200	0.546	
EXT DRO >C28-C36	<10.0	10.0	08/10/2019	ND					

Surrogate 1-Chlorooctane 101 % 41-142

Surrogate 1-Chlorooctadecane 98.3 % 37.6-147

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Celey D. Keene, Lab Director/Quality Manager





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**Analytical Results For:**

APACHE CORP - HOBBS  
JEFFREY BROOM  
2350 W. MARLAND BLVD.  
HOBBS NM, 88240  
Fax To: (575) 393-2432

Received: 08/08/2019  
Reported: 08/15/2019  
Project Name: EMPIRE ABO UNIT K-14  
Project Number: NONE GIVEN  
Project Location: NOT GIVEN

Sampling Date: 08/08/2019  
Sampling Type: Soil  
Sampling Condition: Cool & Intact  
Sample Received By: Tamara Oldaker

Sample ID: SP 2 @ 5' (H902737-04)

BTEX 80218		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.500	0.500	08/14/2019	ND	1.99	99.6	2.00	3.60	
Toluene*	1.62	0.500	08/14/2019	ND	2.13	106	2.00	1.02	
Ethylbenzene*	6.13	0.500	08/14/2019	ND	2.09	104	2.00	2.93	
Total Xylenes*	21.0	1.50	08/14/2019	ND	6.25	104	6.00	2.25	
Total BTEX	28.8	3.00	08/14/2019	ND					

Surrogate 4-Bromofluorobenzene (PIL) 109 % 71 J-129

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRD C6-C10*	568	50.0	08/10/2019	ND	200	100	200	0.237	
DRO >C10-C28*	4920	50.0	08/10/2019	ND	199	99.6	200	1.09	
EXT DRO >C28-C36	723	50.0	08/10/2019	ND					

Surrogate 1-Chlorooctane 160 % 41-142

Surrogate 1-Chlorooctadecane 252 % 37.6-147

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**Analytical Results For:**

APACHE CORP - HOBBS  
JEFFREY BROOM  
2350 W. MARLAND BLVD.  
HOBBS NM, 88240  
Fax To: (575) 393-2432

Received: 08/08/2019  
Reported: 08/15/2019  
Project Name: EMPIRE ABO UNIT K-14  
Project Number: NONE GIVEN  
Project Location: NOT GIVEN

Sampling Date: 08/08/2019  
Sampling Type: Soil  
Sampling Condition: Cool & Intact  
Sample Received By: Tamara Oldaker

**Sample ID: SP 2 @ 6' (H902737-05)**

BTEX 80218		mg/kg	Analyzed By: ms						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.200	0.200	08/15/2019	ND	1.99	99.6	2.00	3.60	
Toluene*	0.685	0.200	08/15/2019	ND	2.13	106	2.00	1.02	
Ethylbenzene*	2.94	0.200	08/15/2019	ND	2.09	104	2.00	2.93	
Total Xylenes*	9.79	0.600	08/15/2019	ND	6.25	104	6.00	2.25	
Total BTEX	13.4	1.20	08/15/2019	ND					

Surrogate 4-Bromofluorobenzene (PIL) 111 % 73.3-129

TPH 80218		mg/kg	Analyzed By: MS						
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	301	50.0	08/10/2019	ND	200	100	200	0.237	
DRO >C10-C28*	2840	50.0	08/10/2019	ND	199	99.6	200	1.09	
EXT DRO >C28-C36	375	50.0	08/10/2019	ND					

Surrogate 1-Chlorooctadecane 167 % 41-142

Surrogate 1-Chlorooctadecane 193 % 37.6-147

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Celey D. Keene, Lab Director/Quality Manager



PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

**Analytical Results For:**

APACHE CORP - HOBBS  
JEFFREY BROOM  
2350 W. MARLAND BLVD.  
HOBBS NM, 88240  
Fax To: (575) 393-2432

Received: 08/08/2019  
Reported: 08/15/2019  
Project Name: EMPIRE ABO UNIT K-14  
Project Number: NONE GIVEN  
Project Location: NOT GIVEN

Sampling Date: 08/08/2019  
Sampling Type: Soil  
Sampling Condition: Cool & Intact  
Sample Received By: Tamara Oldaker

Sample ID: SP 2 @ 7' (H902737-06)

BTEX 8015B		mg/kg		Analyzed By: ms					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	08/15/2019	ND	1.99	99.6	2.00	3.60	
Toluene*	<0.050	0.050	08/15/2019	ND	2.13	106	2.00	1.02	
Ethylbenzene*	<0.050	0.050	08/15/2019	ND	2.09	104	2.00	2.93	
Total Xylenes*	<0.150	0.150	08/15/2019	ND	6.25	104	6.00	2.25	
Total BTEX	<0.300	0.300	08/15/2019	ND					

Surrogate 4-Bromofluorobenzene (PIC) 98.4 % 73.3-129

TPH 8015M		mg/kg		Analyzed By: MS					
Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10*	<10.0	10.0	08/10/2019	ND	200	100	200	0.237	
DRO >C10-C28*	30.0	10.0	08/10/2019	ND	199	99.6	200	1.09	
EXT DRO >C28-C36	<10.0	10.0	08/10/2019	ND					

Surrogate 1-Chlorooctane 101 % 41-142

Surrogate 1-Chlorooctadecane 99.3 % 37.6-147

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\* = Accredited Analyte

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Celey D. Keene, Lab Director/Quality Manager

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## Notes and Definitions

- S-06 The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
- S-04 The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference
- \*\* Samples not received at proper temperature of 6°C or below
- \*\*\* Insufficient time to reach temperature.
- Chloride by SM4500C-8 does not require samples be received at or below 6°C  
Samples reported on an as received basis (wet) unless otherwise noted on report

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Celey D. Keene, Lab Director/Quality Manager



## CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240  
(575) 393-2326 FAX (575) 393-2478

Company Name: <u>Amgen</u>		BILL TO		ANALYSIS REQUEST														
Project Manager: <u>Jeffrey Brown</u>		P.D. #:																
Address:		Company:																
City: <u>Denver</u> State: <u>CO</u> Zip: <u>80202</u>		Attn:																
Phone #: Fax #:		Address:																
Project #: Project Owner:		City:																
Project Name:		State: Zip:																
Project Location: <u>Empire APO UN-L-14</u>		Phone #:																
Sampler Name: <u>Jim Chiswick</u>		Fax #:																
Lab I.D.	Sample I.D.	FOR LAB USE ONLY	MATRIX	PRESERV	SAMPLING													
			GROUNDWATER															
			WASTE WATER															
			SOIL															
			SLUDGE															
			OTHER															
			WASTEWATER															
			SLUDGE															
			OTHER															
			DATE															
			TIME															
1	SP4 @ 2'																	
2	SP4 @ 8'																	
3	SP4 @ 9'																	
4	SP2 @ 5'																	
5	SP2 @ 4'																	
6	SP2 @ 7'																	

ALLIAN with Lab and Company. Cardinal's Lab will store samples for up to 90 days unless otherwise specified in writing and returned by Cardinal within 30 days after completion of the analysis. All fees including those for reanalysis and any other state-mandated fees shall be charged to the client. Cardinal's Lab will not be responsible for any damage to samples or equipment. Cardinal's Lab will not be responsible for any damage to samples or equipment. Cardinal's Lab will not be responsible for any damage to samples or equipment.

Relinquished By: <u>Jim Chiswick</u>	Received By: <u>Janara Aldrete</u>	Phone Results: <input type="checkbox"/> Yes <input type="checkbox"/> No (Add'l Phone #: _____)
Date: <u>12-3-19</u>	Date: <u>12-3-19</u>	Fax Results: <input type="checkbox"/> Yes <input type="checkbox"/> No (Add'l Fax #: _____)
Time: <u>15:35</u>	Time: <u>15:35</u>	REMARKS: <u>Email Results</u>
Delivered By: (Circle One) <u>4.92</u> <u>267</u>	Sample Condition: Cool <input type="checkbox"/> Intact <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>	CHECKED BY: (Initials) <u>JD</u>
Sampler: UPS - Bus - Other: <u>Connected 5.3</u>		

**END OF REPORT**