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	nAPP2307357709
District RP	
Facility ID	
Application ID	

Release Notification

Responsible Party

Responsible Party Hilcorp Energy Company	OGRID 372171
Contact Name Mitch Killough	Contact Telephone 713-757-5247
Contact email mkillough@hilcorp.com	Incident # nAPP2307357709
Contact mailing address 1111 Travis Street, Houston, Texas 77002	

Location of Release Source

Latitude 36.8225021 Longitude -108.0012741
(NAD 83 in decimal degrees to 5 decimal places)

Site Name Aztec 9	Site Type Well
Date Release Discovered: 2/27/2023 @ 01:30 pm (MT)	API# 30-045-24699

Unit Letter	Section	Township	Range	County
M	09	30N	11W	San Juan

Surface Owner: ☐ State ☐ Federal ☐ Tribal ☒ Private (*Name: Old and Bold LLC*)

Nature and Volume of Release

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

☐ Crude Oil	Volume Released (bbls)	Volume Recovered (bbls)
☒ Produced Water	Volume Released (bbls) 3.34 bbls	Volume Recovered (bbls) 0 bbls
	Is the concentration of dissolved chloride in the produced water >10,000 mg/l?	☐ Yes ☒ No
☒ Condensate	Volume Released (bbls) 8.35 bbls	Volume Recovered (bbls) 0 bbls
☐ Natural Gas	Volume Released (Mcf)	Volume Recovered (Mcf)
☐ Other (describe)	Volume/Weight Released (provide units)	Volume/Weight Recovered (provide units)

Cause of Release
A release of approximately 11.69 bbls fluid (8.35 bbls condensate, 3.34 bbls produced water) was released from a hole that formed approximately 2 inches from the bottom of the 300-bbl storage tank. The primary cause of the release is external corrosion. The released fluids pooled immediately around the storage tank within secondary containment. Although discharged fluids did not migrate laterally outside secondary containment, no fluids could be recovered due to soaking into the ground surface. It should be noted that the when the active leak was discovered, the remaining fluid in the tank was pulled by a vacuum truck and transferred to another location.

OCD will be notified 48 hours prior to sampling. The spill amount was determined by operator's monthly tank gauging data.

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2307357709
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)?	

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:

In the case of this release, the spilled fluids soaked vertically into the ground surface beneath the storage tank. If any free liquids could have been recovered, Hilcorp would have certainly done so.

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: Mitch Killough Title: Environmental Specialist

Signature: _____ Date: 03/14/2023

email: mkillough@hilcorp.com Telephone: 713-757-5247

OCD Only

Received by: Jocelyn Harimon Date: 03/15/2023

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 197111
	Action Type: [C-141] Release Corrective Action (C-141)

CONDITIONS

Created By	Condition	Condition Date
jharimon	None	3/15/2023

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2307357709
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?	6 (ft bgs)
Did this release impact groundwater or surface water?	☒ Yes ☐ No
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	☐ Yes ☒ 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)?	☒ Yes ☐ No
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	☐ Yes ☒ 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?	☐ Yes ☒ No
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	☐ Yes ☒ No
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	☒ Yes ☐ No
Are the lateral extents of the release within 300 feet of a wetland?	☒ Yes ☐ No
Are the lateral extents of the release overlying a subsurface mine?	☐ Yes ☒ No
Are the lateral extents of the release overlying an unstable area such as karst geology?	☐ Yes ☒ No
Are the lateral extents of the release within a 100-year floodplain?	☐ Yes ☒ No
Did the release impact areas **not** on an exploration, development, production, or storage site?	☒ Yes ☐ 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 ½-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.

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2307357709
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: Mitch Killough Title: Environmental Specialist

Signature: Date: 6/8/2023

email: mkillough@hilcorp.com Telephone: 713-757-5247

OCD Only

Received by: Jocelyn Harimon Date: 06/08/2023

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2307357709
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: Mitch Killough Title: Environmental Specialist

Signature: Mitch Killough Date: 6/8/2023

email: mkillough@hilcorp.com Telephone: 713-757-5247

OCD Only

Received by: Jocelyn Harimon Date: 06/08/2023

☐ Approved ☐ Approved with Attached Conditions of Approval see text box below - NV ☐ Denied ☐ Deferral Approved

Signature: Nelson Velez Date: 09/06/2023

Remediation plan is approved with the following conditions;

1. BOS 200 application is approved as written.
2. Groundwater monitor wells will require permitting through New Mexico State Engineers Office (NMOSE).
3. Apply US EPA Method 8260B instead of 8021 for the groundwater samples.
4. If groundwater results meet the allowable concentrations within one calendar year from the date of discovery (April 11, 2024) per 19.15.30.12A (7) NMAC, then Hilcorp may request an alternate lesser number of samples the director approves, from the compliance sampling stations the director approved meet the abatement standards for benzene per 19.15.30.9D NMAC.
5. Hilcorp has 120-days (January 4, 2024) to complete the work and submit the appropriate and/or final closure report.

ENSOLUM

June 8, 2023

New Mexico Oil Conservation Division
New Mexico Energy, Minerals, and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: Remediation Work Plan
Aztec #9
Aztec, New Mexico
Hilcorp Energy Company
NMOCD Incident No: nAPP2307357709

To Whom it May Concern:

Ensolum, LLC (Ensolum), on behalf of Hilcorp Energy Company (Hilcorp), presents this *Remediation Work Plan* (Work Plan) for a release at the Aztec #9 natural gas production well (Site). The Site is located on private land in Aztec, New Mexico (Figure 1). This proposed Work Plan includes additional delineation and remediation of impacted soil and groundwater originating from a release of produced water and condensate due to external corrosion of an aboveground storage tank (AST). The Site is located in Unit M, Section 9, Township 30 North, Range 11 West, in San Juan County, New Mexico.

SITE BACKGROUND

On February 27, 2023, Hilcorp discovered a release of 8.35 barrels (bbls) of condensate and 3.34 bbls of produced water at the Site. Upon inspection, a hole was discovered near the bottom of the condensate AST due to corrosion. The released fluids pooled immediately around the AST and stayed within the secondary containment. No released fluids were recovered; however, the remaining fluids within the AST were immediately removed via vacuum truck and transferred to another well location for storage. Hilcorp reported the release to the New Mexico Oil Conservation Division (NMOCD) on a Form C-141 on March 14, 2023. The NMOCD has assigned the Site Incident Number nAPP2307357709.

SITE CHARACTERIZATION

The Site is located on private land in Aztec, New Mexico approximately 0.25 miles from the intersection of West Chaco Street and South Ash Street. As part of the Site investigation, local geology/hydrogeology and nearby sensitive receptors were assessed in accordance with Title 19, Chapter 15, Part 29, Sections 11 and 12 (19.15.29.11 and 12) of the New Mexico Administrative Code (NMAC). This information is further discussed below.

GEOLOGY AND HYDROGEOLOGY

The Site is located in Quaternary age alluvial deposits associated with the Animas River drainage. The alluvial sediment is likely underlain by the Nacimiento Geologic Formation. In the report titled "*Hydrogeology and Water Resources of San Juan Basin, New Mexico*" (Stone, et. al., 1983), the alluvial deposits vary greatly across the basin in both hydrologic properties and water quality.

Where present in sufficient quantity and quality, wells are located in this formation for stock, irrigation, and domestic use. The Nacimiento Formation is characterized by interbedded black carbonaceous mudstones and white, coarse-grained sandstones, which range in thickness from 418 feet to 2,232 feet. The hydrologic properties of the Nacimiento Formation vary dependent on location. Where sufficient yield is present, the primary use of water from this formation is for domestic and/or livestock supply. The Nacimiento Formation is underlain by the Ojo Alamo sandstone (Stone et. al., 1983).

POTENTIAL SENSITIVE RECEPTORS

Potential nearby receptors were assessed through desktop reviews of United States Geological Survey (USGS) topographic maps, Federal Emergency Management Administration (FEMA) Geographic Information System (GIS) maps, New Mexico Office of the State Engineer (NMOSE) database, aerial photographs, and Site-specific observations.

The closest surface water feature is a freshwater pond located approximately 150 feet south of the Site. In addition, the Animas River is located 1,050 feet west of the Site. The Site is within 200 feet from a lakebed and wetland. The closest fresh-water well with depth to water information is NMOSE permitted well SJ-03419 (Appendix A), located approximately 1,420 feet west of the Site. The recorded depth to water on the NMOSE Point of Diversion (POD) summary is 9 feet below ground surface (bgs). Wellhead protection areas are not located within a ½-mile from the Site. The Site is not within a 100-year floodplain, overlying a subsurface mine, or located within an area underlain by unstable geology (area designated as low potential karst by the BLM). Schools, hospitals, institutions, churches, and/or other occupied permanent residence or structures are not located within 300 feet of the Site.

SITE CLOSURE CRITERIA

Based on the information presented above and in accordance with the *Table I, Closure Criteria for Soils Impacted by a Release* (19.15.29.12 NMAC), the following Closure Criteria for constituents of concern (COCs) should be applied to the Site:

- Benzene: 10 milligrams per kilogram (mg/kg)
- Benzene, toluene, ethylbenzene, and xylenes (BTEX): 50 mg/kg
- Total petroleum hydrocarbons (TPH) as a combination of gasoline range organics (GRO), diesel range organics (DRO), and motor oil range organics (MRO): 100 mg/kg
- Chloride: 600 mg/kg

INITIAL EXCAVATION ACTIVITIES

Due to the likelihood of shallow groundwater at the Site, Hilcorp conducted excavation activities of impacted soil located on the well pad on March 6 and 7, 2023. Soil was removed from the area indicated on Figure 2 to a depth of approximately 6 feet bgs, at which point groundwater was encountered within the excavation. During excavation, an Ensolum geologist logged soil lithology and inspected the soil for petroleum hydrocarbon staining and odors. Soil descriptions were noted in a field book and generally followed the Unified Soil Classification System (USCS), as specified in American Society for Testing and Materials (ASTM) method D2488. Soil samples were also field screened for the presence of volatile organic compounds (VOCs) using a calibrated photoionization detector (PID), with results noted in the field book.

Five-point composite soil samples were collected from each sidewall (north, south, east, and west) and immediately placed on ice. Samples were submitted to Hall Environmental Analysis Laboratory (Hall) for analysis of BTEX following United States Environmental Protection Agency (EPA) Method 8021B, TPH following EPA Method 8015D, and chloride following EPA Method 300.0. Based on analytical results, summarized in Table 1, TPH remained in all sidewalls at

concentrations exceeding the NMOCD Closure Criteria. However, BTEX and chloride concentrations were not detected above their respective Closure Criteria in any of the analyzed samples.

Due to access restrictions, additional soil was not removed at that time and Hilcorp/Ensolum determined that additional delineation should be performed to assess the lateral and vertical extent of impacts. In total, approximately 624 cubic yards of soil were removed and disposed off-Site at a permitted facility. Photographs taken during excavation activities are included in Appendix B.

DELINEATION ACTIVITIES

Based on laboratory analytical results and the presence of shallow groundwater, Hilcorp and Ensolum performed delineation activities using a Geoprobe® push probe rig. Specifically, soil borings BH01 through BH07 were advanced at the locations indicated on Figure 2 in order to delineate the lateral and vertical extent of soil impacts. Additionally, a Geoprobe® Hydropunch sampler was used to collect grab-groundwater samples from locations BH02, BH04, and BH06 to assess on and off-pad groundwater conditions at the Site. During delineation activities, a geologist logged soil lithology and field screened for the presence of VOCs using the methods described above. Soil descriptions were noted in the field soil boring logs attached as Appendix C. Hilcorp notified the NMOCD at least 48 hours in advance of any field activities performed at the Site. Notifications and correspondence with the NMOCD are attached in Appendix D.

Soil Sample Collection and Results

In general, two soil samples were collected from each boring (with the exception of boring BH04) in order to delineate the vertical impacts at the Site: one at the depth interval indicating the greatest TPH concentration based on PID field screening results and a second soil sample collected near the terminus of each boring. Boring BH04 met shallow refusal at 4.5 feet bgs, therefore only one sample was collected from this location from a depth interval of 0 to 4 feet bgs. Soil samples were collected directly into laboratory-provided jars and immediately placed on ice. Samples were submitted to Hall for analysis of TPH, BTEX, and chloride by the same methods described above. Sample equipment was decontaminated prior to each use. Once complete, borings were backfilled with hydrated bentonite or grout.

A mix of sand, gravel, and clay (likely river terrace deposits) was encountered in all borings to depths up to 8 feet bgs. Groundwater was also encountered at approximately 3 to 6 feet bgs during advancement of borings. Based on analytical results, TPH concentrations exceeding the NMOCD Table I Closure Criteria were encountered in one sample from boring BH06 at depths between 2 and 4 feet bgs. TPH, BTEX, and/or chloride were either not detected above laboratory reporting limits or were not detected above the applicable Table I Closure Criteria in any other analyzed samples. A summary of analytical results are presented on Figure 2 and summarized in attached Table 2. Complete laboratory reports are attached in Appendix E.

Grab-Groundwater Sample Collection and Results

Grab samples of groundwater were collected by advancing a Geoprobe® Hydropunch into the saturated zone at locations BH02, BH04, and BH06 (Figure 3). After the required depths were reached to encounter groundwater, the sample rod was retracted several feet to expose a stainless-steel well screen housed inside of the sample rod. Once exposed, groundwater was allowed to infiltrate into the well screen. Tubing was placed through the sample rods into the well screen and samples were collected directly into laboratory provided containers using a peristaltic pump. Samples were submitted to Hall for analysis of BTEX by EPA Method 8021B.

Benzene was detected in the groundwater samples at concentrations exceeding the New Mexico Water Quality Control Commission (NMWQCC) standard at locations BH02 and BH06. No other constituents were detected above NMWQCC standards from any of the wells. A summary of analytical results are summarized in attached Table 3 and Figure 3, with complete laboratory reports also attached in Appendix E.

REMEDIATION WORK PLAN

Based on the soil sampling results described above, Hilcorp proposes to further excavate impacted soil at the Site in the approximate area shown on Figure 4. Vadose zone soil located above the groundwater table (up to depths of approximately 6 feet bgs) will be excavated and transported off-Site for disposal at the Envirotech Landfarm located in San Juan County, New Mexico. Based on delineation results, approximately 850 cubic yards of impacted soil remain at the Site that will require excavation and disposal. Once field screening indicates that impacted soil has been removed, 5-point composite confirmation soil samples will be collected from the excavation sidewalls at a frequency of one sample for every 200 square feet. Because of the shallow groundwater at the Site and the assumption that the excavation will be advanced until the groundwater table is exposed, excavation floor samples will not be collected. Additionally, based on previous analytical results and no prior Closure Criteria exceedances of BTEX or chloride, Hilcorp is requesting that soil samples only be analyzed for TPH by EPA Method 8015D during confirmation sampling.

To address impacts to groundwater and soils located within the smear zone at the Site, an amendment of BOS 200® (brochure attached in Appendix F) will be applied to the open excavation and mixed into the water table and the top 1 foot of saturated soil below the water table. BOS 200® is a “Trap & Treat” remedy designed to “trap” petroleum hydrocarbons through absorption onto activated carbon, then subsequently “treat” the petroleum hydrocarbons with the addition of bacteria, nutrients, and electron acceptors designed to enhance microbial activity in the subsurface and enhance natural biodegradation of the contaminants. Based on calculations provided by the vendor, approximately 1,700 pounds of BOS 200®, 750 pounds of gypsum, and 5 gallons of bacteria will be applied to the Site. Once mixed into the subsurface, the excavation will be backfilled and recontoured to match pre-existing conditions at the Site.

Once backfilled, four permanent groundwater monitoring wells will be installed at the approximate locations shown on Figure 4. Hilcorp proposes to sample groundwater from the permanent wells for BTEX by EPA Method 8021 on a quarterly basis. Per rule 19.15.30.9(D) NMAC, because several wells will be located on private property and in off-pad areas, Hilcorp proposed to reduce the sampling timeline so that Site closure can be approved once four consecutive quarters indicate BTEX concentrations are compliant with NMWQCC standards. At that time, Hilcorp will prepare a final report requesting Site closure and approval to plug and abandon the wells.

REFERENCES

Stone, W., Lyford, F., Frenzel, P., Mizell, N., & Padgett, E. (1983). Hydrogeology and Water Resources of San Juan Basin, New Mexico. New Mexico Bureau of Mines & Mineral Resources.

We appreciate the opportunity to provide this work plan to the NMOCD. If you should have any questions or comments regarding this document, please contact the undersigned.

Sincerely,
Ensolum, LLC

Stuart Hyde, LG
Senior Geologist
(970) 903-1607
shyde@ensolum.com

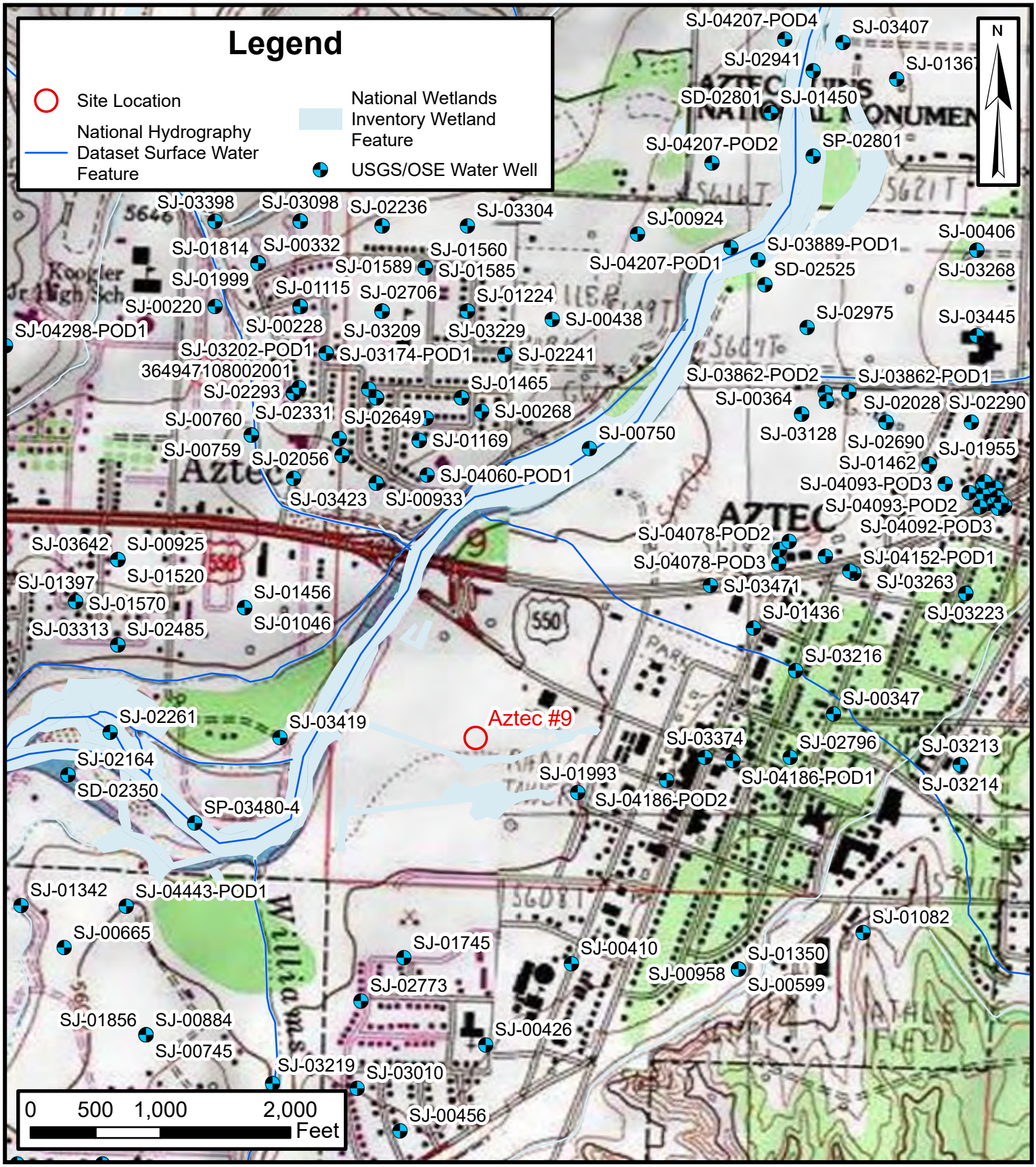
Ashley L. Ager, MS, PG
Principal
(970) 946-1093
aager@ensolum.com

Attachments:

Figure 1:	Site Location Map
Figure 2:	Soil Analytical Results
Figure 3:	Groundwater Analytical Results
Figure 4:	Proposed Additional Excavation and Groundwater Monitoring Wells
Table 1:	Initial Excavation Soil Sample Analytical Results
Table 2:	Delineation Soil Sample Analytical Results
Table 3:	Groundwater Analytical Results
Appendix A:	NMOSE Point of Diversion Summary
Appendix B:	Photographic Log
Appendix C:	Boring Logs
Appendix D:	NMOCD Correspondence
Appendix E:	Laboratory Analytical Reports
Appendix F:	BOS 200® Brochure

ENSOLUM

FIGURES



ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Site Location Map

Aztec #9
Hilcorp Energy Company
36.82245, -108.00108
San Juan County, New Mexico

FIGURE
1

Sources: Environmental Systems Research Institute (ESRI), National Geographic Society, i-cubed

ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Soil Analytical Results

Aztec #9
Hilcorp Energy Company
36.82245, -108.00108
San Juan County, New Mexico

FIGURE
2

Sources: Google Earth

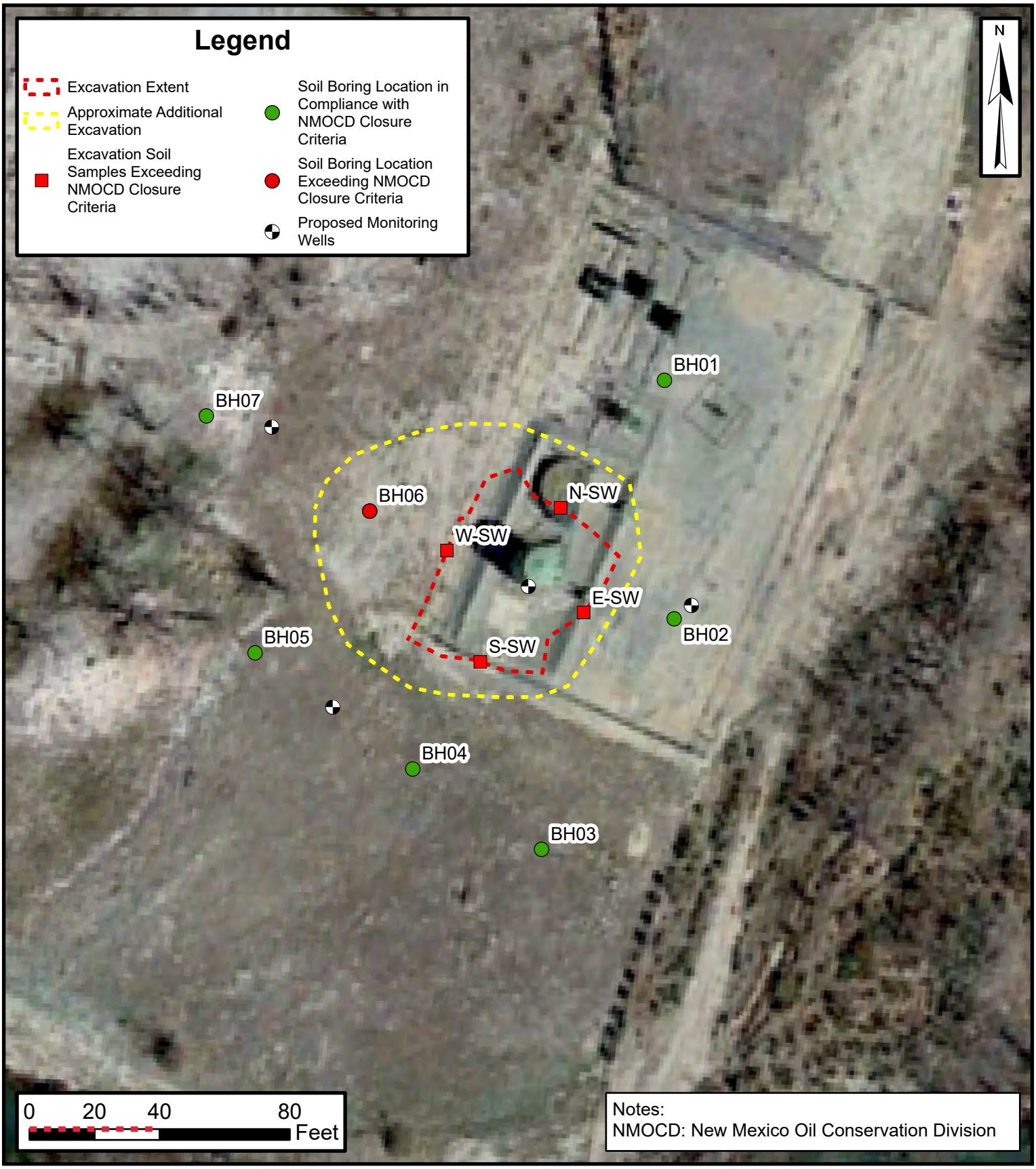
ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Groundwater Analytical Results

Aztec #9
Hilcorp Energy Company
36.82245, -108.00108
San Juan County, New Mexico

FIGURE
3

Sources: Google Earth



ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Proposed Additional Excavation and Groundwater Monitoring Wells

Aztec #9
Hilcorp Energy Company
36.82245, -108.00108
San Juan County, New Mexico

FIGURE
4

Sources: Google Earth

ENSOLUM

TABLES

ENSOLUM

TABLE 1
INITIAL EXCAVATION SOIL SAMPLE ANALYTICAL RESULTS
Aztec #9
Hilcorp Energy Company
San Juan County, New Mexico

Sample Designation	Date	Depth (feet)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH GRO (mg/kg)	TPH DRO (mg/kg)	TPH MRO (mg/kg)	Total TPH (mg/kg)	Chloride (mg/kg)
NMOCD Closure Criteria for Soils Impacted by a Release (Groundwater <50 feet)			**10**	NE	NE	NE	**50**	NE	NE	NE	**100**	**600**
W-SW	3/6/2023	0 - 6	0.18	1.6	0.15	0.86	2.8	560	<9.0	<45	**560**	<60
S-SW	3/6/2023	0 - 6	0.13	2.5	0.40	2.1	5.1	230	<8.8	<44	**230**	<60
N-SW	3/7/2023	0 - 5	1.2	21	2.2	11	35	750	<8.8	<44	**750**	<59
E-SW	3/7/2023	0 - 5	0.81	7.1	<0.93	4.1	12	200	<9.8	<49	**200**	<61

Notes:

bgs: below ground surface
BTEX: Benzene, Toluene, Ethylbenzene, and Xylenes
mg/kg: milligrams per kilogram
NE: Not Established
NMOCD: New Mexico Oil Conservation Division
': feet
GRO: Gasoline Range Organics
DRO: Diesel Range Organics
MRO: Motor Oil/Lube Oil Range Organics
TPH: Total Petroleum Hydrocarbon
<0.037 : indicates result less than the stated laboratory reporting limit (RL)
*Concentrations in **bold** and shaded exceed the New Mexico Oil Conservation Division Table I Closure Criteria for Soils Impacted by a Release*

ENSOLUM

TABLE 2
DELINEATION SOIL SAMPLE ANALYTICAL RESULTS
Aztec #9
Hilcorp Energy Company
San Juan County, New Mexico

Sample Designation	Date	Depth (feet)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH GRO (mg/kg)	TPH DRO (mg/kg)	TPH MRO (mg/kg)	Total TPH (mg/kg)	Chloride (mg/kg)
NMOCD Closure Criteria for Soils Impacted by a Release (Groundwater <50 feet)			**10**	NE	NE	NE	**50**	NE	NE	NE	**100**	**600**
BH01 0-4	3/30/2023	0 - 4	<0.024	<0.048	<0.048	<0.095	<0.095	<4.8	<9.4	<47	<47	<60
BH01 4-8	3/30/2023	4 - 8	<0.024	<0.048	<0.048	<0.095	<0.095	<4.8	<9.7	<49	<49	<60
BH02 0-4	3/30/2023	0 - 4	<0.025	<0.049	<0.049	<0.098	<0.098	<4.9	<9.2	<46	<46	<60
BH02 4-8	3/30/2023	4 - 8	<0.024	<0.048	<0.048	<0.095	<0.095	<4.8	<10	<50	<50	<59
BH03 0-2	3/30/2023	0 - 2	<0.025	<0.050	<0.050	<0.099	<0.099	<5.0	<9.2	<46	<46	140
BH03 4-6	3/30/2023	4 - 6	<0.024	<0.048	<0.048	<0.097	<0.097	<4.8	<9.5	<48	<48	140
BH04 0-4	3/30/2023	0 - 4	<0.025	<0.049	<0.049	<0.099	<0.099	<4.9	<9.4	<47	<47	<60
BH05 2-4	3/30/2023	2 - 4	<0.024	<0.048	<0.048	<0.096	<0.096	<4.8	<9.4	<47	<47	80
BH05 6-8	3/30/2023	6 - 8	<0.023	<0.046	<0.046	<0.092	<0.092	<4.6	<9.4	<47	<47	<60
BH06 2-4	3/30/2023	2 - 4	0.60	7.6	0.73	4.0	13	200	<8.7	<43	**200**	<60
BH06 6-8	3/30/2023	6 - 8	0.13	0.78	0.068	0.51	1.5	33	<9.8	<49	33	<60
BH07 2-4	3/30/2023	2 - 4	<0.024	<0.048	<0.048	<0.097	<0.097	<4.8	<9.9	<50	<50	77
BH07 6-8	3/30/2023	6 - 8	<0.024	<0.048	<0.048	<0.095	<0.095	<4.8	<9.4	<47	<47	<60

Notes:

bgs: below ground surface
BTEX: Benzene, Toluene, Ethylbenzene, and Xylenes
mg/kg: milligrams per kilogram
NE: Not Established
NMOCD: New Mexico Oil Conservation Division
': feet
GRO: Gasoline Range Organics
DRO: Diesel Range Organics
MRO: Motor Oil/Lube Oil Range Organics
TPH: Total Petroleum Hydrocarbon
<0.037 : indicates result less than the stated laboratory reporting limit (RL)
*Concentrations in **bold** and shaded exceed the New Mexico Oil Conservation Division Table I Closure Criteria for Soils Impacted by a Release*

ENSOLUM

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
Aztec #9
Hilcorp Energy Coorporation
San Juan County, New Mexico

Well Identification	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Total Xylenes (mg/L)
NMWQCC Standards		**0.005**	**1.0**	**0.70**	**0.62**
BH02	3/30/2023	**0.0051**	0.028	<0.0020	<0.0040
BH04	3/30/2023	<0.0020	<0.0020	<0.0020	<0.0040
BH06	3/30/2023	**0.096**	0.0030	0.0030	0.013

Notes:

mg/L: milligrams per liter

NMWQCC: New Mexico Water Quality Control Commission

<0.037: indicates result less than the stated laboratory reporting limit (PQL)

*Concentrations in **bold** and shaded exceed the New Mexico Water Quality Control Commission Standards, 20.6.2 of the New Mexico Administrative Code*

ENSOLUM

APPENDIX A

NMOSE Point of Diversion Summary

New Mexico Office of the State Engineer
Point of Diversion Summary

Well Tag	POD Number	(quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) Q64	Q16	Q4	Sec	Tws	Rng	(NAD83 UTM in meters) X	Y
	SJ 03419	2	4	4	08	30N	11W	231847	4079381*

Driller License:	1190	**Driller Company:**	BADGER WESTERN EXPLORATION INC		
Driller Name:	B.C. DALTON				
Drill Start Date:	09/10/2003	**Drill Finish Date:**	09/22/2003	**Plug Date:**	
Log File Date:	11/24/2003	**PCW Rcv Date:**		**Source:**	Shallow
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	20 GPM
Casing Size:	6.63	**Depth Well:**	41 feet	**Depth Water:**	9 feet

Water Bearing Stratifications:	Top	Bottom	Description
	10	25	Sandstone/Gravel/Conglomerate

Casing Perforations:	Top	Bottom
	6	26

***UTM location was derived from PLSS - see Help**

ENSOLUM

APPENDIX B

Site Photographs

ENSOLUM

Photographic Log
Hilcorp Energy Company
Aztec #9
San Juan County, New Mexico

Photograph: 1 Date: 3/6/2023
Description: Excavation extent on March 6, 2023
View: Northwest

Photograph: 2 Date: 3/6/2023
Description: Excavation extent on March 6, 2023
View: Northeast

Photograph: 3 Date: 3/7/2023
Description: Excavation extent on March 7, 2023
View: Southwest

Photograph: 4 Date: 3/7/2023
Description: Excavation extent on March 7, 2023
View: South

ENSOLUM

APPENDIX C

Boring Logs

ENSOLUM

Client: Hilcorp Energy Company
Project Name: Aztec # 9
Project Location: Aztec, NM
Project Manager: Stuart Hyde

BORING LOG NUMBER: BH01
Project No.:

Date Sampled: 3-30-23
Drilled By: Earthworx Environmental Services
Driller: Luis Trujillo
Logged By: Eric Carroll

Ground Surface Elevation:
Top of Casing Elevation: NA
North Coordinate:
West Coordinate:

Borehole Diameter: 4"
Casing Diameter: NA
Well Materials: NA
Surface Completion: NA
Boring Method: Direct Push

DEPTH (FEET)	SAMPLE INTERVAL	RECOVERY (%)	FID/PID READING (PPM)	POTENTIOMETRIC SURFACE	GEOLOGIC LOG SYMBOL	GEOLOGIC DESCRIPTION	BORING/WELL COMPLETION
0							NA
2	0-4	100	0.8		SC	moist dark red brown, sand, and gravel cobbles	
4						NO Stain/odor	
6				▽		wet gravel some sand	
8	4-8	60	0.6				
10						Refusal @ 8'	
12							
14							
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							

ENSOLUM

Client: Hilcorp Energy Company
Project Name: Aztec # 9
Project Location: Aztec, NM
Project Manager: Stuart Hyde

BORING LOG NUMBER: B102
Project No.:

Date Sampled: 3-30-23
Drilled By: Earthworx Environmental Services
Driller: Luis Trujillo
Logged By: Eric Carroll

Ground Surface Elevation:
Top of Casing Elevation:
North Coordinate: NA
West Coordinate:

Borehole Diameter: 4"
Casing Diameter:
Well Materials: NA
Surface Completion:
Boring Method: Direct Push

DEPTH (FEET)	SAMPLE INTERVAL	RECOVERY (%)	FID/PID READING (PPM)	POTENTIOMETRIC SURFACE	GEOLOGIC LOG SYMBOL	GEOLOGIC DESCRIPTION	BORING/WELL COMPLETION
0							NA
2	0-4	50	1.9		SC	moist dark brown, sand some clay & gravel NO stain/odor	
4							
6						wet, coarse sand & gravel	
8	4-8	70	1.1				
10						TD = 8'	
12							
14							
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							

ENSOLUM

Client: Hilcorp Energy Company
Project Name: Aztec #4
Project Location: Aztec, NM
Project Manager: Stuart Hyde

BORING LOG NUMBER: BH03

Date Sampled: 8-30-23
Drilled By: Earthwork Environmental Services
Driller: Luis Trujillo
Logged By: Eric Carroll

Ground Surface Elevation:
Top of Casing Elevation: NA
North Coordinate:
West Coordinate:

Borehole Diameter: 4"
Casing Diameter:
Well Materials: NA
Surface Completion:
Boring Method: Direct Push

DEPTH (FEET)	SAMPLE INTERVAL	RECOVERY (%)	FIELD READING (PPM)	POTENTIAL NETHIC SURFACE	GEOLOGIC LOG SYMBOL	GEOLOGIC DESCRIPTION	BORING/WELL COMPLETION
0							NA
2	0-4	100	0.1			moist dark brown clayey sand. GW @ 3' gravel and cobbles beow 3'	
4			<0.0	→			
6							
8	4-8	0				No recovery wet gravel	
10						TD = 8'	
12							
14						Sample only to 6'	
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							

ENSOLUM

Client: Hilcorp Energy Company
Project Name: Aztec # 9
Project Location: Aztec, NM
Project Manager: Stuart Hyde

BORING LOG NUMBER: BH04
Project No.:

Date Sampled: 3-30-23
Drilled By: Earthworx Environmental Services
Driller: Luis Trujillo
Logged By: Eric Carroll

Ground Surface Elevation:
Top of Casing Elevation:
North Coordinate:
West Coordinate: NA

Borehole Diameter: 4"
Casing Diameter:
Well Materials:
Surface Completion:
Boring Method: Direct Push

DEPTH (FEET)	SAMPLE INTERVAL	RECOVERY (%)	FID/PID READING (PPM)	POTENTIO-METRIC SURFACE	GEOLOGIC LOG SYMBOL	GEOLOGIC DESCRIPTION	BORING/WELL COMPLETION
0							N/A
2	0-4	40	0.3	→		Dark brown clayey sand	
4						coarse sand & gravel	
6							
8						Refusal @ 4.5' gravel/cobbles	
10							
12							
14							
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							

ENSOLUM

Client: Hilcorp Energy Company
Project Name: Aztec # 9
Project Location: Aztec, NM
Project Manager: Stuart Hyde

BORING LOG NUMBER: B405
Project No.:

Date Sampled: 3-30-23
Drilled By: Earthworx Environmental Services
Driller: Luis Trujillo
Logged By: Eric Carroll

Ground Surface Elevation:
Top of Casing Elevation:
North Coordinate: NA
West Coordinate:

Borehole Diameter: 4"
Casing Diameter:
Well Materials: NA
Surface Completion:
Boring Method: Direct Push

DEPTH (FEET)	SAMPLE INTERVAL	RECOVERY (%)	FID/PID READING (PPM)	POTENTIOMETRIC SURFACE	GEOLOGIC LOG SYMBOL	GEOLOGIC DESCRIPTION	BORING/WELL COMPLETION
0			0.4			light brown clayey sand	NA
2	0-4	100					
4			0.4		CH	gray brown sandy clay	
6			0.3			wet gray brown clayey sand	
8	4-8	100	0.1			moist gray fat clay 6.5-8'	
10							
12						TD = 8'	
14							
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							

ENSOLUM

Client: Hilcorp Energy Company
Project Name: Aztec # 9
Project Location: Aztec, NM
Project Manager: Stuart Hyde

BORING LOG NUMBER: BH06
Project No.:

Date Sampled: 3-30-23
Drilled By: Earthworx Environmental Services
Driller: Luis Trujillo
Logged By: Eric Carroll

Ground Surface Elevation:
Top of Casing Elevation:
North Coordinate: NA
West Coordinate:

Borehole Diameter: 4"
Casing Diameter:
Well Materials: NA
Surface Completion:
Boring Method: Direct Push

DEPTH (FEET)	SAMPLE INTERVAL	RECOVERY (%)	FID/PID READING (PPM)	POTENTIOMETRIC SURFACE	GEOLOGIC LOG SYMBOL	GEOLOGIC DESCRIPTION	BORING/WELL COMPLETION
0			14.6			Dark brown organic silty sand	NA
2	0-4	100	882				
4						Dark brown clayey sand	
6	4-8	100	815			Dark brown coarse sand & gravel	
8							
10						TD = 8'	
12							
14							
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							

ENSOLUM

Client: Hilcorp Energy Company
Project Name: Aztec # 9
Project Location: Aztec, NM
Project Manager: Stuart Hyde

BORING LOG NUMBER: BH07
Project No.:

Date Sampled: 3-30-23
Drilled By: Earthworx Environmental Services
Driller: Luis Trujillo
Logged By: Eric Carroll

Ground Surface Elevation:
Top of Casing Elevation:
North Coordinate: NA
West Coordinate:

Borehole Diameter: 4'
Casing Diameter:
Well Materials: NA
Surface Completion:
Boring Method: Direct Push

DEPTH (FEET)	SAMPLE INTERVAL	RECOVERY (%)	FID/PID READING (PPM)	POTENTIOMETRIC SURFACE	GEOLOGIC LOG SYMBOL	GEOLOGIC DESCRIPTION	BORING/WELL COMPLETION
0							NA
2	0-4	100	0.1			moist dark brown clayey Sand	
4							
6			0.1			gray brown clayey sand	
8	4-8					coarse dark sand & gravel	
10							
12						TD = 8'	
14							
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							

ENSOLUM

APPENDIX D

NMOCD Correspondence

From: Stuart Hyde
To: Velez, Nelson, EMNRD
Cc: Ben Mitchell; Cary Green; Mitch Killough; Eric Carroll; Devin Hencmann
Subject: nAPP2307357709 - Aztec 9 Drilling and Sampling Notification
Date: Monday, March 27, 2023 10:26:00 AM
Attachments: image001.png
image002.png
image003.png
image004.png
nAPP2307357709 - Aztec 9 Initial C-141.pdf

Nelson,

On behalf of Hilcorp Energy Company, Ensolum is submitting this drilling and sampling notification to the NMOCD for work at the Aztec 9 well pad located in Aztec, NM, coordinates 36.8225021, -108.0012741. Work is scheduled to take place on Thursday March 30, 2023 beginning at 9 AM. Please reach out with any questions regarding the site. Thanks.

Stuart Hyde, LG
Senior Geologist
970-903-1607
Ensolum, LLC

From: Velez, Nelson, EMNRD
To: Stuart Hyde
Cc: Mitch Killough; Devin Hencmann
Subject: Re: [EXTERNAL] nAPP2307357709 - Aztec 9 Extension Request for Remediation Work Plan
Date: Friday, May 26, 2023 11:17:02 AM
Attachments: image001.png
image002.png
image003.png
image004.png

[**EXTERNAL EMAIL**]
Stuart,

The time extension requested to complete the site assessment/characterization and remediation plan is approved under the condition that they include any and all remedial activities to date. The incident page has been updated with the remediation due date set for June 19, 2023. This is the first time extension requested.

Please keep a copy of this communication for inclusion within the appropriate report submittal.

The OCD requires a copy of all correspondence relative to remedial activities be included in all proposals and/or final closure reports. Correspondence required to be included in reports may include, but not limited to, notifications for liner inspections, sample events, spill/release/fire, and request for time extensions or variances.

Regards,

If you have any questions, please contact me at your convenience.

Regards,

Nelson Velez ● Environmental Specialist - Adv
Environmental Bureau | EMNRD - Oil Conservation Division
1000 Rio Brazos Road | Aztec, NM 87410
(505) 469-6146 | nelson.velez@emnrd.nm.gov
http://www.emnrd.state.nm.us/OCD/

From: Stuart Hyde <shyde@ensolum.com>
Sent: Thursday, May 25, 2023 2:23 PM
To: Velez, Nelson, EMNRD <Nelson.Velez@emnrd.nm.gov>
Cc: Mitch Killough <mkillough@hilcorp.com>; Devin Hencmann <dhencmann@ensolum.com>
Subject: [EXTERNAL] nAPP2307357709 - Aztec 9 Extension Request for Remediation Work Plan

Nelson,

On behalf of Hilcorp Energy Company, Ensolum respectfully requests a 20-day extension to the Remediation Work Plan reporting deadline from May 28, 2023 to June 17, 2023. We have been working with some vendors to provide information related to in-situ soil and groundwater treatment and need a little extra time to assess the applicability for the Site and make recommendations for remediation moving forward.

Please reach out with any questions or comments regarding the site and/or extension request. Thanks and have a great afternoon.

Stuart Hyde, LG
Senior Geologist
970-903-1607
Ensolum, LLC

ENSOLUM

APPENDIX E

Laboratory Analytical Reports

Analytical Report
Lab Order **2303489**
Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: N-SW
Project: Aztec 9
Collection Date: 3/7/2023 3:40:00 PM
Lab ID: 2303489-001 **Matrix:** SOIL **Received Date:** 3/9/2023 7:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	8.8		mg/Kg	1	3/13/2023 1:42:24 PM
Motor Oil Range Organics (MRO)	ND	44		mg/Kg	1	3/13/2023 1:42:24 PM
Surr: DNOP	87.5	69-147		%Rec	1	3/13/2023 1:42:24 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	750	25		mg/Kg	5	3/11/2023 4:12:00 AM
Surr: BFB	107	37.7-212		%Rec	5	3/11/2023 4:12:00 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	1.2	0.12		mg/Kg	5	3/11/2023 4:12:00 AM
Toluene	21	0.25		mg/Kg	5	3/11/2023 4:12:00 AM
Ethylbenzene	2.2	0.25		mg/Kg	5	3/11/2023 4:12:00 AM
Xylenes, Total	11	0.49		mg/Kg	5	3/11/2023 4:12:00 AM
Surr: 4-Bromofluorobenzene	89.9	70-130		%Rec	5	3/11/2023 4:12:00 AM
EPA METHOD 300.0: ANIONS						Analyst: **JTT**
Chloride	ND	59		mg/Kg	20	3/10/2023 5:01:44 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix
E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
PQL	Practical Quanitative Limit
RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.

Analytical Report
Lab Order **2303489**
Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: E-SW
Project: Aztec 9
Collection Date: 3/7/2023 3:45:00 PM
Lab ID: 2303489-002 **Matrix:** SOIL **Received Date:** 3/9/2023 7:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	3/13/2023 2:05:56 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/13/2023 2:05:56 PM
Surr: DNOP	90.2	69-147		%Rec	1	3/13/2023 2:05:56 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	200	93		mg/Kg	20	3/11/2023 5:23:14 AM
Surr: BFB	105	37.7-212		%Rec	20	3/11/2023 5:23:14 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	0.81	0.46		mg/Kg	20	3/11/2023 5:23:14 AM
Toluene	7.1	0.93		mg/Kg	20	3/11/2023 5:23:14 AM
Ethylbenzene	ND	0.93		mg/Kg	20	3/11/2023 5:23:14 AM
Xylenes, Total	4.1	1.9		mg/Kg	20	3/11/2023 5:23:14 AM
Surr: 4-Bromofluorobenzene	89.5	70-130		%Rec	20	3/11/2023 5:23:14 AM
EPA METHOD 300.0: ANIONS						Analyst: **JTT**
Chloride	ND	61		mg/Kg	20	3/10/2023 5:14:08 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303490**
Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: W-SW
Project: Aztec 9
Collection Date: 3/6/2023 3:40:00 PM
Lab ID: 2303490-002 **Matrix:** SOIL **Received Date:** 3/9/2023 7:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **PRD**
Diesel Range Organics (DRO)	ND	9.0		mg/Kg	1	3/10/2023 11:13:40 AM
Motor Oil Range Organics (MRO)	ND	45		mg/Kg	1	3/10/2023 11:13:40 AM
Surr: DNOP	99.5	69-147		%Rec	1	3/10/2023 11:13:40 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	560	24		mg/Kg	5	3/10/2023 4:20:34 PM
Surr: BFB	106	37.7-212		%Rec	5	3/10/2023 4:20:34 PM
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	0.18	0.024		mg/Kg	1	3/11/2023 9:38:00 AM
Toluene	1.6	0.048		mg/Kg	1	3/11/2023 9:38:00 AM
Ethylbenzene	0.15	0.048		mg/Kg	1	3/11/2023 9:38:00 AM
Xylenes, Total	0.86	0.096		mg/Kg	1	3/11/2023 9:38:00 AM
Surr: 4-Bromofluorobenzene	101	70-130		%Rec	1	3/11/2023 9:38:00 AM
EPA METHOD 300.0: ANIONS						Analyst: **JTT**
Chloride	ND	60		mg/Kg	20	3/10/2023 6:28:25 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix
E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
PQL	Practical Quanitative Limit
RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.

Analytical Report
Lab Order **2303490**
Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: S-SW
Project: Aztec 9
Collection Date: 3/6/2023 3:35:00 PM
Lab ID: 2303490-003 **Matrix:** SOIL **Received Date:** 3/9/2023 7:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **PRD**
Diesel Range Organics (DRO)	ND	8.8		mg/Kg	1	3/10/2023 11:38:01 AM
Motor Oil Range Organics (MRO)	ND	44		mg/Kg	1	3/10/2023 11:38:01 AM
Surr: DNOP	100	69-147		%Rec	1	3/10/2023 11:38:01 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	230	24		mg/Kg	5	3/10/2023 4:44:02 PM
Surr: BFB	106	37.7-212		%Rec	5	3/10/2023 4:44:02 PM
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	0.13	0.024		mg/Kg	1	3/11/2023 10:00:00 AM
Toluene	2.5	0.047		mg/Kg	1	3/11/2023 10:00:00 AM
Ethylbenzene	0.40	0.047		mg/Kg	1	3/11/2023 10:00:00 AM
Xylenes, Total	2.1	0.095		mg/Kg	1	3/11/2023 10:00:00 AM
Surr: 4-Bromofluorobenzene	101	70-130		%Rec	1	3/11/2023 10:00:00 AM
EPA METHOD 300.0: ANIONS						Analyst: **JTT**
Chloride	ND	60		mg/Kg	20	3/10/2023 6:40:48 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix
E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
PQL	Practical Quanitative Limit
RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

April 12, 2023

Stuart Hyde
HILCORP ENERGY
PO Box 4700
Farmington, NM 87499
TEL: (505) 564-0733
FAX:

RE: Aztec 9 OrderNo.: 2303F33

Dear Stuart Hyde:

Hall Environmental Analysis Laboratory received 16 sample(s) on 3/31/2023 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

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

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH01 0-4
Project: Aztec 9
Collection Date: 3/30/2023 11:00:00 AM
Lab ID: 2303F33-001 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	4/7/2023 12:49:24 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	4/7/2023 12:49:24 AM
Surr: DNOP	107	69-147		%Rec	1	4/7/2023 12:49:24 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	4/7/2023 5:09:19 AM
Surr: BFB	103	37.7-212		%Rec	1	4/7/2023 5:09:19 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.024		mg/Kg	1	4/7/2023 5:09:19 AM
Toluene	ND	0.048		mg/Kg	1	4/7/2023 5:09:19 AM
Ethylbenzene	ND	0.048		mg/Kg	1	4/7/2023 5:09:19 AM
Xylenes, Total	ND	0.095		mg/Kg	1	4/7/2023 5:09:19 AM
Surr: 4-Bromofluorobenzene	90.4	70-130		%Rec	1	4/7/2023 5:09:19 AM
EPA METHOD 300.0: ANIONS						Analyst: **CAS**
Chloride	ND	60		mg/Kg	20	4/6/2023 6:11:17 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH01 4-8
Project: Aztec 9
Collection Date: 3/30/2023 11:10:00 AM
Lab ID: 2303F33-002 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	4/7/2023 12:59:59 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	4/7/2023 12:59:59 AM
Surr: DNOP	96.2	69-147		%Rec	1	4/7/2023 12:59:59 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	4/7/2023 5:32:54 AM
Surr: BFB	103	37.7-212		%Rec	1	4/7/2023 5:32:54 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.024		mg/Kg	1	4/7/2023 5:32:54 AM
Toluene	ND	0.048		mg/Kg	1	4/7/2023 5:32:54 AM
Ethylbenzene	ND	0.048		mg/Kg	1	4/7/2023 5:32:54 AM
Xylenes, Total	ND	0.095		mg/Kg	1	4/7/2023 5:32:54 AM
Surr: 4-Bromofluorobenzene	89.8	70-130		%Rec	1	4/7/2023 5:32:54 AM
EPA METHOD 300.0: ANIONS						Analyst: **CAS**
Chloride	ND	60		mg/Kg	20	4/6/2023 7:13:19 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH02 0-4
Project: Aztec 9
Collection Date: 3/30/2023 11:20:00 AM
Lab ID: 2303F33-003 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.2		mg/Kg	1	4/7/2023 1:10:37 AM
Motor Oil Range Organics (MRO)	ND	46		mg/Kg	1	4/7/2023 1:10:37 AM
Surr: DNOP	93.3	69-147		%Rec	1	4/7/2023 1:10:37 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	4/7/2023 5:56:29 AM
Surr: BFB	103	37.7-212		%Rec	1	4/7/2023 5:56:29 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.025		mg/Kg	1	4/7/2023 5:56:29 AM
Toluene	ND	0.049		mg/Kg	1	4/7/2023 5:56:29 AM
Ethylbenzene	ND	0.049		mg/Kg	1	4/7/2023 5:56:29 AM
Xylenes, Total	ND	0.098		mg/Kg	1	4/7/2023 5:56:29 AM
Surr: 4-Bromofluorobenzene	89.4	70-130		%Rec	1	4/7/2023 5:56:29 AM
EPA METHOD 300.0: ANIONS						Analyst: **CAS**
Chloride	ND	60		mg/Kg	20	4/6/2023 7:25:44 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH02 4-8
Project: Aztec 9
Collection Date: 3/30/2023 11:25:00 AM
Lab ID: 2303F33-004 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	4/7/2023 1:21:12 AM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	4/7/2023 1:21:12 AM
Surr: DNOP	95.5	69-147		%Rec	1	4/7/2023 1:21:12 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	4/7/2023 6:20:02 AM
Surr: BFB	103	37.7-212		%Rec	1	4/7/2023 6:20:02 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.024		mg/Kg	1	4/7/2023 6:20:02 AM
Toluene	ND	0.048		mg/Kg	1	4/7/2023 6:20:02 AM
Ethylbenzene	ND	0.048		mg/Kg	1	4/7/2023 6:20:02 AM
Xylenes, Total	ND	0.095		mg/Kg	1	4/7/2023 6:20:02 AM
Surr: 4-Bromofluorobenzene	89.9	70-130		%Rec	1	4/7/2023 6:20:02 AM
EPA METHOD 300.0: ANIONS						Analyst: **CAS**
Chloride	ND	59		mg/Kg	20	4/6/2023 7:38:09 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH03 0-2
Project: Aztec 9
Collection Date: 3/30/2023 11:40:00 AM
Lab ID: 2303F33-005 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.2		mg/Kg	1	4/7/2023 1:31:46 AM
Motor Oil Range Organics (MRO)	ND	46		mg/Kg	1	4/7/2023 1:31:46 AM
Surr: DNOP	95.0	69-147		%Rec	1	4/7/2023 1:31:46 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	5.0		mg/Kg	1	4/7/2023 6:43:38 AM
Surr: BFB	101	37.7-212		%Rec	1	4/7/2023 6:43:38 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.025		mg/Kg	1	4/7/2023 6:43:38 AM
Toluene	ND	0.050		mg/Kg	1	4/7/2023 6:43:38 AM
Ethylbenzene	ND	0.050		mg/Kg	1	4/7/2023 6:43:38 AM
Xylenes, Total	ND	0.099		mg/Kg	1	4/7/2023 6:43:38 AM
Surr: 4-Bromofluorobenzene	89.0	70-130		%Rec	1	4/7/2023 6:43:38 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	140	60		mg/Kg	20	4/6/2023 6:37:16 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix
E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
PQL	Practical Quanitative Limit
RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH03 4-6
Project: Aztec 9
Collection Date: 3/30/2023 11:45:00 AM
Lab ID: 2303F33-006 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.5		mg/Kg	1	4/7/2023 1:42:19 AM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	4/7/2023 1:42:19 AM
Surr: DNOP	95.2	69-147		%Rec	1	4/7/2023 1:42:19 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	4/7/2023 7:07:10 AM
Surr: BFB	102	37.7-212		%Rec	1	4/7/2023 7:07:10 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.024		mg/Kg	1	4/7/2023 7:07:10 AM
Toluene	ND	0.048		mg/Kg	1	4/7/2023 7:07:10 AM
Ethylbenzene	ND	0.048		mg/Kg	1	4/7/2023 7:07:10 AM
Xylenes, Total	ND	0.097		mg/Kg	1	4/7/2023 7:07:10 AM
Surr: 4-Bromofluorobenzene	88.5	70-130		%Rec	1	4/7/2023 7:07:10 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	140	60		mg/Kg	20	4/6/2023 6:49:41 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH04 0-4
Project: Aztec 9
Collection Date: 3/30/2023 11:55:00 AM
Lab ID: 2303F33-007 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	4/7/2023 1:53:02 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	4/7/2023 1:53:02 AM
Surr: DNOP	101	69-147		%Rec	1	4/7/2023 1:53:02 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	4/7/2023 7:30:43 AM
Surr: BFB	103	37.7-212		%Rec	1	4/7/2023 7:30:43 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.025		mg/Kg	1	4/7/2023 7:30:43 AM
Toluene	ND	0.049		mg/Kg	1	4/7/2023 7:30:43 AM
Ethylbenzene	ND	0.049		mg/Kg	1	4/7/2023 7:30:43 AM
Xylenes, Total	ND	0.099		mg/Kg	1	4/7/2023 7:30:43 AM
Surr: 4-Bromofluorobenzene	89.5	70-130		%Rec	1	4/7/2023 7:30:43 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	ND	60		mg/Kg	20	4/6/2023 7:02:06 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH05 2-4
Project: Aztec 9
Collection Date: 3/30/2023 12:15:00 PM
Lab ID: 2303F33-008 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	4/7/2023 2:03:41 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	4/7/2023 2:03:41 AM
Surr: DNOP	97.8	69-147		%Rec	1	4/7/2023 2:03:41 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	4/7/2023 7:54:15 AM
Surr: BFB	100	37.7-212		%Rec	1	4/7/2023 7:54:15 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.024		mg/Kg	1	4/7/2023 7:54:15 AM
Toluene	ND	0.048		mg/Kg	1	4/7/2023 7:54:15 AM
Ethylbenzene	ND	0.048		mg/Kg	1	4/7/2023 7:54:15 AM
Xylenes, Total	ND	0.096		mg/Kg	1	4/7/2023 7:54:15 AM
Surr: 4-Bromofluorobenzene	86.8	70-130		%Rec	1	4/7/2023 7:54:15 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	80	60		mg/Kg	20	4/6/2023 7:14:30 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH05 6-8
Project: Aztec 9
Collection Date: 3/30/2023 12:25:00 PM
Lab ID: 2303F33-009 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	4/7/2023 2:14:21 AM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	4/7/2023 2:14:21 AM
Surr: DNOP	97.9	69-147		%Rec	1	4/7/2023 2:14:21 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	4/7/2023 8:17:55 AM
Surr: BFB	103	37.7-212		%Rec	1	4/7/2023 8:17:55 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	ND	0.023		mg/Kg	1	4/7/2023 8:17:55 AM
Toluene	ND	0.046		mg/Kg	1	4/7/2023 8:17:55 AM
Ethylbenzene	ND	0.046		mg/Kg	1	4/7/2023 8:17:55 AM
Xylenes, Total	ND	0.092		mg/Kg	1	4/7/2023 8:17:55 AM
Surr: 4-Bromofluorobenzene	90.2	70-130		%Rec	1	4/7/2023 8:17:55 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	ND	60		mg/Kg	20	4/6/2023 7:26:54 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH06 2-4
Project: Aztec 9
Collection Date: 3/30/2023 12:30:00 PM
Lab ID: 2303F33-010 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	8.7		mg/Kg	1	4/7/2023 2:24:59 AM
Motor Oil Range Organics (MRO)	ND	43		mg/Kg	1	4/7/2023 2:24:59 AM
Surr: DNOP	98.6	69-147		%Rec	1	4/7/2023 2:24:59 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **JJP**
Gasoline Range Organics (GRO)	200	4.9		mg/Kg	1	4/7/2023 8:41:29 AM
Surr: BFB	104	37.7-212		%Rec	1	4/7/2023 8:41:29 AM
EPA METHOD 8021B: VOLATILES						Analyst: **JJP**
Benzene	0.60	0.025		mg/Kg	1	4/7/2023 8:41:29 AM
Toluene	7.6	0.49		mg/Kg	10	4/7/2023 1:19:19 PM
Ethylbenzene	0.73	0.049		mg/Kg	1	4/7/2023 8:41:29 AM
Xylenes, Total	4.0	0.098		mg/Kg	1	4/7/2023 8:41:29 AM
Surr: 4-Bromofluorobenzene	90.5	70-130		%Rec	1	4/7/2023 8:41:29 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	ND	60		mg/Kg	20	4/6/2023 8:04:08 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH06 6-8
Project: Aztec 9
Collection Date: 3/30/2023 12:35:00 PM
Lab ID: 2303F33-011 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	4/7/2023 6:59:29 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	4/7/2023 6:59:29 PM
Surr: DNOP	91.7	69-147		%Rec	1	4/7/2023 6:59:29 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	33	4.9		mg/Kg	1	4/7/2023 7:15:00 AM
Surr: BFB	91.4	37.7-212		%Rec	1	4/7/2023 7:15:00 AM
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	0.13	0.024		mg/Kg	1	4/7/2023 7:15:00 AM
Toluene	0.78	0.049		mg/Kg	1	4/7/2023 7:15:00 AM
Ethylbenzene	0.068	0.049		mg/Kg	1	4/7/2023 7:15:00 AM
Xylenes, Total	0.51	0.098		mg/Kg	1	4/7/2023 7:15:00 AM
Surr: 4-Bromofluorobenzene	88.5	70-130		%Rec	1	4/7/2023 7:15:00 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	ND	60		mg/Kg	20	4/6/2023 8:16:32 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH07 2-4
Project: Aztec 9
Collection Date: 3/30/2023 12:40:00 PM
Lab ID: 2303F33-012 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	4/7/2023 7:32:02 PM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	4/7/2023 7:32:02 PM
Surr: DNOP	92.8	69-147		%Rec	1	4/7/2023 7:32:02 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	4/7/2023 7:36:00 AM
Surr: BFB	97.9	37.7-212		%Rec	1	4/7/2023 7:36:00 AM
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	ND	0.024		mg/Kg	1	4/7/2023 7:36:00 AM
Toluene	ND	0.048		mg/Kg	1	4/7/2023 7:36:00 AM
Ethylbenzene	ND	0.048		mg/Kg	1	4/7/2023 7:36:00 AM
Xylenes, Total	ND	0.097		mg/Kg	1	4/7/2023 7:36:00 AM
Surr: 4-Bromofluorobenzene	90.2	70-130		%Rec	1	4/7/2023 7:36:00 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	77	60		mg/Kg	20	4/6/2023 8:28:57 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH07 6-8
Project: Aztec 9
Collection Date: 3/30/2023 12:43:00 PM
Lab ID: 2303F33-013 **Matrix:** SOIL **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **DGH**
Diesel Range Organics (DRO)	ND	9.4		mg/Kg	1	4/7/2023 7:42:51 PM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	4/7/2023 7:42:51 PM
Surr: DNOP	121	69-147		%Rec	1	4/7/2023 7:42:51 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	4/7/2023 7:58:00 AM
Surr: BFB	91.6	37.7-212		%Rec	1	4/7/2023 7:58:00 AM
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	ND	0.024		mg/Kg	1	4/7/2023 7:58:00 AM
Toluene	ND	0.048		mg/Kg	1	4/7/2023 7:58:00 AM
Ethylbenzene	ND	0.048		mg/Kg	1	4/7/2023 7:58:00 AM
Xylenes, Total	ND	0.095		mg/Kg	1	4/7/2023 7:58:00 AM
Surr: 4-Bromofluorobenzene	90.6	70-130		%Rec	1	4/7/2023 7:58:00 AM
EPA METHOD 300.0: ANIONS						Analyst: **JMT**
Chloride	ND	60		mg/Kg	20	4/6/2023 8:41:21 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH02
Project: Aztec 9
Collection Date: 3/30/2023 11:30:00 AM
Lab ID: 2303F33-014 **Matrix:** AQUEOUS **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	5.1	2.0	P	µg/L	2	3/31/2023 3:14:00 PM
Toluene	28	2.0	P	µg/L	2	3/31/2023 3:14:00 PM
Ethylbenzene	ND	2.0	P	µg/L	2	3/31/2023 3:14:00 PM
Xylenes, Total	ND	4.0	P	µg/L	2	3/31/2023 3:14:00 PM
Surr: 4-Bromofluorobenzene	99.5	70-130	P	%Rec	2	3/31/2023 3:14:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH04
Project: Aztec 9
Collection Date: 3/30/2023 12:45:00 PM
Lab ID: 2303F33-015 **Matrix:** AQUEOUS **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	ND	2.0		µg/L	2	3/31/2023 3:36:00 PM
Toluene	ND	2.0		µg/L	2	3/31/2023 3:36:00 PM
Ethylbenzene	ND	2.0		µg/L	2	3/31/2023 3:36:00 PM
Xylenes, Total	ND	4.0		µg/L	2	3/31/2023 3:36:00 PM
Surr: 4-Bromofluorobenzene	91.1	70-130		%Rec	2	3/31/2023 3:36:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order **2303F33**
Date Reported: **4/12/2023**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Client Sample ID: BH06
Project: Aztec 9
Collection Date: 3/30/2023 1:00:00 PM
Lab ID: 2303F33-016 **Matrix:** AQUEOUS **Received Date:** 3/31/2023 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8021B: VOLATILES						Analyst: **CCM**
Benzene	96	2.0		µg/L	2	3/31/2023 3:57:00 PM
Toluene	3.0	2.0		µg/L	2	3/31/2023 3:57:00 PM
Ethylbenzene	3.0	2.0		µg/L	2	3/31/2023 3:57:00 PM
Xylenes, Total	13	4.0		µg/L	2	3/31/2023 3:57:00 PM
Surr: 4-Bromofluorobenzene	94.0	70-130		%Rec	2	3/31/2023 3:57:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**

12-Apr-23

Client: HILCORP ENERGY

Project: Aztec 9

Sample ID: **MB-74178**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **PBS**	Batch ID: **74178**	RunNo: **95836**							
Prep Date: **4/6/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470307**	Units: **mg/Kg**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	1.5								

Sample ID: **LCS-74178**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **LCSS**	Batch ID: **74178**	RunNo: **95836**							
Prep Date: **4/6/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470308**	Units: **mg/Kg**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	15	1.5	15.00	0	98.6	90	110			

Sample ID: **MB-74168**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **PBS**	Batch ID: **74168**	RunNo: **95856**							
Prep Date: **4/6/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470370**	Units: **mg/Kg**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	1.5								

Sample ID: **LCS-74168**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **LCSS**	Batch ID: **74168**	RunNo: **95856**							
Prep Date: **4/6/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470371**	Units: **mg/Kg**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	14	1.5	15.00	0	92.0	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**

12-Apr-23

Client: HILCORP ENERGY

Project: Aztec 9

Sample ID: **LCS-74143**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **74143**	RunNo: **95858**
Prep Date: **4/5/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470517** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	49	10	50.00	0	97.5	61.9	130			
Surr: DNOP	5.7		5.000		114	69	147			

Sample ID: **MB-74143**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **74143**	RunNo: **95858**
Prep Date: **4/5/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470519** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	12		10.00		118	69	147			

Sample ID: **2303F33-011AMS**	SampType: **MS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **BH06 6-8**	Batch ID: **74174**	RunNo: **95870**
Prep Date: **4/6/2023**	Analysis Date: **4/7/2023**	SeqNo: **3471232** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	51	8.8	44.13	0	115	54.2	135			
Surr: DNOP	6.1		4.413		138	69	147			

Sample ID: **2303F33-011AMSD**	SampType: **MSD**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **BH06 6-8**	Batch ID: **74174**	RunNo: **95870**
Prep Date: **4/6/2023**	Analysis Date: **4/7/2023**	SeqNo: **3471233** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	52	9.7	48.64	0	107	54.2	135	2.29	29.2	
Surr: DNOP	5.8		4.864		120	69	147	0	0	

Sample ID: **LCS-74174**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **74174**	RunNo: **95870**
Prep Date: **4/6/2023**	Analysis Date: **4/7/2023**	SeqNo: **3471353** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	44	10	50.00	0	87.3	61.9	130			
Surr: DNOP	4.6		5.000		91.6	69	147			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**

12-Apr-23

Client: HILCORP ENERGY

Project: Aztec 9

Sample ID: **LCS-74176**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **74176**	RunNo: **95870**
Prep Date: **4/6/2023**	Analysis Date: **4/7/2023**	SeqNo: **3471354** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	5.7		5.000		113	69	147			

Sample ID: **MB-74174**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **74174**	RunNo: **95870**
Prep Date: **4/6/2023**	Analysis Date: **4/7/2023**	SeqNo: **3471360** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	8.6		10.00		86.5	69	147			

Sample ID: **MB-74176**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **74176**	RunNo: **95870**
Prep Date: **4/6/2023**	Analysis Date: **4/7/2023**	SeqNo: **3471361** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	9.3		10.00		92.6	69	147			

Sample ID: **MB-74198**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **74198**	RunNo: **95898**
Prep Date: **4/7/2023**	Analysis Date: **4/10/2023**	SeqNo: **3472268** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	8.3		10.00		83.4	69	147			

Sample ID: **LCS-74198**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **74198**	RunNo: **95898**
Prep Date: **4/7/2023**	Analysis Date: **4/10/2023**	SeqNo: **3472269** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.4		5.000		88.5	69	147			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**

12-Apr-23

Client: HILCORP ENERGY

Project: Aztec 9

Sample ID: **lcs-74141**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS**	Batch ID: **74141**	RunNo: **95830**
Prep Date: **4/5/2023**	Analysis Date: **4/7/2023**	SeqNo: **3469617** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	19	5.0	25.00	0	76.1	70	130			
Surr: BFB	2000		1000		195	37.7	212			

Sample ID: **mb-74141**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS**	Batch ID: **74141**	RunNo: **95830**
Prep Date: **4/5/2023**	Analysis Date: **4/7/2023**	SeqNo: **3469618** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	900		1000		89.9	37.7	212			

Sample ID: **lcs-74127**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS**	Batch ID: **74127**	RunNo: **95860**
Prep Date: **4/4/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470642** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	21	5.0	25.00	0	82.8	70	130			
Surr: BFB	1900		1000		193	37.7	212			

Sample ID: **mb-74127**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS**	Batch ID: **74127**	RunNo: **95860**
Prep Date: **4/4/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470644** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	990		1000		99.4	37.7	212			

Sample ID: **lcs-74186**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS**	Batch ID: **74186**	RunNo: **95861**
Prep Date: **4/6/2023**	Analysis Date: **4/7/2023**	SeqNo: **3471592** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	2000		1000		200	37.7	212			

Sample ID: **mb-74186**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS**	Batch ID: **74186**	RunNo: **95861**
Prep Date: **4/6/2023**	Analysis Date: **4/8/2023**	SeqNo: **3471593** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	890		1000		88.8	37.7	212			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**
12-Apr-23

Client: HILCORP ENERGY
Project: Aztec 9

Sample ID: **lcs-74179**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS**	Batch ID: **74179**	RunNo: **95869**
Prep Date: **4/6/2023**	Analysis Date: **4/8/2023**	SeqNo: **3471789** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	1900		1000		185	37.7	212			

Sample ID: **mb-74179**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS**	Batch ID: **74179**	RunNo: **95869**
Prep Date: **4/6/2023**	Analysis Date: **4/8/2023**	SeqNo: **3471791** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	970		1000		96.7	37.7	212			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**

12-Apr-23

Client: HILCORP ENERGY

Project: Aztec 9

Sample ID: **lcs-74141**	SampType: **LCS**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **LCSS**	Batch ID: **74141**	RunNo: **95830**
Prep Date: **4/5/2023**	Analysis Date: **4/7/2023**	SeqNo: **3469624** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.89	0.025	1.000	0	89.3	80	120			
Toluene	0.90	0.050	1.000	0	89.8	80	120			
Ethylbenzene	0.88	0.050	1.000	0	87.7	80	120			
Xylenes, Total	2.6	0.10	3.000	0	86.7	80	120			
Surr: 4-Bromofluorobenzene	0.92		1.000		91.7	70	130			

Sample ID: **mb-74141**	SampType: **MBLK**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **PBS**	Batch ID: **74141**	RunNo: **95830**
Prep Date: **4/5/2023**	Analysis Date: **4/7/2023**	SeqNo: **3469625** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: 4-Bromofluorobenzene	0.91		1.000		90.6	70	130			

Sample ID: **LCS-74127**	SampType: **LCS**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **LCSS**	Batch ID: **74127**	RunNo: **95860**
Prep Date: **4/4/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470697** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.89	0.025	1.000	0	89.3	80	120			
Toluene	0.90	0.050	1.000	0	89.8	80	120			
Ethylbenzene	0.89	0.050	1.000	0	89.3	80	120			
Xylenes, Total	2.7	0.10	3.000	0	89.3	80	120			
Surr: 4-Bromofluorobenzene	0.90		1.000		90.3	70	130			

Sample ID: **mb-74127**	SampType: **MBLK**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **PBS**	Batch ID: **74127**	RunNo: **95860**
Prep Date: **4/4/2023**	Analysis Date: **4/6/2023**	SeqNo: **3470699** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: 4-Bromofluorobenzene	0.87		1.000		87.4	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**

12-Apr-23

Client: HILCORP ENERGY

Project: Aztec 9

Sample ID: **lcs-74186**	SampType: **LCS**	TestCode: **EPA Method 8021B: Volatiles**							
Client ID: **LCSS**	Batch ID: **74186**	RunNo: **95861**							
Prep Date: **4/6/2023**	Analysis Date: **4/8/2023**	SeqNo: **3471696**	Units: **%Rec**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	0.91		1.000		91.0	70	130			

Sample ID: **mb-74186**	SampType: **MBLK**	TestCode: **EPA Method 8021B: Volatiles**							
Client ID: **PBS**	Batch ID: **74186**	RunNo: **95861**							
Prep Date: **4/6/2023**	Analysis Date: **4/8/2023**	SeqNo: **3471699**	Units: **%Rec**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	0.88		1.000		88.1	70	130			

Sample ID: **LCS-74179**	SampType: **LCS**	TestCode: **EPA Method 8021B: Volatiles**							
Client ID: **LCSS**	Batch ID: **74179**	RunNo: **95869**							
Prep Date: **4/6/2023**	Analysis Date: **4/8/2023**	SeqNo: **3473502**	Units: **%Rec**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	0.84		1.000		84.2	70	130			

Sample ID: **mb-74179**	SampType: **MBLK**	TestCode: **EPA Method 8021B: Volatiles**							
Client ID: **PBS**	Batch ID: **74179**	RunNo: **95869**							
Prep Date: **4/6/2023**	Analysis Date: **4/8/2023**	SeqNo: **3473503**	Units: **%Rec**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	0.83		1.000		83.3	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2303F33**

12-Apr-23

Client: HILCORP ENERGY

Project: Aztec 9

Sample ID: **100NG BTEX LCS**	SampType: **LCS**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **LCSW**	Batch ID: **BW95703**	RunNo: **95703**
Prep Date:	Analysis Date: **3/31/2023**	SeqNo: **3464767** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	19	1.0	20.00	0	95.4	70	130			
Toluene	19	1.0	20.00	0	96.9	70	130			
Ethylbenzene	19	1.0	20.00	0	97.3	70	130			
Xylenes, Total	58	2.0	60.00	0	97.1	70	130			
Surr: 4-Bromofluorobenzene	20		20.00		101	70	130			

Sample ID: **mb**	SampType: **MBLK**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **PBW**	Batch ID: **BW95703**	RunNo: **95703**
Prep Date:	Analysis Date: **3/31/2023**	SeqNo: **3464769** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	2.0								
Surr: 4-Bromofluorobenzene	20		20.00		101	70	130			

Sample ID: **2303F33-014ams**	SampType: **MS**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **BH02**	Batch ID: **BW95703**	RunNo: **95703**
Prep Date:	Analysis Date: **3/31/2023**	SeqNo: **3464773** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	43	2.0	40.00	5.136	94.1	70	130			
Toluene	66	2.0	40.00	28.50	93.4	70	130			
Ethylbenzene	39	2.0	40.00	0.7540	95.9	70	130			
Xylenes, Total	120	4.0	120.0	2.250	95.7	70	130			
Surr: 4-Bromofluorobenzene	38		40.00		95.0	70	130			

Sample ID: **2303F33-014amsd**	SampType: **MSD**	TestCode: **EPA Method 8021B: Volatiles**
Client ID: **BH02**	Batch ID: **BW95703**	RunNo: **95703**
Prep Date:	Analysis Date: **3/31/2023**	SeqNo: **3464774** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	42	2.0	40.00	5.136	91.0	70	130	2.98	20	
Toluene	63	2.0	40.00	28.50	87.2	70	130	3.84	20	
Ethylbenzene	38	2.0	40.00	0.7540	93.5	70	130	2.49	20	
Xylenes, Total	110	4.0	120.0	2.250	93.6	70	130	2.23	20	
Surr: 4-Bromofluorobenzene	38		40.00		94.3	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.
B	Analyte detected in the associated Method Blank
E	Above Quantitation Range/Estimated Value
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: HILCORP ENERGY Work Order Number: 2303F33 RcptNo: 1

Received By: Tracy Casarrubias 3/31/2023 7:10:00 AM

Completed By: Tracy Casarrubias 3/31/2023 8:18:01 AM

Reviewed By: 3/31/23

Chain of Custody

1. Is Chain of Custody complete?	Yes ☐	No ☑	Not Present ☐
2. How was the sample delivered?	Courier		

Log In

3. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
5. Sample(s) in proper container(s)?	Yes ☑	No ☐	
6. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
7. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
8. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA?	Yes ☑	No ☐	NA ☑
10. Were any sample containers received broken?	Yes ☐	No ☑	
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
12. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
13. Is it clear what analyses were requested?	Yes ☑	No ☐	
14. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

KPA 3.31.23

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by KPA 3.31.23

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

16. Additional remarks:

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.0	Good	Yes	Morty		

Chain-of-Custody Record

Client: Hilcorp

Mitch Killough

Mailing Address:

Phone #:

email or Fax#: mkillough@hilcorp.com

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance

☐ NELAC ☐ Other

☐ EDD (Type)

Turn-Around Time: 5 day

☒ Standard ☐ Rush

Project Name: Aztec #9

Project #:

Project Manager: Stuart Hyde - Ensolum

Sampler: Eric Carroll

On Ice: ☒ Yes ☐ No Molly

# of Coolers: 1

Cooler Temp(Including CF): 4.0-0 = 4.0 (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2303F33	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)
3-30	11:00	Soil	BH01 0-4	1 4oz		001	X	X					X			
	11:10		BH01 4-8			002										
	11:20		BH02 0-4			003										
	11:25		BH02 4-8			004										
	11:40		BH03 0-2			005										
	11:45		BH03 4-6			006										
	11:55		BH04 0-4			007										
	12:15		BH05 2-4			008										
	12:25		BH05 6-8			009										
	1230		BH06 2-4			010										
	1235		BH06 6-8			011										
	1240		BH07 2-4			012										

Analysis Request

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
3-30	1450	Eric Carroll				
3/30/23	1819			Courier	3/31/23	710

Remarks:

cc: shyde@ensolum.com

ecarroll@ensolum.com

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Chain-of-Custody Record

Client: Hilcorp

Mitch Killough

Mailing Address:

Phone #:

email or Fax#: mkillough@hilcorp.com

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance

☐ NELAC ☐ Other

☐ EDD (Type)

Turn-Around Time: 5 day

☒ Standard ☐ Rush

Project Name: Aztec #9

Project #:

Project Manager: Stuart Hyde - Ensolum

Sampler: Eric Carroll

On Ice: ☑ Yes ☐ No Marty

# of Coolers: 1

Cooler Temp(Including CF): 4.0 -0 = 4.0 (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No.	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)
3-30	1243	Soil	BH07 6-8	1 4oz	Cool	013	X	X					X			
	1130	AQ	BH02	3 VOA	HCl		X									
	1245	AQ	BH04	3 VOA	HCl		X									
↓	1300	AQ	BH06	3 VOA	HCl		X									

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
3-30	1450				3/30/23	1450
3/30/23	1819			cour	Date	Time
					3/31/23	7:10

Remarks:

cc: shyde@ensolum.com

ecarroll@ensolum.com

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

ENSOLUM

APPENDIX F

BOS 200® Brochure

TRAP & TREAT® - BOS 200®

Based on years of experience using a variety of injectable technologies, ranging from augmented bioremediation to Fenton chemistry using hydrogen peroxide, it became clear that a better mousetrap was needed. As a consequence of this line of thought, an idealized product was defined having the following characteristics.

1. Can reduce contaminant concentrations quickly to regulatory standards.
2. Works in a variety of soil and groundwater conditions.
3. Is non-toxic and has no adverse impact on soil properties or groundwater quality.
4. Is applicable to a variety of contaminants.
5. Is reasonably cost-effective, at least in comparison to existing remedies.
6. Is a passive system, easily installed using equipment common to the industry.

The above six characteristics are the heart and sole of RPI's Trap & Treat® concept. The trap portion is designed around an immediate and predictable impact, observable in groundwater and soil after installation of the product. This aspect of BOS 200® is due to the presence of activated carbon in the product. In other words, the "Trap" is absorption by the activated carbon. Significant reductions in contaminant concentrations are typically realized in a matter of hours.

BOS 200® does not stop at stabilization of contamination. Absorption is just the first step in the process. Treatment is accomplished through biodegradation of the absorbed contaminants. In general, whenever the following conditions are present,

Microorganisms + Electron Donors + Electron Acceptors + Nutrients.

The result is metabolic by-products + energy + new microorganisms (Wiedemeier, 1999).

In this case, petroleum-degrading microorganisms are the "bugs" and hydrocarbon contaminants are the electron donors. Hydrocarbon degraders are very robust and can thrive under a wide range of conditions. In fact, they have been known to withstand pressures of hundreds of bars, pH conditions ranging from 1 to 10, temperatures from 0^{o} to 75^{o} C, and salinities greater than normal seawater (Freeze and Cherry, 1979). In the last decade, a great deal of research has been conducted on the role and importance of electron acceptors and nutrients within hydrocarbon plumes and the consensus is that the rate of biodegradation is limited by a lack of electron acceptors rather than a lack of nutrients. BOS 200® contains selected nutrients including phosphorus and nitrogen, and it contains a variety of electron acceptors that can be utilized under aerobic or anaerobic conditions.

A complete story of the electron acceptors must begin in the mixing tank. The product is shipped as a dry powder, which is mixed with water in the field to prepare an injectable slurry. One feature of activated carbon is that it has quite an affinity for oxygen. It adsorbs oxygen as the BOS 200® is manufactured, stored, and from the aerated water during the mixing operation. In short, the product is saturated with oxygen before injection into the contaminated formation. The product contains additional electron acceptors in the form of nitrate, ammonia and a time-release source of sulfate. The source of the time-release sulfate is gypsum or calcium sulfate.

Gypsum has been used by farmers for centuries as a soil conditioner and is not very soluble in water. However its solubility is such that a low but persistent concentration of sulfate can be maintained in groundwater for a number of years with a single application. A hidden benefit of this chemistry has to do with phosphorus. During manufacture, a small amount of ammonium phosphate is blended into the mix. This readily dissolves when mixed with water. However, calcium phosphate is virtually insoluble in water and so the available phosphate is rapidly precipitated out of solution, into and onto the activated carbon during the mixing operation. This provides a bio-available form of phosphorus (an essential nutrient) to the microorganisms that cannot be washed out by groundwater seep.

For thermodynamic reasons, microorganisms preferentially utilize those electron acceptors that provide the greatest amount of free energy during respiration (Bower 1992). The driving force for the biodegradation of petroleum hydrocarbons is the transfer of electrons from the donor (hydrocarbon) to the electron acceptor. The organism derives energy from this process and the more energy it can derive, the more attractive the process becomes. The high end of the energy spectrum is represented by aerobic utilization of oxygen as the electron acceptor. An overview of the next stops along the energy path is given by the following.

Nitrate reduction, Fe+3 reduction, Sulfate reduction, and the last stop is given by methanogenic respiration.

The concept of respiration is important in that the organism literally breaths nitrate or sulfate while oxidizing hydrocarbons. In each case above, the energy derived decreases as one moves down from nitrate toward methanogenic respiration. It is clear that if oxygen is available, it will be the preferred electron acceptor. The catch is that organisms must be present that can take advantage of prevailing conditions at any given time. When the material is first injected, it is saturated with oxygen. Consequently, no matter what the prevailing condition is within the plume, the prevailing condition within the BOS 200® is initially aerobic. Once the oxygen is consumed, nitrate will become the next favored electron acceptor, finally settling into sulfate reduction along with some methanogenic respiration. This process can be short-circuited by a persistent source of a higher energy acceptor. For example, if a sustainable source of oxygen is available, the dominant mechanism for degradation will remain aerobic.

This points to an important concept. Much discussion in the literature is devoted to the apparent advantage indigeneous microorganisms have over cultured bacteria that one might add to the mix. It is widely held that existing organisms have become accustomed to the prevailing condition and already “occupy the niche”. As a result, it is very hard for a new organism to take

over or to even get a foothold in the existing biocosm. In fact, the BOS 200 represents a new niche that is very attractive to bacteria. Bugs love activated carbon. We take advantage of this by mixing bacteria with the product when preparing the injectable slurry. The product is innoculated with bacteria before it is installed. This is an important step because the new niche is already occupied by bacteria designed to degrade hydrocarbons before it is installed. Shortly after installation, hydrocarbons are adsorbed and the niche is full.

RPI recommends and uses a specific blend of microorganisms with its product. It is a customized culture of facultative anaerobes that can take advantage of the wide swing in conditions presented by the installed BOS 200®. As a result, there are organisms present that can use the oxygen initially present. Further, there are nitrate reducers, iron reducers, sulfate reducers, fermenters, and methanogens. No matter what condition exists within the activated carbon, there are microorganisms present to take advantage.

Metabolic by-products vary depending on what metabolic pathway is being used for hydrocarbon degradation. Carbon dioxide and water are common although many other compounds are possible, including various alcohols and volatile fatty acids. Acetate turns out to be produced by aerobic conditions as well as by anaerobic fermentation, and under methanogenic respiration. Other products include lactate, formate, butyrate, isobutyrate, pyruvate, and proprionate along with methane.

When BOS 200 is mixed with water, the resulting slurry has elevated concentrations of nitrate, sulfate, and chloride. This results in elevated concentrations in the groundwater wherever the material is injected. Under normal conditions, contaminant levels drop literally overnight. Initially, nitrate levels within the treatment area range from 50 ppm to perhaps as high as 250 ppm with sulfate ranging from 200 ppm to 1500 ppm. Chloride is initially somewhere between 50 ppm and 150 ppm. At first, microbes utilize oxygen. When oxygen is depleted, nitrate is the next highest energy electron acceptor. The first step in the de-nitrification is the formation of nitrite. Over the first month or two (post injection), nitrate levels typically drop and low levels of nitrite are often observed. The nitrite and nitrate are normally consumed within the first two months and nitrate falls to levels below regulatory standards. At about the same time, measurable levels of acetate can begin to show up. Finally, fermentation, sulfate reduction, and methanogenic respiration become the dominant pathways.

Regulators often postulate that the disappearance of nitrate is simply due to the natural dispersion from groundwater movement and diffusion. Chloride can be used as an internal measure of these effects as there are no biological demands for this species nor are there chemical demands that are commonly encountered in groundwater plumes. As a result, the behavior of chloride over time is a good indication of natural forces such as groundwater seep and diffusion. It should be noted that neither chloride nor nitrate is adsorbed by activated carbon. In fact, activated carbon is virtually transparent to charged inorganic species. As described above, nitrate typically plummets over the first two months, falling from an initial value of over 100 ppm to less than 5 ppm. Chloride, on the other hand, typically remains fairly stable over this same time period. Given such performance, it is hard to argue that the disappearance of nitrate is not due to its consumption in anaerobic respiration.

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 225494

CONDITIONS

Operator: HILCORP ENERGY COMPANY 1111 Travis Street Houston, TX 77002	OGRID: 372171
	Action Number: 225494
	Action Type: [C-141] Release Corrective Action (C-141)

CONDITIONS

Created By	Condition	Condition Date
nvelez	Remediation plan is approved with the following conditions; 1. BOS 200 application is approved as written. 2. Groundwater monitor wells will require permitting through New Mexico State Engineers Office (NMOSE). 3. Apply US EPA Method 8260B instead of 8021 for the groundwater samples. 4. If groundwater results meet the allowable concentrations within one calendar year from the date of discovery (April 11, 2024) per 19.15.30.12A (7) NMAC, then Hilcorp may request an alternate lesser number of samples the director approves, from the compliance sampling stations the director approved meet the abatement standards for benzene per 19.15.30.9D NMAC. 5. Hilcorp has 120-days (January 4, 2024) to complete the work and submit the appropriate and/or final closure report.	9/6/2023