



**LT Environmental, Inc.**  
Advancing Opportunity

# **DELINEATION REPORT AND REMEDIAL ALTERNATIVE EVALUATION**

**OH Randel #5, API #30-045-05964  
San Juan County, New Mexico**

**NMOC**

**FEB 01 2019**

**DISTRICT III**

**January 31, 2019**

**Prepared for:**

**HILCORP ENERGY COMPANY  
382 County Road 3100  
Aztec, New Mexico 87410**

Incident# nVF1602039091  
Reviewed and Procseed  
2/27/19

**Prepared by:**

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## Smith, Cory, EMNRD

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**From:** Smith, Cory, EMNRD  
**Sent:** Wednesday, February 27, 2019 3:11 PM  
**To:** Clara Cardoza  
**Cc:** Ashley Ager; Matt Henderson; 'Devin Hencmann'  
**Subject:** RE: OH Randel #5 Delineation and Variance Request

Clara,

OCD has reviewed the Delineation and Variance Request for the OH Randel # 5 received on February 1, 2019. After Review the OCD has denied HilCorp variance request to leave the impacted material in place. The Primary concern is the impacted mass is very large and contains high levels of BTEX constituents which are soluble and highly mobile. The mass is deep enough that natural biodegradation will not be very effective and will take an extremely large amount of time due to the eventual anaerobic environment caused by biodegradation.

The delineation report and variance request will be scanned into the well file asap.

Please submit to the OCD no later than April 1, 2019 HilCorps proposed remediation plan to include time lines.

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**From:** Devin Hencmann <dhenemann@ltenv.com>  
**Sent:** Thursday, January 31, 2019 1:45 PM  
**To:** Smith, Cory, EMNRD <Cory.Smith@state.nm.us>  
**Cc:** Ashley Ager <aager@ltenv.com>; Clara Cardoza <ccardoza@hilcorp.com>; Matt Henderson <mhenderson@hilcorp.com>  
**Subject:** [EXT] OH Randel #5 Delineation and Variance Request

Cory,

Please see the attached Delineation and Variance Request Report for the OH Randel#5.

Please let me know if you have any questions.

Thank you,  
Devin



## DELINEATION REPORT AND REMEDIAL ALTERNATIVE EVALUATION

OH RANDEL #5  
SAN JUAN COUNTY, NEW MEXICO

Project Number: 017818016

A handwritten signature in black ink, appearing to read "Devin Hencmann".

Prepared by: \_\_\_\_\_

Devin Hencmann  
LTE Project Geologist

January 31, 2019

\_\_\_\_\_  
Date

A handwritten signature in black ink, appearing to read "Ashley L. Ager".

Reviewed by: \_\_\_\_\_

Ashley Ager, M.S., P.G.  
LTE Senior Geologist

January 31, 2019

\_\_\_\_\_  
Date



## TABLE OF CONTENTS

1.0 INTRODUCTION .....	1-1
2.0 SITE HISTORY .....	2-1
2.1 ACTIVE REMEDIATION .....	2-1
2.2 REGULATORY FRAMEWORK .....	2-1
3.0 SITE SETTING .....	3-1
3.1 LAND AND WATER USE .....	3-1
3.2 REGIONAL GEOLOGY AND HYDROLOGY .....	3-1
4.0 SITE CHARACTERIZATION .....	4-1
4.1 FINAL DELINEATION .....	4-1
4.2 DELINEATION RESULTS .....	4-1
4.3 DELINEATION FINDINGS .....	4-2
5.0 CONCEPTUAL SITE MODEL .....	5-1
5.1 SOURCES .....	5-1
5.2 TRANSPORT MECHANISMS .....	5-1
5.2.1 Volatilization and Enclosed-Space Accumulation .....	5-2
5.2.2 Leaching and Groundwater Transport .....	5-2
5.3 EXPOSURE PATHWAYS AND RECEPTORS .....	5-3
5.3.1 Outdoor Air – Inhalation Exposure Route .....	5-3
5.3.2 Indoor Air – Inhalation Exposure Route .....	5-3
5.3.3 Groundwater – Direct and Incidental Contact and Ingestion .....	5-3
5.3.4 Surface Water – Direct Contact and Ingestion .....	5-4
5.3.5 Conclusions .....	5-4
6.0 REMEDIAL ALTERNATIVES EVALUATION .....	6-1
6.1 PRIMARY SOURCE AREA REMOVAL WITH NATURAL ATTENUATION OF SECONDARY AND TERTIARY SOURCES .....	6-1
6.1.1 Protection of HH&E .....	6-2
6.1.2 Compliance .....	6-2
6.1.3 Long-term Effectiveness and Permanence .....	6-2
6.1.4 Toxicity, Mobility, or Volume Reduction Through Treatment .....	6-2
6.1.5 Short-term Effectiveness .....	6-2
6.1.6 Implementability .....	6-3
6.1.7 Costs .....	6-3





## TABLE OF CONTENTS (continued)

6.2	SOIL VAPOR EXTRACTION .....	6-3
6.2.1	Protection of HH&E .....	6-4
6.2.2	Compliance .....	6-4
6.2.3	Long-term Effectiveness and Permanence .....	6-4
6.2.4	Toxicity, Mobility, or Volume Reduction Through Treatment .....	6-4
6.2.5	Short-term Effectiveness .....	6-4
6.2.6	Implementability .....	6-4
6.2.7	Costs .....	6-5
6.3	EXCAVATION .....	6-5
6.3.1	Protection of HH&E .....	6-5
6.3.2	Compliance .....	6-5
6.3.3	Long-term Effectiveness and Permanence .....	6-5
6.3.4	Toxicity, Mobility, or Volume Reduction Through Treatment .....	6-6
6.3.5	Short-term Effectiveness .....	6-6
6.3.6	Implementability .....	6-6
6.3.7	Costs .....	6-6
6.4	PREFERRED ALTERNATIVE .....	6-6
7.0	FINDINGS AND REQUEST FOR VARIANCE .....	7-1
7.1	FINDINGS .....	7-1
7.2	VARIANCE REQUEST .....	7-2
8.0	REFERENCES .....	8-1

### FIGURES

FIGURE 1	SITE LOCATION MAP
FIGURE 2	SOIL ANALYTICAL RESULTS MAP
FIGURE 3	BTEX ISOPACH MAP
FIGURE 4	CROSS SECTION A-A'
FIGURE 5	CROSS SECTION B-B'
FIGURE 6	POTENTIAL RECEPTOR MAP

### TABLES

TABLE 1	BOREHOLE SOIL ANALYTICAL RESULTS
TABLE 2	THRESHOLD AND BALANCING CRITERIA

### APPENDICES

APPENDIX A	BORING LOGS
APPENDIX B	LABORATORY ANALYTICAL REPORTS



## 1.0 INTRODUCTION

LT Environmental, Inc. (LTE), on behalf of Hilcorp Energy Company (Hilcorp), has prepared the following Delineation Report and Remedial Alternative Evaluation associated with subsurface petroleum hydrocarbon impacts encountered at the OH Randel #5 natural gas production well (Site). The report summarizes subsurface data collected during previous investigations and a final delineation event conducted in December 2018.

Evaluation of the subsurface was initiated following a release from an on-site production tank and was continued as additional impacts were discovered. Ultimately, impacts from three releases were identified, mapped, and characterized.

This report additionally documents LTE's evaluation of remedial alternatives based on the findings of the site characterization. The objectives of the remedial alternative evaluation are to evaluate the potential risks to human health and environmental receptors posed by the impacted soil and to propose remedial actions, as appropriate, to eliminate or mitigate potential exposure pathways. The subsurface investigations conducted to date have characterized the impact to soil and the potential migration pathways of the contaminants of concern (COCs). The fate and exposure points of the impacts are discussed to select a remedial approach that will close the pathways for exposure to COCs at the Site and downgradient.



## 2.0 SITE HISTORY

The Site is located on Navajo tribal land approximately 2.65 miles west of United States Highway 550 in San Juan County, New Mexico, in Unit D of Section 10, Township 26 North and Range 11 West (Figure 1). On January 18, 2016, XTO Energy, Inc. (XTO), the former operator of the Site, discovered a frozen valve on a 100-barrel (bbl) production tank that resulted in approximately 27 bbls of condensate and 5.5 bbls of produced water draining on to the ground and infiltrating into the subsurface. The release was contained in the tank berm, however no liquids were recovered.

Multiple soil sampling events were conducted at the Site between January 2016 and September 2017, as described in the *LTE Summary Report and Delineation Work Plan* (2018 Summary Report), submitted to the New Mexico Oil Conservation Division (NMOCD) in September 2018. A total of 32 soil borings were advanced by hand auger and hollow-stem auger to depths varying from 4 feet to 82 feet below ground surface (bgs). Results from the subsurface investigations indicated observed impacts were attributed to three different releases: the recent production tank release (the Primary Source) and two separate historical releases (identified as Secondary and Tertiary in Section 4). Petroleum hydrocarbon impact resulting from the recent production tank release (Primary Source) was limited in extent. Soil impacted by the two identified historical releases were demonstrated to be larger in volume and deeper than the impact from the Primary Source.

### 2.1 ACTIVE REMEDIATION

Following identification of the initial recent soil impacts beneath the production tank and prior to the full discovery of the additional areas of impacted soil, XTO installed a soil vapor extraction (SVE) system to address shallow subsurface impacts. The SVE system targeted, and most likely successfully remediated, soil impacted by the releases from the production tank. SVE system installation details and operating results were provided in the 2018 Summary Report. The SVE system is currently active and air sampling results from 2018 suggest it has removed available petroleum hydrocarbons from the subsurface; however, confirmation soil sampling has not been conducted. Additional details of the SVE system are discussed in Section 5.0.

### 2.2 REGULATORY FRAMEWORK

The Primary Source release occurred prior to August 14, 2018, and XTO ranked the Site a zero pursuant to the NMOCD *1993 Guidelines for Remediation of Leaks, Spills and Releases* to determine applicable remediation action levels. The nearest permitted water well is 1.7 miles to the south with a depth to groundwater of 200 feet bgs. The nearest significant watercourse is a dry arroyo 756 feet north of the Site. Based on these observations, the remediation action levels applied to the Site were 10 milligrams per kilogram (mg/kg) benzene, 50 mg/kg total for the sum of benzene, toluene, ethylbenzene, and total xylenes (BTEX), and 5,000 mg/kg for total petroleum hydrocarbons (TPH).

Following the transfer of ownership of the Site from XTO to Hilcorp, the NMOCD, in an electronic message (email) dated August 28, 2018, requested that Hilcorp update the SVE operational data, conduct additional delineation, and provide a remediation work plan for the Site. The 2018 Summary Report provided the updated information and proposed additional delineation to be conducted in two phases: one phase to confirm remediation and full delineation of impacted shallow soil affected by the



production tank and a second phase using different drilling technologies to delineate the deeper and more extensive impacts east of the production tank. The NMOCD's response to the work plan proposal, as documented in an email dated October 22, 2018, required full delineation to be completed by January 22, 2019. The NMOCD specified that remediation should comply with Title 19, Chapter 15, Part 29, Section 12 (19.15.29.12) of the New Mexico Administrative Code (NMAC), but that delineation and remediation should proceed using previously established remediation standards.

LTE mobilized a sonic drill rig in December 2018 to reach the deeper subsurface intervals and focused on a full-site delineation of the known source areas. The delineation boreholes required the entirety of the available drilling schedule, and no confirmation samples were collected to evaluate remediation by the SVE system. The details of the final delineation event are provided in subsequent sections of this report and are used to fully characterize the identified releases as discussed in Section 4.0.



## 3.0 SITE SETTING

The Site is located on the Navajo Nation Reservation in the Bisti Region of the San Juan Basin, approximately 14 miles south-southwest of Bloomfield, New Mexico. The Site is at an elevation of approximately 6,422 feet above mean sea level with surface drainage northwest toward the San Juan River.

### 3.1 LAND AND WATER USE

The Site is situated in a high-desert environment that is largely undeveloped. What land use there is consists of natural gas development, rangeland, and cropland that is irrigated by the Navajo Indian Irrigation Project (NIIP) operated by the Navajo Agricultural Products Industry (NAPI). The nearest crop circle is approximately 1,267 feet south-southeast of the Site. The nearest residence is located approximately 2 miles south of the Site.

The nearest permitted water supply well (SJ01626) is a single-use domestic water well located approximately 1.7 miles south of the Site. The well is completed in a bedrock aquifer to a total depth of 255 feet bgs. Depth to groundwater in the water well is reported as 200 feet bgs. Additional permitted water wells south and southwest of the Site target deeper aquifers around 200 feet bgs and greater.

### 3.2 REGIONAL GEOLOGY AND HYDROLOGY

The area is regionally described as having a thin cover of eolian sands at the ground surface overlying the Nacimiento Formation, which outcrops to the north and west. The lower portion of the Nacimiento Formation is composed of interbedded black, carbonaceous mudstones and white, coarse-grained sandstones. The upper part is comprised of mudstone and sandstone. It is generally slope-forming, even within the sandstone units. Aquifers within the coarser and continuous sandstone bodies of the Nacimiento Formation are between 0 and 1,000 feet deep in the San Juan Basin. The 1,000-foot depth range for aquifers covers an area over 20 miles wide and the depth decreases toward the margin of the San Juan Basin. The Site is more centrally located, and the depth to the aquifer is expected to be closer to 200 feet to 500 feet bgs (Stone et al., 1983).

The Site is part of a large area of land farmed by the NAPI for growing a variety of crops, including corn, potatoes, alfalfa, and pinto beans. In 1960, the United States Congress authorized construction of the NIIP to provide a water delivery system from the Navajo Dam reservoir to 110,630 acres of irrigable land in the Bisti Region. The NAPI was created to manage and maintain the croplands and water delivery system. Irrigation water is released from the San Juan River at Navajo Dam through a diversion headworks and travels through a series of concrete- and membrane-lined open canals. Irrigation in the Bisti Region can produce shallow discontinuous perched aquifers; however, these aquifers are not defined in published literature, and shallow groundwater was not identified at the Site through soil borings as deep as 105 feet bgs.

Local stratigraphy at the Site consists of graded fill over approximately 50 feet of reddish-brown silty sand. A poorly sorted, semi-consolidated, coarse sand is present from approximately 50 feet to 85 feet bgs. Below the sand at approximately 85 feet bgs is a dark, grayish-black fat, highly plastic and



compacted clay. The lithologies are part of the Nacimiento Formation with weathered facies near the surface and more consolidated sands and clays occurring with depth.



## 4.0 SITE CHARACTERIZATION

Subsurface investigations were initiated following the release from the production tank and consisted of multiple soil sampling events occurring from January 2016 to September 2017 as additional impacts were discovered. Impacts to soil were observed in two areas: beneath the production tank and east of the production tank. Final delineation was conducted in December of 2018. A sonic drilling rig was utilized during the final delineation to complete boreholes to depths below observed impact, where a hollow-stem auger had previously met refusal. The previous delineation events were documented in the 2018 Summary Report. The final delineation event has not been documented; therefore, those findings are presented in detail below to complete the site characterization.

### 4.1 FINAL DELINEATION

Between December 13, 2018 and December 19, 2018, LTE utilized a sonic drilling rig to advance eight boreholes (BH-28 through BH-36) to total depths ranging from 32 feet to 105 feet bgs. Locations of the existing and new boreholes are presented on Figure 2. Samples were collected in a continuous sample barrel. As specified in the email dated October 22, 2018, from NMOCD approving the work plan proposed in the 2018 Summary Report, composite soil samples were collected from the first 10 feet bgs, and then every five feet thereafter. Samples from the continuous sample barrel were split and screened for volatile aromatic hydrocarbons using a photo-ionization detector (PID) equipped with a 10.6 electron volt lamp. Laboratory analysis was conducted on samples collected from the intervals with the highest field screening result and from the bottom of each borehole. In some cases, additional sample intervals were analyzed to better characterize soil impacts. For laboratory analysis, the remaining split soil sample was placed directly into pre-cleaned glass jars, labeled with location, date, time, sampler, and method of analysis and immediately placed on ice. The soil samples were shipped at 4 degrees Celsius (°C) under strict chain-of-custody procedures to Hall Environmental Analysis Laboratory (Hall) in Albuquerque, New Mexico, for analysis of BTEX by United States Environmental Protection Agency (USEPA) Method 8021B and TPH-gasoline range organics (GRO), TPH-diesel range organics (DRO), and TPH- oil range organics (ORO) by USEPA Method 8015M/D. Boring logs are included in Appendix A.

### 4.2 DELINEATION RESULTS

To present a full site characterization, the delineation results are summarized in this section. Laboratory analytical results indicated that soil samples from boreholes HA-1, BH-7, BH-9, BH-12, BH-13, BH-15, BH-16, BH-20, BH-21, BH-22, BH-27, BH-31, BH-33, and BH-34 exceeded the NMOCD remediation action level of 50 mg/kg for total BTEX; soil samples from boreholes BH-12, BH-20, BH-21, BH-31, BH-33, and BH-34 exceeded the NMOCD remediation action level of 10 mg/kg for benzene; and soil samples collected from boreholes BH-12, BH-13, BH-20, BH-21, BH-31, BH-33, and BH-34 exceeded the NMOCD remediation action level of 5,000 mg/kg for TPH. Laboratory analytical results for soil samples from remaining boreholes did not exceed NMOCD remediation action levels for TPH, BTEX, or benzene. The soil analytical results exceeding NMOCD remediation action levels are depicted on Figure 2 and as compared to the NMOCD remediation action levels are presented in Table 1. The laboratory analytical reports are attached in Appendix B.



### 4.3 DELINEATION FINDINGS

Results from the final delineation event confirmed conclusions posed in the 2018 Summary Report while completing lateral and vertical delineation at the Site. Three separate source areas were identified within two areas of the Site based on concentrations of COCs and geometry, or distribution, of the impacted soil. Higher concentrations of benzene and BTEX were observed in the eastern area of the Site compared to the western area under the production tank (Figure 3). Additionally, the presence of TPH exceeding the NMOCD remediation action levels in the eastern area suggests a separate source signature for the area identified herein as the Tertiary Source (Table 1).

Figures 4 and 5 represent cross sections derived from soil borings conducted during the previous investigations. The cross sections indicate there are two areas of impact that correlate to the signature geometry presented in Figure 3: one to the west and one to the east.

The western area is under the production tank and can be differentiated vertically and identified herein as the Primary Source and Secondary Source areas. Field screening results observed in borehole HA-1 exhibited a decreasing trend from the ground surface to 6 feet bgs and then an increasing trend from 8 feet to 20 feet bgs. Impacts observed in borehole HA-1 from the ground surface to approximately 6 feet bgs (the Primary Source area) are attributed to the production tank release discovered on January 18, 2016. Impact encountered from 8 feet to 20 feet bgs (the Secondary Source area) is attributed to a historical release likely related to the same production tank (Figure 4). Boreholes BH-15 and BH-16 were drilled in close proximity to HA-1; however, impacts encountered in BH-15 and BH-16 were not observed until 10 feet bgs. Soil samples collected in boreholes BH-14, BH-17, BH-18, BH-19, BH-28, and BH-29 serve as lateral delineation points for the Primary and Secondary source areas in the north, south, and east directions (Figure 2). Vertical delineation of the western area is achieved with clean soil samples collected from the bottoms of borehole BH-15 at 30 feet to 32 feet bgs and borehole BH-16 at 33 feet to 35 feet bgs.

The eastern impact is more extensive both laterally and vertically. Impact, defined by soil samples exceeding NMOCD remediation action levels, begins at approximately 15 feet bgs in the area near boreholes BH-7 and BH-21, then extends to approximately 85 feet bgs where a compacted clay layer was observed. Vertical delineation in the eastern area is achieved by soil samples collected from the bottom of boreholes BH-29, BH-31, BH-32, and BH-33. The clay continues to a depth of at least 105 feet bgs, the deepest soil sampling interval in BH-33. This clay serves as a confining layer to soil impacts and restricts the vertical migration of petroleum hydrocarbons. No soil samples collected from the clay contained concentrations of COCs exceeding NMOCD remediation action levels. Lateral delineation in the eastern area is documented by clean soil samples collected from boreholes BH-23, BH-24, BH-25, BH-32, BH-35, and BH-36.

Data collected between the eastern and western areas, represented by boreholes HA-5, BH-5, and BH-31, suggest there is separation between soil impacts. Shallower impacts represented by elevated field screening results occurring at approximately 15 feet bgs were observed in boreholes HA-5 and BH-5, but no soil exceeding the NMOCD remediation action levels was encountered (Figure 4). Field screening results in borehole BH-31 indicated elevated field screening results occur deeper, at approximately 20 feet bgs, and this soil contains elevated concentrations of BTEX and TPH concentrations that are out of range with concentrations observed in the western area.







## 5.0 CONCEPTUAL SITE MODEL

To better understand the potential impact to environmental and public health receptors, LTE has developed a Conceptual Site Model (CSM) to evaluate the sources and exposure pathways. The CSM follows industry-accepted methods for assessing risk by identifying potential receptors, transport mechanisms, and exposure pathways.

### 5.1 SOURCES

Subsurface investigation results suggest petroleum hydrocarbons were released at the Site at least three times. Two releases appear to have occurred from the production tank. On January 18, 2016, a production tank released approximately 27 bbls of condensate and 5.5 bbls of produced water that drained onto the ground and infiltrated into the subsurface. The release was contained within the tank berm, but no liquids were recovered. This is considered the Primary Source. Directly beneath soil impacted by the Primary Source is another area of impacted soil, likely the result of a historical production tank release. The historical production tank release is the Secondary Source. The COCs from the Primary and Secondary sources are characterized by BTEX concentrations ranging from 63.4 mg/kg to 142.4 mg/kg. Although benzene and TPH concentrations were detected, no concentrations exceeded the NMOCD remediation action levels. The Primary Source impacts are estimated to be approximately 50 cubic yards in volume. The Secondary Source resulted in soil impacts that are approximately 245 cubic yards in volume.

In 2016, LTE installed six SVE wells and a 1-horsepower blower at the Site to address areas impacted by the Primary and Secondary sources. The SVE system operated continuously from August 11, 2016, until April 19, 2017, with greater than 92 percent (%) run time. As documented in the 2018 Summary Report, the SVE system achieved an 80.2% reduction in total BTEX (2,421 micrograms per liter [µg/L] to 480 µg/L) and an 80.7% reduction in TPH (46,000 µg/L to 8,900 µg/L) in air emissions. As of August 17, 2018, it was estimated that 768 pounds of total BTEX and 14,243 pounds of TPH had been removed from the subsurface via SVE. Although final confirmation samples have not been collected, it is likely that the SVE system remediated the Primary and Secondary source areas.

The Tertiary Source is of an unknown source, but resulted in extensive impact. LTE has researched release notifications for the Site available on the NMOCD database, but no conclusive historical source is evident. Available aerial photographs offer no clues to the source origin. Based on the site history, it can be assumed the Tertiary Source area was impacted by petroleum hydrocarbons in production fluids. The COCs for the Tertiary Source area consist of benzene, BTEX (primarily xylenes), and TPH that exceed NMOCD remediation action levels. The highest concentration of benzene was 66.3 mg/kg; BTEX observed as high as 990 mg/kg; and TPH was detected at 12,114 mg/kg. The estimated volume of impacted soil is approximately 14,000 cubic yards. Vertical delineation of the impacts was achieved at a confining clay layer occurring at approximately 85 feet bgs.

### 5.2 TRANSPORT MECHANISMS

Contaminant transport mechanisms from petroleum hydrocarbon-impacted soil resulting from the three identified sources at the Site are:



- Volatilization to soil gas;
- Migration to groundwater; and
- Groundwater migration to surface water.

### 5.2.1 Volatilization and Enclosed-Space Accumulation

Petroleum hydrocarbons are volatile. Migration of *de minimis* concentrations of BTEX and TPH through the soil column may be occurring and the potential therefore exists for accumulation in enclosed spaces situated directly above the soil. BTEX values observed in the subsurface range from below the laboratory detection limit to 990 mg/kg. TPH concentrations at the Site range from below the laboratory detection limit to 12,114 mg/kg. Currently there are no inhabitable enclosed spaces or structures above the impacted soil areas at the Site, except for a meter house. The sources do not extend beyond the lateral extents of the Site. Future development of the Site to include enclosed spaces is limited by the existing natural gas production well pad and potential use of the surface for agriculture.

### 5.2.2 Leaching and Groundwater Transport

Based on soil boring investigations, the site lithology consists of sand intervals that transition to silty sands and then a highly plastic clay that was encountered at approximately 85 feet bgs. The petroleum hydrocarbon impacts identified in the Tertiary Source area investigation were observed in the vertical intervals of the sand, with the sand content decreasing with depth. The observed impacts, as represented by concentrations of BTEX and TPH, decrease in the deeper, finer, and silty intervals, then are absent within the underlying clay layer.

The vertical transport of the petroleum hydrocarbons through the sand has reached an asymptotic state and any further transport would be dependent on applying enough head or flowing pressure to overcome the existing adsorption of the petroleum hydrocarbons to the soil. This adsorption is stronger in finer soils, including clay, which has a higher surface area that is more likely to adsorb and retain the petroleum hydrocarbons. Finer soils also exhibit lower hydraulic conductivity values (typically clay hydraulic conductivity values range from  $1 \times 10^{-7}$  centimeters per second [cm/sec] to  $1 \times 10^{-9}$  cm/sec compared to a silty sand hydraulic conductivity value of  $1 \times 10^{-3}$  cm/sec to  $1 \times 10^{-5}$  cm/sec). The lower hydraulic conductivity will slow migration of impacts. If driving mechanisms still exist to transport the impacts, then the top layer of the clay would exhibit impact. Field observations and laboratory analytical results for soil samples collected within the clay layer indicated that petroleum hydrocarbons have not migrated past the first several inches of this clay layer. As petroleum hydrocarbons were not observed in the clays, it is apparent the soil above the clay has acted to slow any downward transport of impact. The absence of a driving mechanism combined with lower hydraulic conductivity soils observed at depth will result in retardation and prevention of movement of the petroleum hydrocarbons through the clay.

As the releases are no longer occurring, the only driving mechanism that could increase vertical transport would be water infiltration. With little rainfall historically recorded in San Juan County (approximately 10 inches per year), the potential of surface water infiltrating and transporting the petroleum hydrocarbon impacts is limited. The water would need to displace the petroleum from the grains of soil or adsorb the petroleum and continue downward vertical migration. If sufficient water infiltration occurred, the sandy interval would act to adsorb the additional petroleum hydrocarbons.



Based on local hydrology and nearby water wells discussed in Section 3.1, groundwater is estimated to be greater than 200 feet bgs. Vertical migration of impact would need to transport through the highly adsorptive clay interval that has been observed to be at least 20 feet thick. A pathway for the migration of impacts to reach the groundwater has not been identified.

### 5.3 EXPOSURE PATHWAYS AND RECEPTORS

As the current use of the Site and surrounding properties is rangeland, agriculture, and oil and gas development, the potential receptors on site would be employees and contractors. It is estimated that oil and gas operations would continue for approximately 30 years. Following oil and gas operations, it is likely that native vegetation would be restored, or the area would be used for rangeland or agriculture. Generally, a vegetative root zone of up to 3 feet bgs is assumed. Given the depth of the remaining impact (approximately 15 feet bgs), animal and plant exposure are unlikely. No plants are currently found at the Site due to vegetation controls that restrict growth within the boundaries of the Site. With no subsurface transport mechanism, it is highly unlikely that human exposure would occur offsite. The potential exposure pathways are evaluated for on-site receptors.

#### 5.3.1 Outdoor Air – Inhalation Exposure Route

Volatilized hydrocarbons migrating through the soil column to ambient air are possible from the Primary Source area; however, this source has likely been remediated by SVE. Personnel could potentially contact soil containing petroleum hydrocarbons during excavation activities and presumably inhale VOCs should concentrations remain in place; however, safety precautions and mitigation techniques can be used to remove this potential threat. Due to the depth of the Secondary and Tertiary source areas, it is unlikely that volatilized hydrocarbons would migrate through the soil column to the surface. The outdoor air exposure pathway is designated as “Incomplete” on the CSM for evaluated receptors.

#### 5.3.2 Indoor Air – Inhalation Exposure Route

The indoor air exposure pathway applies only to site personnel. Currently there are no inhabitable enclosed spaces or structures above the sources, so indoor exposure is not occurring. A meter house is present on site, but the structure is not air tight. If an inhabitable structure (non-confined space) were to be installed at the Site, a potential exists for volatilized hydrocarbons to migrate through the soil column and enter the structure if the floor is not impermeable. For these reasons, the indoor air exposure pathway is designated as “Incomplete” on the CSM.

#### 5.3.3 Groundwater – Direct and Incidental Contact and Ingestion

There are no water supply wells at the Site extracting groundwater for domestic or industrial purposes, and no water supply wells are located within one mile of the Site. The nearest permitted water well is SJ 01626, located approximately 1.7 miles south of the Site, with a depth to groundwater of 200 feet and a total depth of 255 feet bgs. Therefore, no exposure to on-site or off-site receptors is occurring. As discussed, petroleum hydrocarbon impacts do not exceed 85 feet bgs, and a highly plastic clay is present at depth to restrict future migration of COCs. Therefore; there are no current or future groundwater receptors. For these reasons, the groundwater ingestion pathway is designated as “Incomplete” on the CSM.



#### 5.3.4 Surface Water – Direct Contact and Ingestion

The nearest continuously flowing surface water feature that would be recharged by groundwater appears to be the San Juan River located approximately 13 miles north of the Site. Due to the depth of impacts and depth to groundwater discussed previously, it is unlikely that groundwater could become impacted and flow to surface water.

The nearest significant watercourse is a dry arroyo located 754 feet away from the Site. The nearest surface water to the Site is a United States Fish and Wildlife National Wetland Inventory (UFWS NWI) mapped wetland located approximately 5 miles northwest of the Site and an irrigation canal located approximately 5.2 miles northwest of the Site (Figure 6). Due to depth of the Tertiary Source area, surface flow from the Site would not be impacted by these sources. For these reasons, the surface water direct contact and ingestion exposure pathway is designated as “Incomplete” on the CSM.

#### 5.3.5 Conclusions

The CSM identifies no complete pathway for human or environmental exposure to the COCs. Subsequent sections will evaluate remedial alternatives.



## 6.0 REMEDIAL ALTERNATIVES EVALUATION

The Remedial Alternatives Evaluation (RAE) summarizes the methods considered for remediation of the petroleum hydrocarbon impacted soil identified at the Site. To support the selection of a remedy, remediation alternatives were evaluated based on site-specific conditions. The remedies are detailed below with comparative analysis based on threshold and balancing criteria, which include protection of human health and environment (HH&E), long- and short-term effectiveness, reduction of toxicity, implementability, and cost. These criteria are derived from the USEPA feasibility policy for analysis of remedial action alternatives and consists of analysis of the method under specific criteria including protection of health and environment; compliance; long- and short-term effectiveness; resultant toxicity, mobility, or volume reduction; implementability; and cost. A summary of the evaluation is included as Table 2.

Remediation activities have been conducted on site as discussed herein. An SVE system operated for approximately two years and removed an estimated 7 tons of TPH from the subsurface. The system targeted the Primary and Secondary source areas. The soil impacted by the Primary and Secondary sources may have been remediated to NMOCD remediation action levels, but confirmation soil samples have not been collected. For this evaluation, options are included to address the potential that SVE did not fully remediate the Primary and Secondary sources and additional remedial efforts are required to bring the identified sources at the Site into compliance. Additional soil samples will be collected prior to commencing remediation to determine if NMOCD remediation action levels have been met.

The alternatives selected for evaluation include:

1. Primary Source area removal with natural attenuation of Secondary and Tertiary source area;
2. SVE; and
3. Comprehensive excavation.

### 6.1 PRIMARY SOURCE AREA REMOVAL WITH NATURAL ATTENUATION OF SECONDARY AND TERTIARY SOURCES

This alternative consists of conducting confirmation sampling of the Primary and Secondary source areas remediated by SVE to determine if additional corrective actions are necessary. Should confirmation sampling indicate concentrations of COCs in the Primary and Secondary source areas are compliant with NMOCD remediation action levels, those releases will be closed and the Tertiary source area will be allowed to naturally attenuate.

Should sampling determine that SVE did not successfully remediate impacts from the Primary and Secondary source areas, remaining impacts will be removed from the Primary Source area. Assuming worst-case scenario, this alternative involves removing approximately 50 cubic yards of impacted soil from the 2016 release and leaving any residual subsurface contamination from the Secondary and Tertiary sources in place at depths of 15 feet to 85 feet bgs. COCs consist of BTEX and TPH. Contaminant concentrations range from 10.3 to 66.3 mg/kg for benzene, 57.2 to 990 mg/kg for BTEX, and 5,357 to 12,114 mg/kg for TPH, which exceed the NMOCD remediation action levels. However, the pathway analysis presented in the CSM above indicates that exposure pathways (direct contact with soil, air,



groundwater, and surface water) are currently incomplete because of the depth of contamination, the depth to groundwater, and the distance to surface water. In the future, the Site may be used for agriculture, but the depth of contamination would prevent impacted soil from being exposed at the surface, and pathways would remain incomplete.

#### **6.1.1 Protection of HH&E**

Based on the CSM and the size of the source area, removing residual soil exceeding NMOCD remediation action levels in the Primary Source area via excavation would be the most favorable option for eliminating the potential threat of shallow impacts affecting HH&E, assuming the Primary Source area has not been remediated by SVE. The location and depth of the Secondary and Tertiary source areas as discussed previously results in an incomplete pathway with no threat to HH&E.

Natural processes will degrade the Secondary and Tertiary source contaminants over time, resulting in a reduction of toxicity and volume over the long term. In the short term, HH&E will be protected due to the pathway remaining incomplete.

#### **6.1.2 Compliance**

Primary Source area removal would result in meeting residential screening levels in the shallow soil. Natural attenuation of the Secondary and Tertiary source areas would result in meeting residential screening levels in the future.

#### **6.1.3 Long-term Effectiveness and Permanence**

Through excavation of the Primary Source area, residual COCs would be removed from the Site permanently in that zone. Source removal can be demonstrated through documentation and laboratory analytical results of soil confirmation sampling. Excavation is the most favorable long-term effective and permanent solution of the three options. Natural attenuation of Secondary and Tertiary source areas would eventually result in degradation of COCs to acceptable levels.

#### **6.1.4 Toxicity, Mobility, or Volume Reduction Through Treatment**

Excavation would remove the contaminants and immediately reduce the toxicity, mobility, and volume of on-site contaminants; however, the toxicity and volume of contaminants would be transferred to a landfill and experience anaerobic conditions, which would be the slowest of all remedial processes. Secondary and Tertiary source contaminants are degraded *in situ* by biological processes that will reduce the petroleum hydrocarbons to carbon dioxide and water. The process takes time to reduce the toxicity, mobility, and volume. As it is a non-active remediation strategy that requires time, the option has intermediate favorability.

#### **6.1.5 Short-term Effectiveness**

The option would remove the Primary Source area for short-term effectiveness. The Secondary and Tertiary source areas would require a much longer time for natural attenuation and is not an effective short-term remedy.



### 6.1.6 Implementability

The Primary Source area can be excavated using typical equipment and techniques. Due to the depth of the Secondary and Tertiary source areas, excavation is not feasible and natural attenuation is the most favorable option. The determination of infeasibility is based on safety concerns involved in excavating to 85 feet bgs, the surface area disturbance required to safely bench and shore an excavation to that depth, and the removal of such a large volume of native soil. There is an estimated volume of 14,000 cubic yards of Tertiary Source material in the subsurface. The impacted soil is overlain by 15 to 40 feet of overburden that would additionally have to be removed. Surface disturbance and removal of such large volumes of native soil would result in more environmental harm than leaving the material buried in place. Excavation to extreme depths in such a large area introduces a safety hazard.

### 6.1.7 Costs

The estimated cost to remove the Primary Source area via excavation is approximately \$75,000. This is favorable and is a reasonable cost.

## 6.2 SOIL VAPOR EXTRACTION

SVE technology remediates petroleum hydrocarbon impacts *in situ* by applying a vacuum to wells drilled into the impacted area. The applied vacuum initiates air flow from the subsurface and into the SVE wells. The subsurface air flow enhances petroleum hydrocarbon volatilization and the vapors are pulled out by a blower/vacuum pump on the surface. The removed petroleum hydrocarbons are typically emitted directly into the atmosphere unless air permitting thresholds or sensitive receptors require air treatment with petroleum hydrocarbon removal.

Wells are drilled into the subsurface and screened to provide air flow evenly throughout the subsurface. When determining the number of wells and screen intervals, heterogeneities in the geology are considered to prevent air being pulled only through the most permeable zones. SVE systems typically operate for 1 to 10 years until cleanup is obtained. Geology can be too tight to allow airflow and, in such cases, SVE is not feasible. This option is evaluating the treatment of the Primary, Secondary, and Tertiary source areas.

SVE was in operation for approximately two years in the Primary and Secondary source areas. The system removed approximately 7 tons of petroleum hydrocarbons. Assuming the Primary and Secondary source areas have not been remediated, the system would require approximately 10 additional SVE wells and a larger blower to influence the full Secondary Source area volume. It is unknown if SVE would be effective in the silt present in the Secondary Source area, as the silt has less permeability and initiating airflow may not be feasible.

To expand the system to the Tertiary Source area, at least 30 new and nested SVE wells drilled to depths ranging from 30 feet to 80 feet bgs would be required with a significantly larger blower providing vacuum and flow. The consolidated sand found throughout a majority of the Tertiary Source area will likely be problematic and initiating airflow would be difficult. Typically, if the geology refuses a hollow-stem auger drill rig, then the material is not conducive for SVE technology as the material lacks sufficient permeability. The hollow-stem auger rig encountered refusal at 40 feet to 80 feet bgs during subsurface investigations.





### 6.2.1 Protection of HH&E

An SVE system would be protective of HH&E as it would remove petroleum hydrocarbons from the subsurface and remediate existing soil *in situ*. Bringing petroleum hydrocarbons to the surface could become an exposure pathway for human outdoor or indoor air inhalation; however, steps can be implemented to mitigate exposure potential through the treatment of vapors, institutional controls, and/or employee training. The SVE option is protective of HH&E with proper vapor exposure mitigation measures in place.

### 6.2.2 Compliance

The SVE technology would potentially bring the Site into compliance following 2 to 10-plus years of system operation. Soil confirmation samples would be collected from the subsurface and laboratory analytical results would be compared to the NMOCD remediation action levels.

### 6.2.3 Long-term Effectiveness and Permanence

COCs would be removed from the Site via the SVE system. Soil heterogeneities could limit the effectiveness of the SVE system and some areas of the Site may be untreatable via SVE technology. SVE is the second most favorable long-term effectiveness and permanent solution of the three options.

### 6.2.4 Toxicity, Mobility, or Volume Reduction Through Treatment

SVE would reduce the volume of contaminants in the subsurface, which would inhibit mobility into groundwater or other subsurface soil. Through SVE operation, the petroleum hydrocarbons would volatilize and be released into the air (unless air emission treatment was conducted). In the air, the petroleum hydrocarbons could be ingested through inhalation, become a greenhouse gas, and/or act as an ozone precursor. Due to an influx of oxygen, some of the petroleum hydrocarbons would be reduced via aerobic microbial degradation. This option would reduce petroleum hydrocarbon volume but could provide additional exposure pathways for petroleum hydrocarbon inhalation. This option is less favorable when considering mobility of the contaminants. If air emission equipment is used, then this option is favorable.

### 6.2.5 Short-term Effectiveness

This option requires 2 to 10-plus years of operation and is not an effective short-term remedy. The number of required SVE wells and the blower capacity would need to increase to decrease the number of years of operation.

### 6.2.6 Implementability

The depth and the volume of the Tertiary Source impact would require a substantial SVE well infrastructure to influence all of the impacted zones. This not only includes laterally distributed wells, but nested vertical wells to address the 70-plus feet of vertical impact in the subsurface of the Tertiary Source area. Screening across 70 feet would be inefficient for vapor recovery and smaller intervals would be needed to generate sufficient vacuum. Preliminary design of the system indicated approximately 40 additional nested SVE wells will be required, and it is not certain the technology would



address COCs in the more consolidated sandstone. The system can be implemented but would require a large effort and continued operation and maintenance for a 2 to 10-plus year period. SVE ranks low for implementability.

#### **6.2.7 Costs**

Drilling for a significant SVE well infrastructure, blower equipment, controls, power drop, and air pollution control equipment would be a significant cost. The work is estimated at \$300,000 to \$500,000 for installation, plus another \$50,000 per year of operation and maintenance costs during the life of the system.

### **6.3 EXCAVATION**

This alternative consists of removing impacted soil from the Primary, Secondary, and Tertiary source areas for disposal or treatment offsite. Hauling to the nearest off-site commercial disposal facility would require a truck hauling 16 cubic yards per trip, driving 25 miles round trip, for about 893 trips to haul all petroleum hydrocarbon impacted soil to a commercial disposal facility, thereby equaling 22,325 total miles driven. This poses adverse environmental and safety risks to the surrounding landscape, to personnel driving the trucks, and to other people residing or driving along the route to be used to haul the soil to the nearest landfill. Conducting an excavation to a depth of 90 feet bgs requires engineering controls and is a substantial effort. The sidewalls would need to be sloped to at least a 1:1 ratio which would cause a substantial surface disturbance. The surface disturbance is harmful to the surface environment and would affect operations at the Site and adjacent production locations.

#### **6.3.1 Protection of HH&E**

Based on the CSM and the size of the source areas, removing the Primary Source area via excavation would be the most favorable option for eliminating the potential threat of shallow impacts affecting HH&E. However, given the location and depth of the Secondary and Tertiary sources areas as discussed previously, the fact that there is no threat to HH&E under current and potential future conditions, an excavation of this size poses a safety threat to personnel and the environment that is not worth the environmental benefits.

#### **6.3.2 Compliance**

Compliance of source removal can be demonstrated through laboratory analysis of soil confirmation samples. Soil confirmation samples would be collected from the sidewalls and base of any excavation. Laboratory analytical results would be compared to the NMOCD remediation action levels.

#### **6.3.3 Long-term Effectiveness and Permanence**

Through excavation, COCs would be removed from the Site permanently. Source removal can be demonstrated through documentation and laboratory analytical results of soil confirmation sampling. Although excavation provides the fastest long-term effectiveness on site, it does not reduce the toxicity of contaminants in soil that is transferred to an alternative location.



#### **6.3.4 Toxicity, Mobility, or Volume Reduction Through Treatment**

Excavation would remove the contaminants and immediately reduce the toxicity, mobility, and volume of on-site contaminants; however, the toxicity and volume of contaminants would be transferred to a landfill and would experience anaerobic conditions, which would be the slowest of all remedial processes. The option is most favorable but would be less favorable if landfill disposal is considered as a transfer of impact.

#### **6.3.5 Short-term Effectiveness**

The option would remove the contaminants in the short term, resulting in high short-term effectiveness.

#### **6.3.6 Implementability**

The Primary Source area can be excavated using typical equipment and techniques. Due to the depth of the Secondary and Tertiary source areas, excavation is not feasible and is the least favorable option. Excavation equipment and trucking increase greenhouse gas emissions. Transferring the impact to a landfill is not sustainable.

#### **6.3.7 Costs**

Removing all three sources via excavation does not appear to be a viable option. An excavation of that magnitude would require engineering design and controls to maintain safety and stability as well as relocating much of the on-site equipment. Including equipment costs, oversight, transportation, and disposal fees, this work is estimated to cost \$3,700,000.

### **6.4 PREFERRED ALTERNATIVE**

Based on a review of the three alternatives, and with consideration of protective and balancing criteria, the preferred alternative is Primary Source area removal with natural attenuation of the Secondary and Tertiary source areas. This alternative is protective of human health and the environment because exposure pathways are incomplete due to the depth of impact and the absence of transport mechanisms in the source areas. Over the long term, contaminant toxicity and volume will naturally attenuate, and the implementation of the preferred alternative will not cause disturbance of the surrounding landscape, or transport contaminated media from one location to another location. The SVE option would provide a substantial investment in infrastructure, would increase emissions for the area surrounding the Site, and may not be feasible in the deep geologic setting. Excavating all of the source soil is technically infeasible and would transfer the petroleum hydrocarbons to a landfill and not reduce the toxicity and would create a significant safety concern, destroy vast amounts of undisturbed surface, and have a substantial greenhouse gas footprint from equipment and trucking.



## 7.0 FINDINGS AND REQUEST FOR VARIANCE

### 7.1 FINDINGS

Multiple soil sampling events were conducted at the Site between January 2016 and December 2018, as described in the LTE 2018 Summary Report and the Site Characterization section of this report. Results from the subsurface investigations indicated observed impacts are likely attributed to three different releases, one in 2016 and two historic releases. Petroleum hydrocarbon impacts resulting from the recent production tank release were relatively small in extent, while deeper soil impacted by two historical releases was demonstrated to be larger in volume and contained higher concentrations of COCs. Impacted soil from the three identified releases is limited to the vadose zone and restricted from migration to deeper groundwater by a low permeability clay. The lateral extent of the impacts does not exceed the site boundaries. The recent and shallow impacts are undergoing active remediation through SVE, which has likely remediated the Primary and Secondary source areas.

The CSM was developed to evaluate the three source areas and associated exposure pathways. The petroleum hydrocarbon impacts are defined as elevated concentrations of BTEX and TPH, which were observed to approximately 85 feet bgs, at which point a clay layer was observed, restricting further vertical migration of petroleum hydrocarbons. Transport mechanisms of COCs in the vadose zone were determined to be volatilization to soil gas, migration to groundwater, and groundwater migration to surface water. The potential for petroleum hydrocarbon vapor intrusion is possible; however, there are no habitable structures on the surface currently and no structures are expected in the future. Groundwater is estimated to be 200 feet to 250 feet bgs, which is much deeper than the impacted area and separated from the impacted soil by a low permeability clay layer that has demonstrated no impact to date from historical sources. The potential for surface water impact is low based on lack of impacted groundwater, the absence of nearby surface water bodies, and the presence of approximately 15 feet of clean overburden separating the impacts from the ground surface (assuming the Primary Source area is remediated). Disturbance of the buried impacted soil and extraction of the COCs entrained in that soil provides the greatest chance of exposure to human health and environment.

To evaluate remaining impacts at the Site, LTE proposes confirmation soil sampling of the Primary and Secondary source areas to evaluate remediation by SVE. This includes collecting soil samples in the western area as proposed in the 2018 Summary Report. LTE proposes to use a hollow-stem auger drill rig to advance two confirmation boreholes to 30 feet bgs near boreholes SVE-2 and SVE-5 in the locations identified on Figure 8 in the 2018 Summary Report. Boreholes will be positioned to supplement existing soil data. Continuous soil samples will be logged by an LTE geologist and described using the Unified Soil Classification System (USCS). The intervals from immediately beneath the ground surface to 10 feet bgs and then every 5-foot interval thereafter will be composited and screened for volatile aromatic hydrocarbons. Soil with the highest field screening results and from the bottom of each soil boring will be collected for laboratory analysis of BTEX and TPH (GRO, DRO, and MRO). If soil sampling results indicate the Primary and Secondary source areas have been remediated, those areas will be closed and the Tertiary Source area will be addressed by natural attenuation as described below.

Based on a review of remedial alternatives, and with consideration of protective and balancing criteria, the preferred remedial alternative for soil exceeding the NMOCD remediation action levels following



confirmation soil sampling is Primary Source area removal with natural attenuation of the Secondary and Tertiary source areas.

A second alternative that was evaluated included installing an SVE system appropriately designed for Secondary and Tertiary source areas. This alternative would require too many wells with depths to 85 feet bgs and uncertainty regarding the success of this method in the deeper, more consolidated sediments. The process is costly, time consuming, and would create a pathway for surface exposure to petroleum hydrocarbon vapors.

A third alternative evaluated was excavation to the depths at which the Secondary and Tertiary source areas occur. This type of deep excavation would require extensive engineering and most likely shutdown operations at the Site and adjacent production operations. Excavation would create a pathway for surface exposure to petroleum hydrocarbon vapors and direct contact to impacted soil during excavation. The removal and disposal by truck poses adverse environmental and safety risks to the surrounding undeveloped landscape, the personnel driving the trucks, and other people residing or driving along the route to be used to haul the soil to the nearest landfill. In addition, excavation to an offsite disposal area would transfer the contamination to another area.

## 7.2 VARIANCE REQUEST

The preferred alternative, although protective, would result in leaving impacted media in place exceeding NMOCD remediation action levels. As such, a variance is required according to 19.15.29.14 NMAC. The variance requirements include discussion of a need for a variance and a demonstration of how the variance will provide better or equal protection of public health, safety, and the environment.

The need for a variance is presented in the analysis of remedial alternatives. The available methods of treatment include natural attenuation, excavation, or SVE. Confirmation of remediation and subsequent removal of shallow residual impacts in conjunction with natural attenuation of deeper impacts is the most logical remedial alternative as determined by a detailed comparative analysis derived from USEPA feasibility policy based on threshold and balancing criteria, which include protection of HH&E, long- and short-term effectiveness, reduction of toxicity, implementability, and cost.

Equal or better protection of public health and the environment through the preferred remedial alternative is documented in the evaluation of transport mechanisms and exposure pathways that concludes there is no complete pathway for human or environmental exposure to the COCs. Those pathways are significantly altered and effectually opened by excavation or SVE remediation alternatives, which bring the subsurface impact to the surface as vapors that can impact humans and the environment.

Based on full delineation and characterization of vadose zone impacts at the Site, no complete pathway to human or environmental exposure to identified COCs, and a thorough evaluation of remedial alternatives, Hilcorp requests approval to proceed with confirmation sampling of the Primary and Secondary source areas and to address any residual impacts in those areas and identified impacts in the Tertiary Source area by natural attenuation.

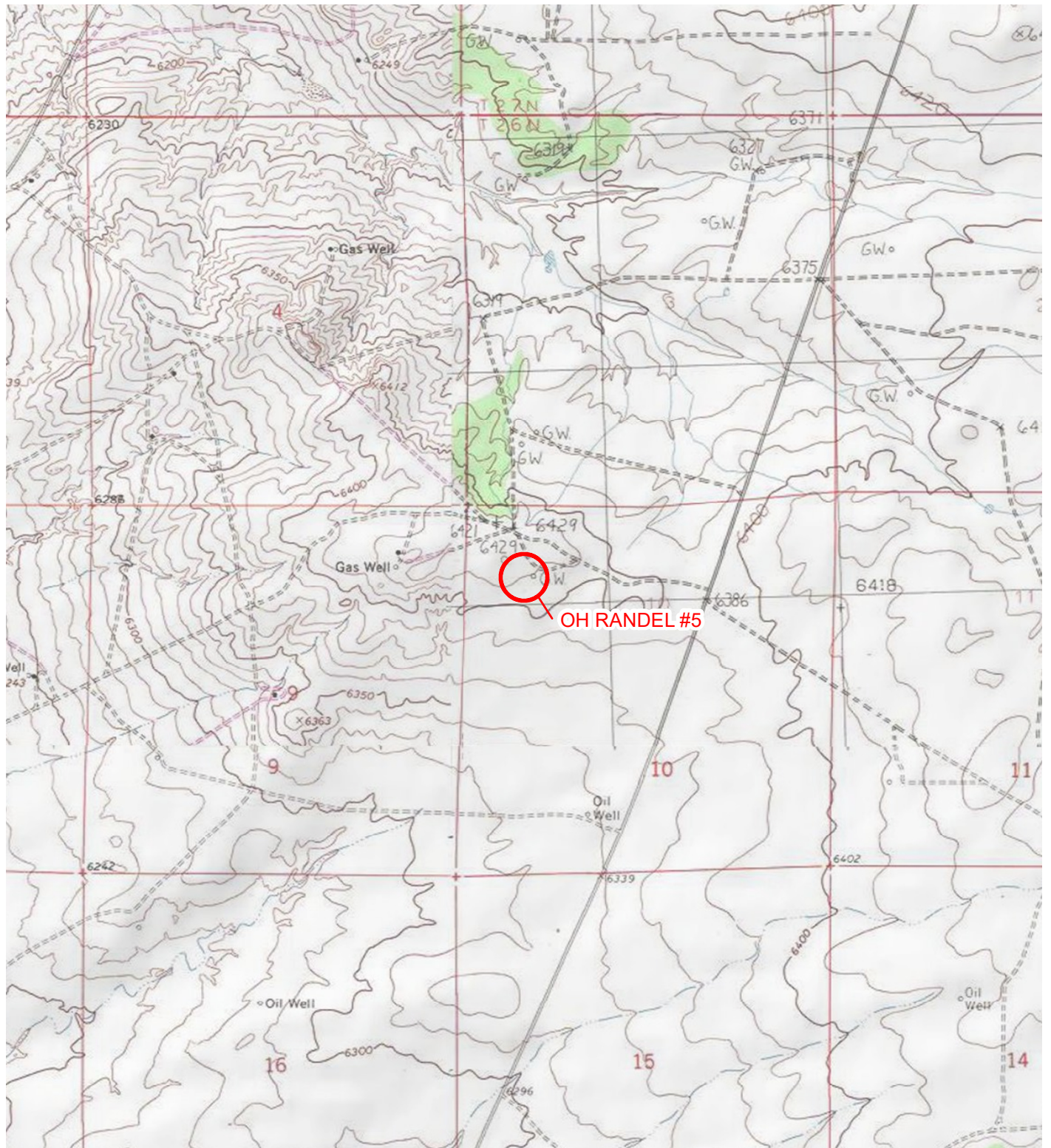


## 8.0 REFERENCES

Stone, W.J., F.P. Lyford, P.F. Frenzel, N.H. Mizell, and E.T. Padgett, 1983, *Hydrogeology and Water Resources of the San Juan Basin*, New Mexico: HR-6 New Mexico Bureau of Geology and Mineral Resources Hydrology Report 6.







# LEGEND

○ SITE LOCATION



NEW MEXICO

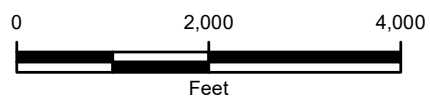


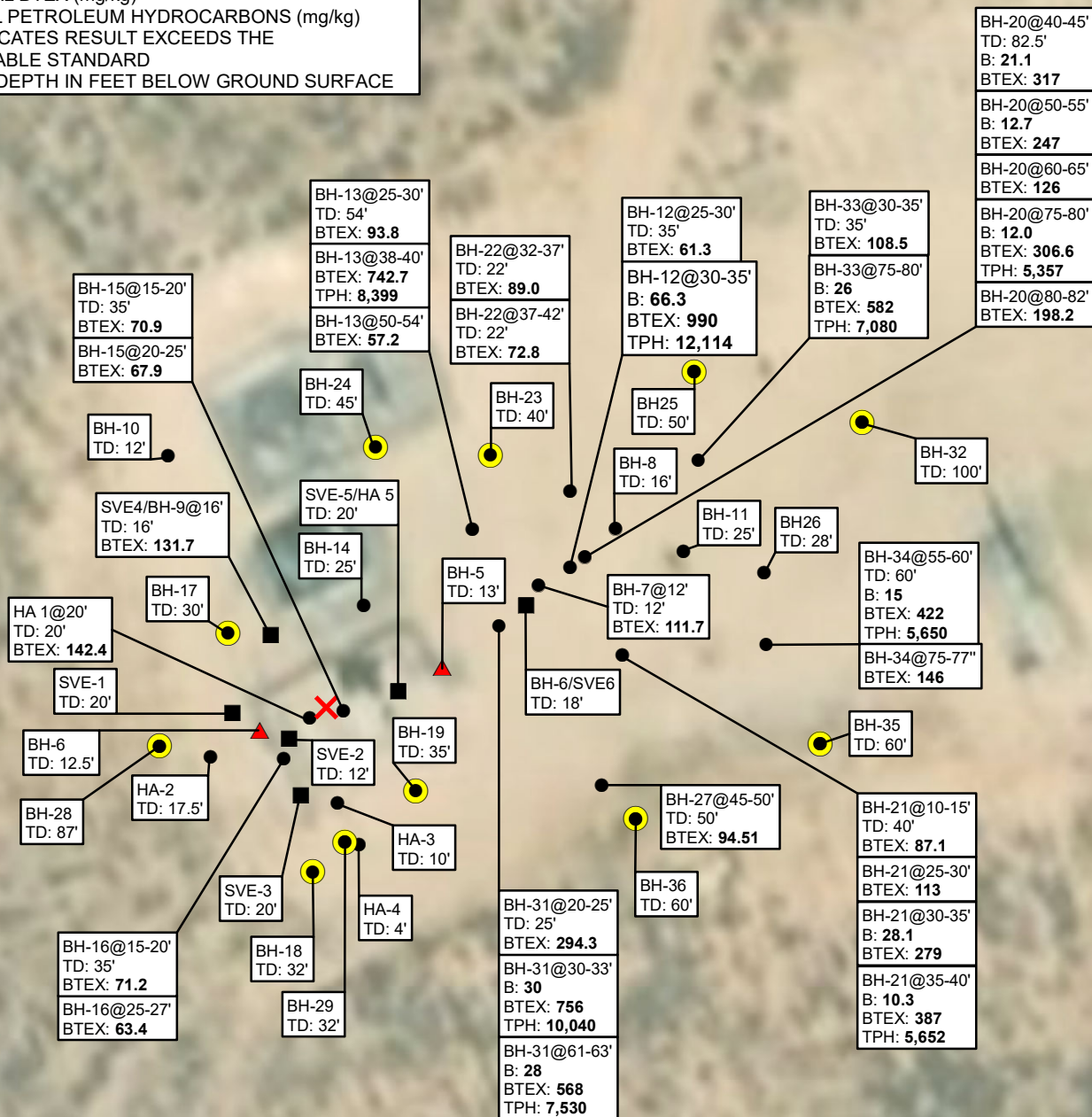
IMAGE COURTESY OF ESRI/USGS

**FIGURE 1**  
**SITE LOCATION MAP**  
**OH RANDEL #5**  
**NWNW SEC 10 T26N R11W**  
**SAN JUAN COUNTY, NEW MEXICO**  
**HILCORP ENERGY COMPANY**





SAMPLE ID @ DEPTH BELOW GROUND SURFACE (FEET)  
 B: BENZENE IN MILLIGRAMS PER KILOGRAM (mg/kg)  
 T: TOLUENE (mg/kg)  
 E: ETHYLBENZENE (mg/kg)  
 X: TOTAL XYLENES (mg/kg)  
 BTEX: TOTAL BTEX (mg/kg)  
 TPH: TOTAL PETROLEUM HYDROCARBONS (mg/kg)  
**BOLD:** INDICATES RESULT EXCEEDS THE  
 APPLICABLE STANDARD  
 TD: TOTAL DEPTH IN FEET BELOW GROUND SURFACE



## LEGEND

- RELEASE LOCATION
- EXISTING LATERAL DELINEATION POINT
- BOREHOLE
- SOIL VAPOR EXTRACTION (SVE) WELL
- BOREHOLE ADVANCED BY XTO

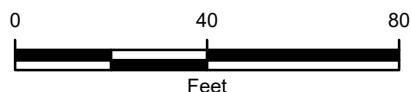


FIGURE 2  
 SOIL ANALYTICAL RESULTS MAP  
 OH RANDEL #5  
 NWNW SEC 10 T26N R11W  
 SAN JUAN COUNTY, NEW MEXICO  
 HILCORP ENERGY COMPANY



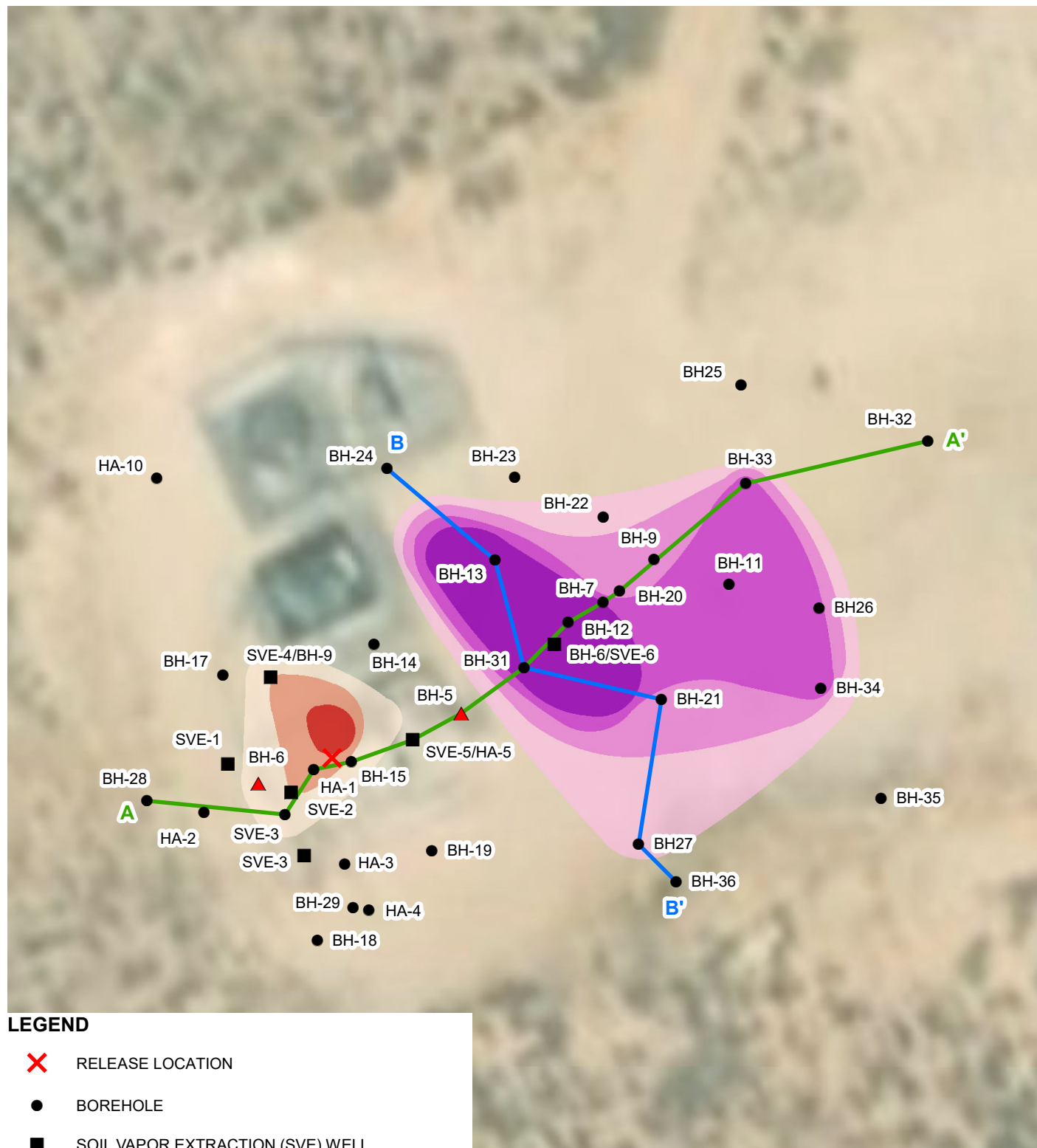


IMAGE COURTESY OF ESRI

# LEGEND



RELEASE LOCATION



BOREHOLE



SOIL VAPOR EXTRACTION (SVE) WELL



BOREHOLE ADVANCED BY XTO

CROSS SECTION A-A'

CROSS SECTION B-B'

INFERRED BTEX ISOCONCENTRATION (PARTS PER MILLION)

50.00 - 200.00

50.00 - 100.00

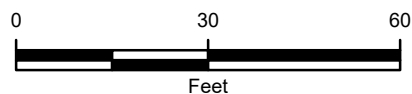
200.01 - 400.00

100.01 - 200.00

400.01 - 600.00

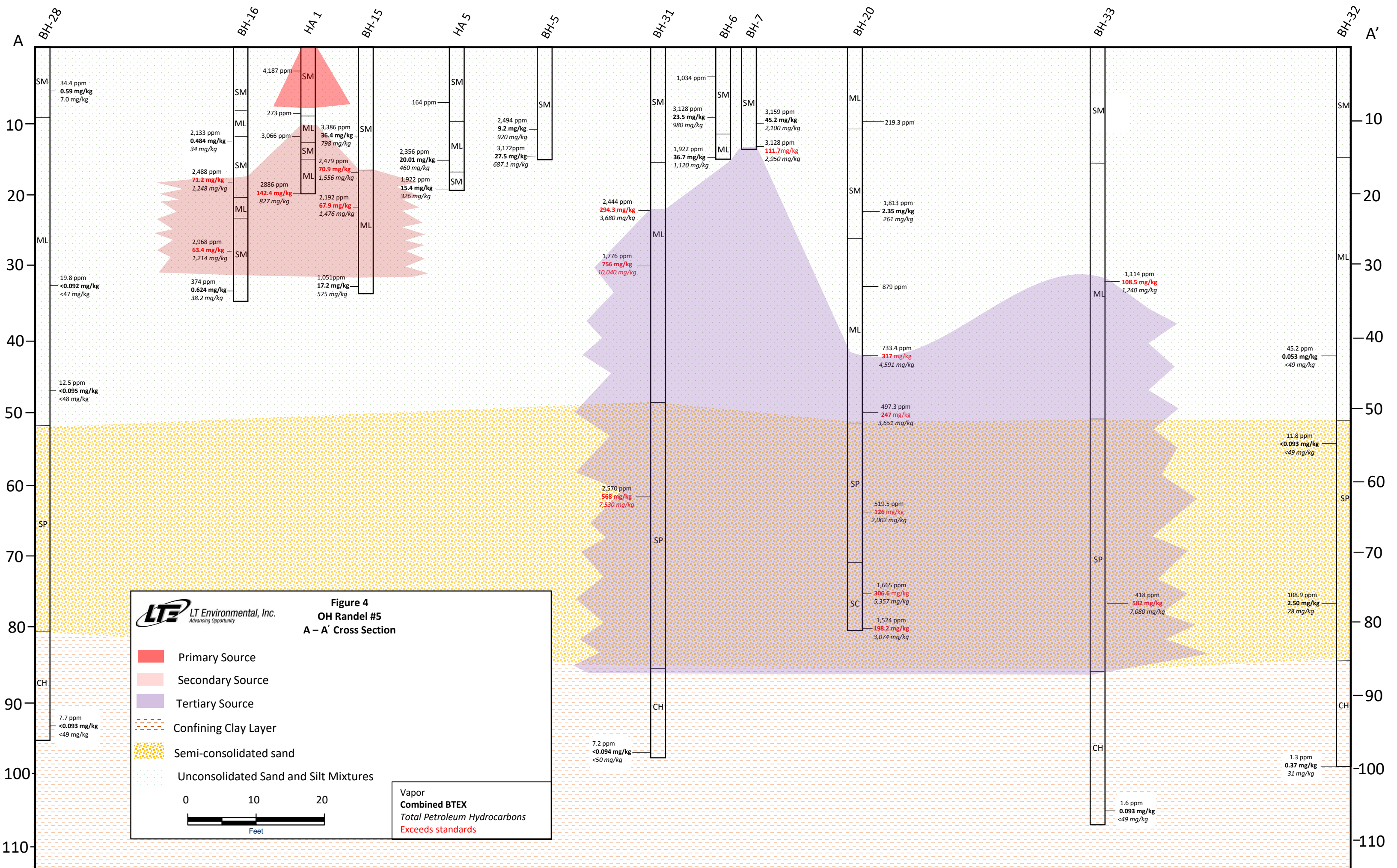
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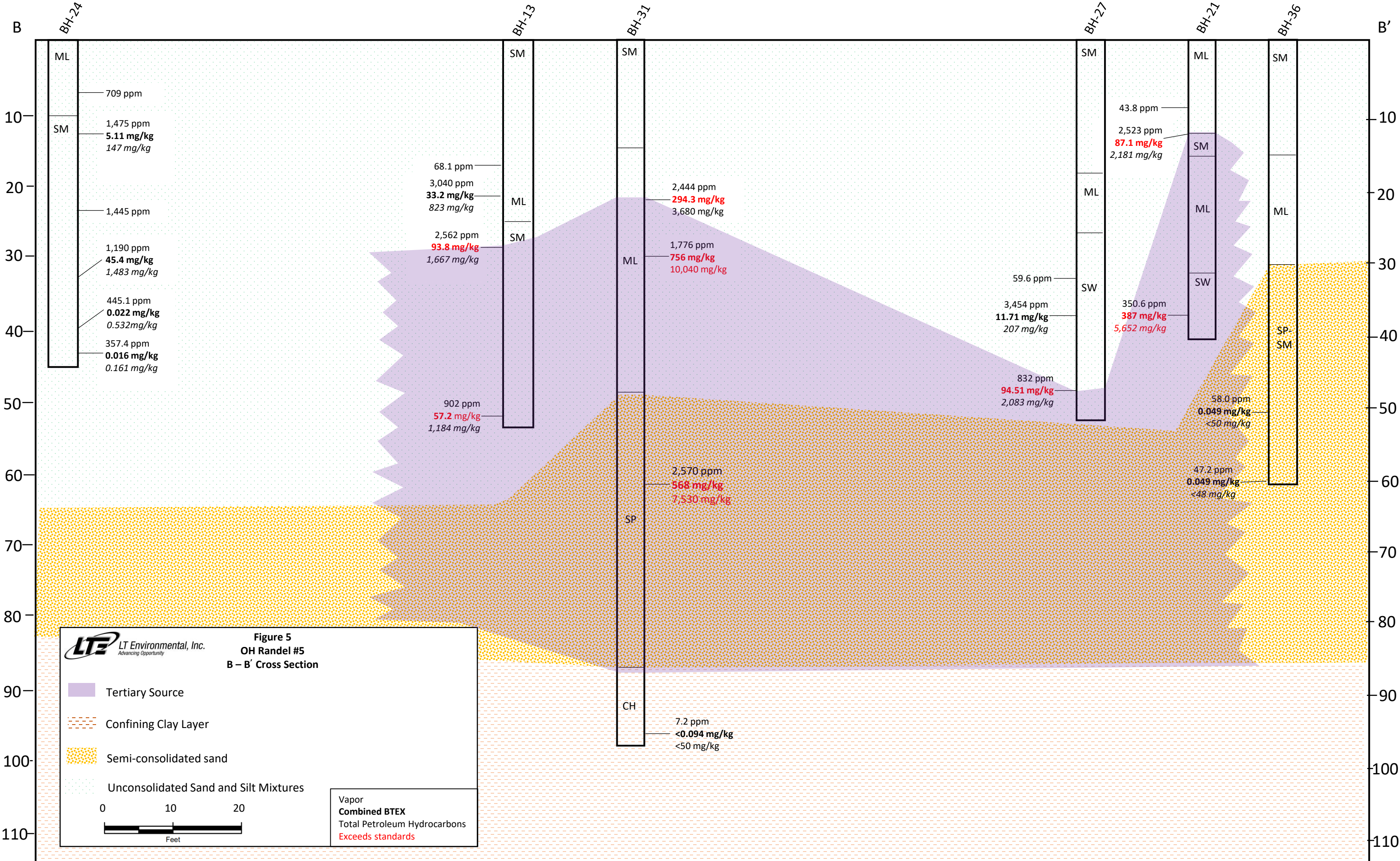
> 600.00



**FIGURE 3**  
**BTEX ISOPACH MAP**  
**OH RANDEL #5**  
**NWNW SEC 10 T26N R11W**  
**SAN JUAN COUNTY, NEW MEXICO**  
**HILCORP ENERGY COMPANY**









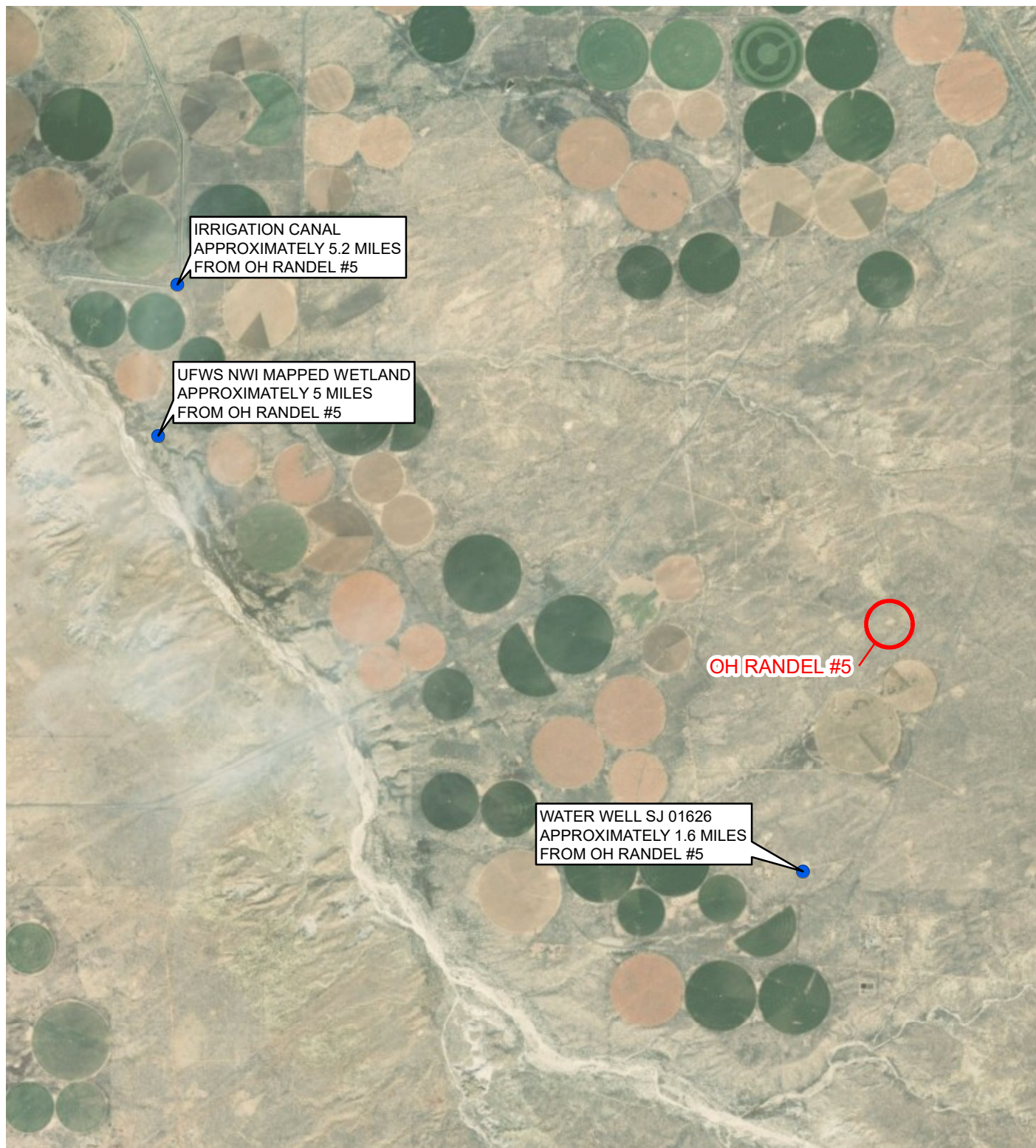
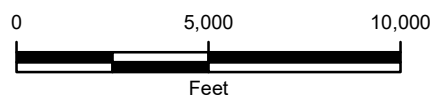


IMAGE COURTESY OF ESRI/USGS

# **LEGEND**

- SITE LOCATION
- RECEPTOR



**FIGURE 6**  
**SITE LOCATION MAP**  
**OH RANDEL #5**  
**NWNW SEC 10 T26N R11W**  
**SAN JUAN COUNTY, NEW MEXICO**  
**HILCORP ENERGY COMPANY**





**TABLE 1  
BOREHOLE SOIL ANALYTICAL RESULTS**

**OH RANDEL #5  
SAN JUAN COUNTY, NEW MEXICO  
XTO ENERGY, INC**

Soil Sample ID	Sample Date	Depth (feet)	Vapor (ppm)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	MRO (mg/kg)	TPH (mg/kg)
HA 1	7/5/2016	20	2,886	5.1	56	7.3	74	<b>142.4</b>	810	17	NA	827
HA 5	7/5/2016	16	2,356	0.21	3.5	1.3	15	20.01	310	150	NA	460
HA 5	7/5/2016	21.5	1,922	<0.10	2.4	1.0	12	15.4	260	66	NA	326
BH-6	8/2/2016	9	3,128	<0.49	1.8	1.7	20	23.5	840	140	NA	980
	8/2/2016	18	1,922	<0.49	7.3	2.4	27	36.7	1,000	120	NA	1,120
BH-7	8/2/2016	11	3,159	<0.42	2.6	3.6	39	45.2	1,700	400	NA	2,100
	8/2/2016	12	3,128	<0.42	9.4	8.3	94	<b>111.7</b>	2,600	350	NA	2,950
BH-8	8/2/2016	16	3,125	<0.47	<0.94	1.3	12	13.3	560	340	NA	900
BH-9	8/2/2016	16	2,413	<1.0	23	8.7	100	<b>131.7</b>	2,200	240	NA	2,440
*BH-5 @ 9.2'	11/18/2016	9.2	2,494	<0.121	<1.21	<0.121	9.2	9.2	783	137	NA	920
*BH-5 @ 13'	11/18/2016	13	3,172	0.314	<2.45	1.28	25.9	27.494	633	54.1	NA	687.1
*BH-6 @ 9'	11/18/2016	9	2,197	<0.0495	<0.495	<0.0495	<0.148	0.148	51.1	17.9	NA	69
*BH-6 @ 10'	11/18/2016	10	2,980	0.0218	<0.00500	0.188	0.0413	0.2511	138	9.27	NA	147.27
*BH-6 @ 12.6'	11/18/2016	12.6	2,347	<0.0122	<0.122	<0.0122	<0.0368	<0.122	53.9	5.81	NA	59.71
BH-11 @ 20-25'	4/19/2017	20-25	0.6	<0.000612	<0.00612	<0.000612	0.00220	0.00220	<0.122	<4.95	<4.95	<4.95
BH-12 @ 0-10'	4/19/2017	0-10	51.4	<0.000538	<0.00538	<0.000538	<0.00161	<0.00538	<0.108	5.66	<4.44	5.66
BH-12 @ 10-15'	4/19/2017	10-15	1,001	<0.110	<1.10	0.403	2.11	2.51	401	39.7	4.39	441
BH-12 @ 15-20'	4/19/2017	15-20	73.1	0.000728	0.00750	0.00379	0.0779	0.0892	2.36	508	8.00	518
BH-12 @ 20-25'	4/19/2017	20-25	269	0.00535	0.0218	0.0114	0.156	0.189	4.02	67.1	<4.48	71.1
BH-12 @ 25-30'	4/19/2017	25-30	1,904	0.149	2.98	2.82	55.5	<b>61.3</b>	1,260	275	<4.48	1,535
BH-12 @ 30-35'	4/19/2017	30-35	1,632	<b>66.3</b>	392	39.8	558	<b>990</b>	11,400	687	26.7	<b>12,114</b>
BH-13 @ 0-10'	4/19/2017	0-10	0.7	<0.000570	<0.00570	<0.000570	<0.00171	<0.00570	<0.114	<4.65	<4.65	<4.65
BH-13 @ 10-15'	4/19/2017	10-15	1.4	0.00113	<0.00567	<0.000567	0.0444	0.0455	1.32	<4.63	<4.63	1.32
BH-13 @ 15-20'	4/19/2017	15-20	68.1	<0.000590	<0.00590	<0.000590	0.0132	0.0132	0.672	8.14	<4.72	8.81
BH-13 @ 20-25'	4/19/2017	20-25	3,040	<0.114	<1.14	1.59	31.6	33.2	698	120	5.29	823
BH-13 @ 25-30'	4/19/2017	25-30	2,562	0.871	27.9	6.39	59.5	<b>93.8</b>	1,380	277	9.51	1,667
BH-13 @ 30-35'	4/19/2017	30-35	1,694	5.31	45.6	8.48	70.1	<b>124.2</b>	1,950	240	7.61	2,190
BH-13 @ 38-40'	9/28/2017	38-40	1,172	73.4	378	43.7	321	<b>742.7</b>	8,090	295	14.4	<b>8,399</b>
BH-13 @ 50-54'	9/28/2017	50-54	902	0.592	14.8	4.07	38.3	<b>57.2</b>	908	257	18.8	1,184
BH-14 @ 15'-20'	4/20/2017	15-20	231	0.00116	<0.00586	0.0175	0.0491	0.0666	0.966	<4.78	<4.78	0.966
BH-14 @ 20'-25'	4/20/2017	20-25	16.0	<0.000529	<0.00529	<0.000529	0.00185	0.00185	<0.106	<4.50	<4.50	<4.50
BH-15 @ 0-10'	4/20/2017	0-10	2,949	<0.0277	<0.277	<0.0277	2.04	2.04	61.8	50.5	<4.48	112
BH-15 @ 10-15'	4/20/2017	10-15	3,386	<0.0572	3.87	2.82	29.7	36.4	651	147	<4.67	798
BH-15 @ 15-20'	4/20/2017	15-20	2,479	0.525	10.7	5.23	55.0	<b>70.9</b>	1,270	286	<4.97	1,556
BH-15 @ 20-25'	4/20/2017	20-25	2,192	0.117	10.2	4.63	53.1	<b>67.9</b>	1,110	366	<4.52	1,476
BH-15 @ 30-32'	4/20/2017	30-32	1,051	0.812	3.53	1.16	12.5	17.2	549	25.6	<4.43	575
BH-16 @ 0-10'	4/20/2017	0-10	164	<0.000552	<0.00552	<0.000552	0.00315	0.00315	<0.110	7.67	<4.50	7.67
BH-16 @ 10-15'	4/20/2017	10-15	2,133	<0.000558	0.00694	0.0352	0.442	0.484	11.5	22.7	<4.70	34
BH-16 @ 15-20'	4/20/2017	15-20	2,488	0.143	7.02	3.79	60.2	<b>71.2</b>	1,150	97.8	<4.76	1,248
BH-16 @ 23-25'	4/20/2017	23-25	2,606	<0.115	2.37	1.36	17.6	21.3	399	169	<4.59	568
BH-16 @ 25-27'	4/20/2017	25-27	2,968	0.252	11.5	4.43	47.5	<b>63.4</b>	997	217	<4.53	1,214
BH-16 @ 27-29'	4/20/2017	27-29	2,784	0.107	5.72	2.14	17.2	25.1	600	51.0	<4.51	651
BH-16 @ 33-35'	4/20/2017	33-35	374	0.0252	0.242	0.0393	0.343	0.624	5.34	32.9	<4.41	38.2
BH-17 @ 20-25'	4/21/2017	20-25	362	0.000588	0.00605	0.00778	0.150	0.164	5.52	5.26	<4.51	10.78
BH-18 @ 30-32'	4/21/2017	30-32	9.8	<0.000522	<0.00522	<0.000522	0.00646	0.00646	<1.04	<4.26	<4.26	<4.26
BH-19 @ 30-35'	4/21/2017	30-35	113	0.000866	<0.00521	<0.000521	0.00464	0.00464	<0.104	<4.30	<4.30	<4.30
BH-20 @ 20-25'	8/21/2017	20-25	1,813	0.0138	<0.125	<0.0125	2.35	2.35	96.9	150	13.8	261
BH-20 @ 40-45'	8/21/2017	40-45	733.4	<b>21.1</b>	125	18.8	152	<b>317</b>	4,170	421	<40.0	4,591
BH-20 @ 50-55'	8/22/2017	50-55	497.3	<b>12.7</b>	90.9	15.7	128	<b>247</b>	3,310	336	5.44	3,651



**TABLE 1**  
**BOREHOLE SOIL ANALYTICAL RESULTS**

**OH RANDEL #5**  
**SAN JUAN COUNTY, NEW MEXICO**  
**XTO ENERGY, INC**

Soil Sample ID	Sample Date	Depth (feet)	Vapor (ppm)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	MRO (mg/kg)	TPH (mg/kg)
BH-20 @ 60-65'	8/22/2017	60-65	519.5	2.26	32.9	9.6	80.8	<b>126</b>	1,600	392	9.8	2,002
BH-20 @ 75-80'	9/28/2017	75-80	1,665	<b>12.0</b>	114	21.6	171	<b>306.6</b>	4,900	435	21.5	<b>5,357</b>
BH-20 @ 80-82'	9/28/2017	80-82	1,524	2.11	63.8	13.4	121	<b>198.2</b>	2,710	340	24.2	3,074
BH-21 @ 10-15'	8/21/2017	10-15	2,523	<0.500	5.39	<0.500	81.7	<b>87.1</b>	1,710	457	14.0	2,181
BH-21 @ 25-30'	8/21/2017	25-30	1,259	2.47	29.1	8.57	72.7	<b>113</b>	1,880	325	8.88	2,214
BH-21 @ 30-35'	8/21/2017	30-35	624.1	<b>28.1</b>	123	13.9	114	<b>279</b>	3,620	95.8	<20.0	3,716
BH-21 @ 35-40'	8/21/2017	35-40	350.6	<b>10.3</b>	131	26.8	219	<b>387</b>	4,810	842	<40.0	<b>5,652</b>
BH-22 @ 24-26'	8/21/2017	24-26	1,523	0.0142	<0.125	<0.0125	0.859	0.873	82.5	64.1	<20.0	147
BH-22 @ 32-37'	8/21/2017	32-37	1,047	0.841	22.7	7.02	58.4	<b>89.0</b>	1,430	360	<20.0	1,790
BH-22 @ 37-42'	8/21/2017	37-42	304.7	3.50	25.6	4.42	39.3	<b>72.8</b>	1,250	92.7	<20.0	1,343
BH-23 @ 30-35'	8/22/2017	30-35	246.9	0.0192	0.0386	0.00242	0.0229	0.0831	0.470	<4.00	<4.00	0.470
BH-23 @ 35-40'	8/22/2017	35-40	349.2	0.00512	0.0102	0.00133	0.00697	0.0236	0.195	<4.00	<4.00	0.195
BH-24 @ 10-15'	8/22/2017	10-15	1,475	0.276	0.517	0.517	3.80	5.11	180	40.8	<4.00	121
BH-24 @ 30-35'	8/22/2017	30-35	1,190	0.462	4.82	3.17	37.4	45.4	1,000	483	<20.0	1,483
BH-24 @ 35-40'	8/22/2017	35-40	445.1	0.00431	0.0085	<0.000500	0.00915	0.0220	0.532	<4.00	<4.00	0.532
BH-24 @ 40-45'	8/22/2017	40-45	357.4	0.00369	0.00711	0.000684	0.00471	0.0162	0.161	<4.00	<4.00	0.161
BH-25 @ 30-35'	9/28/2017	30-35	112	0.00956	0.0413	0.00304	0.0534	0.0977	0.399	5.0	<4.97	5.399
BH-25 @ 45-50'	9/29/2017	45-50	8.9	0.000770	<0.00528	<0.000528	0.00202	0.00202	<0.106	<4.22	<4.22	<4.22
BH-26 @ 20-25'	9/29/2017	20-25	0.0	0.0103	0.0146	<0.000622	0.00390	0.0185	<0.124	<4.98	<4.98	<4.98
BH-27 @ 35-40'	9/30/2017	35-40	3,454	0.0442	0.863	1.19	9.66	11.7130	207	<5.29	<5.29	207
BH-27 @ 40-45'	9/30/2017	40-45	1,947	<0.263	5.91	3.98	35.4	45.29	621	303	26.7	951
BH-27 @ 45-50'	9/30/2017	45-50	832	<0.533	18.9	7.51	68.1	<b>94.51</b>	1,540	510	33.2	2,083
BH-28 @ 0-10'	12/17/2018	0-10	34.4	<0.025	0.21	<0.049	0.38	0.59	7.0	<9.9	<49	7.0
BH-28 @ 30-35'	12/17/2018	30-35	19.8	<0.023	<0.046	<0.046	<0.092	<0.092	<4.6	<9.3	<47	<47
BH-28 @ 45-50'	12/19/2018	45-50	12.5	<0.024	<0.048	<0.048	<0.095	<0.095	<4.8	<9.6	<48	<48
BH-28 @ 85-87'	12/19/2018	85-87	7.7	<0.023	<0.047	<0.047	<0.093	<0.093	<4.7	<9.7	<49	<49
BH-29 @ 10-15'	12/17/2018	10-15	1.0	<0.024	<0.047	<0.047	<0.095	<0.095	<4.7	<9.5	<47	<47
BH-29 @ 27-32'	12/17/2018	27-32	0.8	<0.023	<0.047	<0.047	<0.094	<0.094	<4.7	<9.5	<48	<48
BH-31 @ 20-25'	12/16/2018	20-25	2,444	1.3	100	13	180	<b>294.3</b>	3,400	280	<49	3,680
BH-31 @ 30-33'	12/16/2018	30-33	1,776	<b>30</b>	360	36	360	<b>756</b>	9,600	440	<49	<b>10,040</b>
BH-31 @ 61-63'	12/19/2018	61-63	2,570	<b>28</b>	270	28	270	<b>568</b>	7,200	330	<50	<b>7,530</b>
BH-31 @ 94-96'	12/19/2018	94-96	7.2	<0.023	<0.047	<0.047	<0.094	<0.094	<4.7	<10	<50	<50
BH-32 @ 40-45'	12/14/2018	40-45	45.2	<0.023	0.053	<0.047	<0.093	0.053	<4.7	<9.8	<49	<49
BH-32 @ 50-57'	12/14/2018	50-57	11.8	<0.023	<0.047	<0.047	<0.093	<0.093	<4.7	<9.8	<49	<49
BH-32 @ 75-80'	12/18/2018	75-80	108.9	0.069	0.66	0.14	1.70	2.50	28	<9.6	<48	28
BH-32 @ 95-100'	12/18/2018	95-100	1.3	0.024	0.048	<0.047	0.30	0.37	31	<9.9	<50	31
BH-33 @ 30-35'	12/13/2018	30-35	1,114	<1.2	31	6.5	71	<b>108.5</b>	1,100	140	<46	1,240
BH-33 @ 75-80'	12/14/2018	75-80	418	<b>26</b>	250	26	280	<b>582</b>	6,900	180	<50	<b>7,080</b>
BH-33 @ 100-105'	12/17/2018	100-105	1.6	<0.023	0.093	<0.046	<0.046	0.093	<4.6	<9.7	<49	<49
BH-34 @ 55-60'	12/15/2018	55-60	1,118	<b>15</b>	180	22	220	<b>422</b>	5,300	350	<44	<b>5,650</b>
BH-34 @ 75-77'	12/15/2018	75-77	943	1.9	49	9.0	86	<b>146</b>	1,700	170	<43	1,870
BH-35 @ 45-50'	12/15/2018	45-50	73.1	<0.024	<0.049	<0.049	<0.097	<0.097	<4.9	<9.0	<45	<45
BH-35 @ 55-60'	12/15/2018	55-60	18.1	<0.024	<0.048	<0.048	<0.096	<0.096	<4.8	<9.8	<49	<49
BH-36 @ 50-55'	12/16/2018	50-55	58.0	<0.024	0.049	<0.047	<0.095	0.049	<4.7	<10	<50	<50
BH-36 @ 55-60'	12/16/2018	55-60	47.2	<0.024	0.049	<0.049	<0.098	0.049	<4.9	<9.6	<48	<48
<b>NMOCD Closure Criteria</b>				<b>10</b>	<b>NE</b>	<b>NE</b>	<b>NE</b>	<b>50</b>	<b>NE</b>	<b>NE</b>	<b>NE</b>	<b>5,000</b>

**NOTES:**

< - indicates result is less than the stated laboratory reporting limit

\* - Boreholes drilled by XTO

**Bold** - indicates value exceeds stated NMOCD standard

BTEX - Benzene, Toluene, Ethylbenzene, Total Xylenes analyzed by EPA method 8021

DRO - diesel range organics analyzed by EPA Modified Method 8015

GRO - gasoline range organics analyzed by EPA Modified Method 8015

mg/kg - milligrams per kilogram

NE - Not established

NMOCD - New Mexico Oil Conservation Division

ppm - parts per million

TPH - total petroleum hydrocarbons





**TABLE 2  
THRESHOLD AND BALANCING CRITERIA**

**OH RANDEL #5  
SAN JUAN COUNTY, NEW MEXICO  
XTO ENERGY, INC.**

<b>Remedial Alternatives</b>	<b>Protection of Human Health and the Environment</b>	<b>Compliance</b>	<b>Long Term Effectiveness and Permanence</b>	<b>Toxicity, Mobility, or Volume Reduction Through Treatment</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>
Option 1 –  Primary Source Area Removal with Natural Attenuation of Secondary and Tertiary Source Areas	Removing the Primary Source area via excavation would be the most favorable option for eliminating shallow impacts. However, given the location and depth of the Secondary and Tertiary source areas, there is no threat to human health and environment under current and potential future conditions.	Primary Source area removal would bring the site into partial compliance. Natural attenuation of the Secondary and Tertiary source areas would eventually bring contaminant concentrations into compliance.	Natural processes would eventually degrade contaminants resulting in long-term effectiveness and permanence.	Primary Source area would be eliminated. Secondary and Tertiary source area contaminants are degraded <i>in situ</i> by biological processes that will reduce the petroleum hydrocarbons to carbon dioxide and water. The process takes time to reduce the toxicity, mobility, and volume. As it is a non-active remediation strategy that requires time, the option has intermediate favorability.	This option would remove the Primary Source area for short-term effectiveness. The Secondary and Tertiary source areas would require a much longer time for natural attenuation and is not an effective short-term remedy.	The Primary Source area can be excavated using typical equipment and techniques. Due to the depth of the Secondary and Tertiary source areas, excavation is not feasible and natural attenuation is the most favorable option.	Minimal – Cost is estimated at \$75,000. Most favorable option.
Option 2 –  Soil Vapor Extraction (SVE) of Primary, Secondary, and Tertiary Source Areas	Petroleum hydrocarbons are removed from the subsurface but could create an exposure pathway for air inhalation. Treatment of vapors and institutional controls could prevent exposure. Protective with proper vapor mitigation measures in place.	Could bring the site into compliance within 2 to 10-plus years.	The SVE process long-term effectiveness and reliability has intermediate favorability. Soil heterogeneities could limit the effectiveness of the SVE system.	SVE would reduce the volume of contaminants in the subsurface, which would inhibit subsurface mobility. Petroleum hydrocarbons would be released into the air (unless air emission treatment was conducted) and could be inhaled, become a greenhouse gas, and/or act as an ozone precursor. This option is less favorable when considering mobility and favorable if air emission equipment is used.	The process does require time and would require 2 to 10-plus years of system operation. The option is moderately favorable when compared to excavation.	A substantial SVE well infrastructure is required to influence all three impacted zones. Preliminary design of the system indicated approximately 40 SVE wells. The system can be implemented but would require a large effort and continued operation and maintenance for a 2 to 10-plus year period. Low implementability.	Moderate – Cost is estimated at approximately \$300,000 to \$500,000 plus \$50,000 annually for operation and maintenance. Intermediate favorability.
Option 3 –  Excavation of Primary, Secondary, and Tertiary Source Areas	Removing the impacted soil via excavation would eliminate the contaminants of concern (COCs) from the site. However, an excavation of this size could pose a safety threat to personnel and would be an Occupational Safety and Health Administration (OSHA) engineered excavation. The impact would be brought to the surface which could open an exposure pathway.	Would bring the site into compliance with excavation but would result in the potential for exposure to COCs during excavation.	COCs would be removed from the Site but transferred to another location. Confirmation soil sampling would ensure reliability.	Excavation would remove the COCs and immediately reduce the toxicity, mobility, and volume of on-site COCs; however, the toxicity and volume of contaminants would be transferred to a landfill and experience anaerobic conditions, which would be the slowest of all the processes. The option is most favorable but would be less favorable if landfill disposal is considered a transfer of impact.	Contaminants removed quickly. The most favorable short-term effectiveness of the three options.	The Primary Source area can be excavated using typical equipment and techniques. Due to the depth of the Secondary and Tertiary source areas, excavation is not feasible. The least favorable option.	High cost due to equipment, trucking, and disposal fees. Approximately \$3,700,000. Least favorable option.



## APPENDIX A: BORING LOGS



**Compliance • Engineering • Remediation**  
**LT Environmental, Inc.**  
 848 E. 2nd Ave  
 Durango, Colorado 81301

### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	HA-1	Project:	OH Randel #5
Date:	6/29/2016	Project Number:	12916007
Logged By:	Josh Adams/Devin Hencmann	Drilled By:	Josh Adams/Devin Hencmann
Elevation:	Detector:	Drilling Method:	Sampling Method:
	Mini Rae Lite	Hand Auger	Hand Auger
Gravel Pack:	Seal:	Grout:	
NA	NA	NA	
Casing Type:	Diameter:	Length:	Hole Diameter:
NA	NA	NA	3-inch
Screen Type:	Slot:	Diameter:	Length:
NA	NA	NA	NA
		Total Depth:	Depth to Water:
		19.5'	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
		4187	yes		1	0-1'				
		2822	yes		2	1-2'				
		483	yes		3	2-3'				
		859	yes		4	3-4'				
		473	yes		5	4-5'				
		564	no		6	5-6'				
		273	yes		7	6-7'				
		785	yes		8	7-8'				
		999	yes		9	8-9'				
		3066	yes		10	9-10'				
		3746	yes		11	10-11'				
		3584	yes		12	11-12'				
		2655	yes		13	12-13'				
		3384	yes		14	13-14'				
		3441	yes		15	14-15'				



**Compliance „ Engineering „ Remediation**  
**LT Environmental, Inc.**

Boring/Well #

HA-1

Project:

OH Randel#5

Project #

Date

6/29/2016

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	dry				15			ML	Light brown silty clay, ml compact 10YR 7/4	
		2886	yes		16	15-16'				
	dry	2322	yes		17	16-17'		ML	light brown silty sand, loose, ml 10YR 7/4	
		1977	yes		18	17-18'				
		2886	yes		19	18-19.5'				
					20					
					21					
					22					
					23					
					24					
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					



**Compliance <sub>™</sub> Engineering <sub>™</sub> Remediation**  
**LT Environmental, Inc.**  
**848 E. 2nd Ave**  
**Durango, Colorado 81301**

**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	HA-2	Project:	OH Randel #5
Date:	6/29/2016	Project Number:	12916007
Logged By:	Josh Adams/Devin Hencmann	Drilled By:	Josh Adams/Devin Hencmann
Elevation:	Detector:	Drilling Method:	Sampling Method:
	Mini Rae Lite	Hand Auger	Hand Auger
Gravel Pack:	Seal:	Grout:	
NA	NA	NA	
Casing Type:	Diameter:	Length:	Hole Diameter:
NA	NA	NA	3-inch
Screen Type:	Slot:	Diameter:	Length:
NA	NA	NA	NA
		Total Depth:	Depth to Water:
		17.5	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1	0-1'				
					2	1-2'				
					3	2-3'				
					4	3-4'				
					5	4-5'				
					6	5-6'				
					7	6-7'				
					8	7-8'				
					9	8-9'				
					10	9-10'				
					11	10-11'				
					12	11-12'				
					13	12-13'				
					14	13-14'				
					15	14-15'				



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**LT Environmental, Inc.**

Boring/Well #

HA-2

Project:

OH Randel #5

Project #

12916007

Date

6/29/2016

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	moist	3.2	no		15			SM	same lith as above, orange staining/stringers, slight HC oder 10YR 7/1 and 5YR 7/8	
					16	15-16'				
					17	16-17'				
					18					
					19					
					20					
					21					
					22					
					23					
					24					
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					



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**LT Environmental, Inc.**  
**848 E. 2nd Ave**  
**Durango, Colorado 81301**

**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	HA-3	Project:	OH Randel #5
Date:	6/29/2016	Project Number:	12916007
Logged By:	Josh Adams/Devin Hencmann	Drilled By:	Josh Adams/Devin Hencmann
Elevation:	Detector:	Drilling Method:	Sampling Method:
	Mini Rae Lite	Hand Auger	Hand Auger
Gravel Pack:	Seal:	Grout:	
NA	NA	NA	
Casing Type:	Diameter:	Length:	Hole Diameter:
NA	NA	NA	3-inch
Screen Type:	Slot:	Diameter:	Length:
NA	NA	NA	NA
		Total Depth:	Depth to Water:
		10	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
		0	no		1	0-1'				
		0	no		2	1-2'				
		0	no		3	2-3'				
		0	no		4	3-4'				
		0	no		5	4-5'				
		0	no		6	5-6'				
		0	no		7	6-7'				
		65	no		8	7-8'				
		907	no		9	8-9'				
		3062	yes		10	9-10'				
									rock encountered, drilling advanced stopped	



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	HA-4	Project:	OH Randel #5
Date:	6/29/2016	Project Number:	12916007
Logged By:	Josh Adams/Devin Hencmann	Drilled By:	Josh Adams/Devin Hencmann
Elevation:	Detector:	Drilling Method:	Sampling Method:
	Mini Rae Lite	Hand Auger	Hand Auger
Gravel Pack:	Seal:	Grout:	
NA	NA	NA	
Casing Type:	Diameter:	Length:	Hole Diameter:
NA	NA	NA	3-inch
Screen Type:	Slot:	Diameter:	Length:
NA	NA	NA	NA
		Total Depth:	Depth to Water:
		13	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
		0	no		1	0-1'				
		0	no		2	1-2'				
		0	no		3	2-3'				
		0	no		4	3-4'				
	dry	0	no		5	4-5'		SM	silty sand, 40% silt, 50% clean sand 10% lithics light brown 10YR 7/4	
		0	no		6	5-6'				
		0	no		7	6-7'				
		0	no		8	7-8'				
		0	no		9	8-9'				
		0	no		10	9-10'				
	moist	0	no		11			ML	silty/clay rich sand, cohesive, light brown 10YR 7/4	
		0	no		12					
	moist	0	no		13			SM	silty sand, 40% silt, 50% clean sand 10% lithics light brown 10YR 7/4	
					14					
					15					





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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	HA-5	Project:	OH Randel #5
Date:	7/5/2016	Project Number:	12916007
Logged By:	Josh Adams/Alex Crooks	Drilled By:	Josh Adams/Alex Crooks
Elevation:	Detector:	Drilling Method:	Sampling Method:
	Mini Rae Lite	Hand Auger	Hand Auger
Gravel Pack:	Seal:	Grout:	
NA	NA	NA	
Casing Type:	Diameter:	Length:	Hole Diameter:
NA	NA	NA	3-inch
Screen Type:	Slot:	Diameter:	Length:
NA	NA	NA	NA
		Total Depth:	Depth to Water:
		21.5	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1	0-1'		SM	silty sand with some gravel, 70% sand, 25% silt 5% gravel med-fine grained subrounded, pale red brown 2.5YR 6/8	
					2	1-2'				
					3	2-3'		SM	Same as above except no gravel 70% sand 30% silt 2.5YR 6/8	
					4	3-4'				
					5	4-5'				
					6	5-6'		SM	fine grained silty sand 60% sand 40% silt, subrounded, light golden tan 10YR 7/6	
					7	6-7'				
					8	7-8'		SM	silty sand with clay 60% sand 30% silt 10% clay light tan grey 10YR 7/3	
					9	8-9'				
					10	9-10'		SM	same lith as above, orange staining/stringers 10YR 7/2 and 5YR 7/8	
					11	10-11'				
					12	11-12'				
					13	12-13'				
					14	13-14'		SM	silty sand with clay 60% sand 30% silt 10% clay very fine to fine grained sand, dark golden brown 10YR 6/8	
					15	14-15'				



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Boring/Well #

HA-5

Project:

OH Randel#5

Project #

Date

7/5/2016

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
	dry	2356	yes		16	15-16'		ML	increase in clay content, silty sand with clay 55% sand 30% silt 15% clay, no staining	
		2017	yes		17	16-17'				
		1857	yes		18	17-18'				
		1993	yes		19	18-19'				
	dry	2168	yes		20	19-20'		SM	silty sand with clay 60% sand, 30% silt, 10% clay light tan grey 10YR7/2	
		1922	yes		21	20-21.5'		SM	silty sand with gravel 55% sand 35% silt, 10% gravel well rounded, very fine to fine grained sand light brown grey 10YR 7/2	
	dry	1116	yes							
					22				rock encountered, drilling advance stopped	
					23					
					24					
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	BH-6	Project:	OH Randel #5
Date:	8/2/2016	Project Number:	12916007
Logged By:	Josh Adams/Devin Hencmann	Drilled By:	Louis Trujillo
Elevation:	Detector:	Drilling Method:	Sampling Method:
	Mini Rae Lite	Geo Probe	Continuous
Gravel Pack:	Seal:	Grout:	
NA	NA	NA	
Casing Type:	Diameter:	Length:	Hole Diameter:
NA	NA	NA	3-inch
Screen Type:	Slot:	Diameter:	Length:
NA	NA	NA	NA
		Total Depth:	Depth to Water:
		18	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0			SM		
					1	0-1'				
					2	1-2'				
					3	2-3'				
					4	3-4'				
					5	4-5'				
					6	5-6'				
					7	6-7'				
					8	7-8'				
					9	8-9'				
					10	9-10'				
					11	10-11'				
					12	11-12'				
					13	12-13'				
					14	13-14'				
					15	14-15'				



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Boring/Well #

BH-6

Project:

OH Randel#5

Project #

Date

8/2/2016

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	dry				15					
		2390	yes		16	15-16'			silty sand 45% silt 50% fine sand 5% med sand light grey brown 10YR 7/2	
		2425	yes		17	16-17'				
		1922	yes		18	17-18'				
					19				refusal at 18'	
					20					
					21					
					22					
					23					
					24					
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number: BH-7		Project: OH Randel #5	
Date: 8/2/2016		Project Number: 12916007	
Logged By: Josh Adams/Devin Hencmann		Drilled By: Louis Trujillo	
Drilling Method: Geo probe		Sampling Method: Continuous	
Seal: NA		Grout: NA	
Diameter: NA	Length: NA	Hole Diameter: 3-inch	Depth to Liquid:
Diameter: NA	Length: NA	Total Depth: 12	Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1	0-1'	N		no recovery	
					2	1-2'	R			
					3	2-3'				
	dry	108	no		4	3-4'		SM	silty sand with gravel , 60% sand 30% silt 10% gravel light brown 10YR7/4	
		3.5	no							
					5	4-5'				
					6	5-6'	NR		no recovery	
	dry	13.9	no		7	6-7'				
		34	no		8	7-8'		SM	silty sand 40% silt, 30% fine sand 20% med sand minor coarse light brown 10YR 7/4	
					9	8-9'				
	dry	1805	yes		10	9-10'		SM	silty sand 30% silt 30% med sand 40% fine sand minor coarse, HC oder light grey brown 10YR 7/2	
		3159	yes		11	10-11'				
		3128	yes		12	11-12'				
									refusal at 12'	



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH-8	Project:	OH Randel #5
Date:	8/2/2016	Project Number:	12916007
Logged By:	Josh Adams/Devin Hencmann	Drilled By:	Louis Trujillo
Elevation:	Detector:	Drilling Method:	Sampling Method:
	Mini Rae Lite	Geo probe	Continuous
Gravel Pack:	Seal:	Grout:	
NA	NA	NA	
Casing Type:	Diameter:	Length:	Hole Diameter:
NA	NA	NA	3-inch
Screen Type:	Slot:	Diameter:	Length:
NA	NA	NA	NA
		Total Depth:	Depth to Water:
		16	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1	0-1'	N		no recovery	
					2	1-2'	R			
		0	no		3	2-3'				
	dry	3	no		4	3-4'		SM	silty sand with surface gravel light brown 10YR 7/4	
					5	4-5'	NR		no recovery	
					6	5-6'				
	dry	5.3	no		7	6-7'		SM	silty sand 60% sand 40% silt light brown 10YR 7/4	
		1.5	no		8	7-8'				
		2	no		9	8-9'				
		2.2	no		10	9-10'				
	moist	468	no		11	10-11'		ML	silty sand with clay 50% sand 40% silt 10% clay, light grey brown 10YR 7/2	
		772	no		12	11-12'				
					13	12-13'				
		88	no		14	13-14'				
					15	14-15'				



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Boring/Well #

BH-8

Project:

OH Randel#5

Project #

Date

8/2/2016

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	moist				15			ML	silty sand with clay 50% sand 40% silt 10% clay	
		3125	yes		16	15-16'			, light grey brown 10YR 7/2	
					17				refusal at 16'	
					18					
					19					
					20					
					21					
					22					
					23					
					24					
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	BH-9	Project:	OH Randel #5
Date:	8/2/2016	Project Number:	12916007
Logged By:	Josh Adams/Devin Hencmann	Drilled By:	Louis Trujillo
Elevation:	Detector: Mini Rae Lite	Drilling Method:	Geo probe
Gravel Pack:	NA	Seal:	NA
Casing Type:	NA	Hole Diameter:	3-inch
Screen Type:	NA	Length:	NA
Slot:	NA	Total Depth:	16
Diameter:	NA	Depth to Liquid:	
Length:	NA	Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1	0-1'	N		no recovery	
					2	1-2'	R			
					3	2-3'				
	dry	0	no		4	3-4'		SM	silty sand with surface gravel light brown 10YR 7/4	
		0	no		5	4-5'				
		0	no		6	5-6'				
		0.4	no		7	6-7'				
	dry	0.6	no		8	7-8'		SM	silty sand 40% silt 40% fine sand 20% med sand light brown 10YR 7/4	
		0	no		9	8-9'				
		3.7	no		10	9-10'				
		13.5	no		11	10-11'				
		776	yes		12	11-12'				
	dry	1927	yes		13	12-13'		SM	silty sand 50% med sand 20% fine sand 30% silt light grey 10YR 7/2 hc oder and staining	
		2355	yes		14	13-14'				
		2114	yes		15	14-15'				





# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: BH-10		Project: OH Randel #5	
Date: 8/2/2016		Project Number: 12916007	
Logged By: Josh Adams/Devin Hencmann		Drilled By: Louis Trujillo	
Drilling Method: Geo Probe		Sampling Method: Continuous	
Seal: NA		Grout: NA	
Diameter: NA	Length: NA	Hole Diameter: 3-inch	Depth to Liquid:
Diameter: NA	Length: NA	Total Depth: 12	Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
		0	no		1	0-1'				
		0	no		2	1-2'				
		0	no		3	2-3'				
	dry	0	no		4	3-4'		SM	silty sand, 40% silt, 50% clean sand 10% surface gravel light brown 10YR 7/4	
		0	no		5	4-5'				
		0	no		6	5-6'				
		0	no		7	6-7'				
		0	no		8	7-8'				
		0	no		9	8-9'				
	dry	0	no		10	9-10'		ML	silty sand with clay 50% sand 40% silt 10% clay cohesive, light grey 10YR7/2	
		0	no		11	10-11'				
		0	no		12	11-12'				
									refusal at 12'	



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: <b>BH-11</b>	Project: <b>OH Randel #5</b>
Date: <b>4-19-17</b>	Project Number: <b>12916007</b>
Logged By: <b>D. Burns</b>	Drilled By: <b>GEOMAT</b>
Drilling Method: <b>Hollowstem Auger</b>	Sampling Method: <b>2' split spoon Continuous</b>
Gravel Pack: <b>NA</b>	Seal: <b>NA</b>
Casing Type: <b>NA</b>	Grout: <b>NA</b>
Screen Type: <b>NA</b>	Diameter: <b>NA</b> Length: <b>NA</b>
Slot: <b>NA</b>	Hole Diameter: <b>NA</b> Depth to Liquid: <b>NA</b>
Diameter: <b>NA</b> Length: <b>NA</b>	Total Depth: <b>25'</b> Depth to Water: <b>NA</b>

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0				Road base 0-6"	
	Dry	0.0	No		1		100	SW	4/3 10YR Brown well graded sand with silt. No stain/odor.	Bentonite Cap
					2	PID.		SM		
	Dry	0.0	No	BH-11	3	COMP	60%		SAA.	
				0-10	4	0.0		SM	silty sand. 6/3 2.5Y yellowish gray	
	Dry	0.3	No		5		50		SAA	
					6					
	Dry	0.3	No		7		80	SM	Dense grayish brown + tan silty sand. No s/o	
					8					
	Dry	0.0	No		9		100	SP	SAA Oxidized orangish-tan coarse sand No s/o	
					10					
	Dry	0.3		BH-11	11	PID			SAA. No s/o	
				10-15	12	comp.	0.2			
					13				grayish tan med-coarse sand no s/o	
	Dry	0.3			14					
					15			ML	Brownish olive silt with sand No s/o	



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Boring/Well #

BH-11

Project:

OH Randel #5

Project #

Date

4-19-17

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	0.5	No		15			ML	Brownish red + olive silt w/ sand	
					16	PID				
					17	COMP				
					18	0.5 ppm	3	ML	gray slightly cemented siltstone w/ sand	
					19				No s/o	Cuttings
					20					
	Dry	0.6	No		21					
					22					
					23					
					24		2'	SP SM	Lt. Brown + tan silty sand	Bentonite chips, hydrated
					25				Some consolidated	
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					



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# **BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	BH-12		Project:	OH Randel #5	
Date:	4-19-17		Project Number:	012916007	
Logged By:	D. Burns		Drilled By:	GEOMAT	
Elevation:	Detector: PID		Drilling Method:	Hollowstem Auger	
Gravel Pack:	NA		Seal:	NA	
Casing Type:	NA		Sampling Method:	Continuous	
Screen Type:	NA		Grout:	NA	
	Slot: NA		Diameter:	Length:	Hole Diameter:
			NA	NA	Depth to Liquid:
			Diameter:	Length:	Total Depth:
			NA	NA	Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Moist	0.1	No	BH-12 0-10	0	0-10 comp.		SP -SM	Reddish brown med sand w/ silt No s/o	
					1					
					2	PID				
					3	0.8 ppm				
					4					
	Moist	0.0	No		5				some carbonate material. No s/o	
					6					
	Dry	0.8			7					
					8					
					9					
	Dry	51.4	Slight odor		10			SP SM	Lt. gray tan. dense compact silty sand. Slight odor.	
					11	10-15 comp PID				
	Dry	656	Slt. odor		12					
					13	947 ppm				
					14					
	Dry	1001	mod odor		15			SP SM	SAA.	



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Boring/Well # BT-1-12  
Project: Oti Rundle #5  
Project #  
Date 4-19-17

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17	15-20 comp				
					18					
					19					
	Dry	73.1	No		20		1.5	ML	Brownish gray w/oxidization silt w/ sand. some silt. cementization v. mild HC odor	
					21					
					22					
					23					
	Dry	269	No		24		2'	SP SM	Lt tan sand w/ silt. silt. odor.	
					25					
					26					
					27					
					28					
					29		1.5	SPSM	SAA. Lt tan sand w/silt silt. odor	
	Dry	1,904	No		30					
					31					
					32					
					33	comp				
					34	30-35	3'	SW	Lt. tan to gray med coarse sand w/ oxid. coarsening w/ gravel. fenses of med. odor. Lt. gray coarse sandstone. weathered med. dense.	
	Dry	1,632	No		35					
					36					
					37					



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH-13	Project:	OH Randel #5
Date:	4-19-17	Project Number:	12916007
Logged By:	D. Burns	Drilled By:	GEOMAT
Elevation:		Drilling Method:	Hollowstem Auger
Detector:	PID	Sampling Method:	Continuous
Gravel Pack:	NA	Seal:	NA
Casing Type:	NA	Hole Diameter:	
Screen Type:	NA	Length:	NA
Slot:	NA	Depth to Liquid:	
Diameter:	NA	Total Depth:	
Length:	NA	Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	M.	0.1	No		0					
					1	0-10'				
					2	COMP				
					3	PID		SP-SM	Reddish brown sand w/ silt. No s/o	
	M.		No		4	0.3 ppm	4'			
					5			SP-SM	olive-brown sand w/ silt + some trace carbonate. Damp odor. No stain	
					6					
					7					
					8					
					9					
	M	0.7	No		10		1'	SP-SM	SAA. olive BRN sand w/ silt Damp odor. No stain	
					11					
					12	10-15				
					13	comp				
					14	PID:				
	Dry	1.4			15	13.7	2'	SP-SM	Lt. gray w/ oxidiz. sand w/ silt	



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Boring/Well # BH-13  
Project: OH Randel #5  
Project #  
Date 4-19-17

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17					
					18					
					19		1.5	SP SM ML	Brownish gray and olive sand w/ silt - Lt. grayish olive silt w/ sand no s/o	
	Dry	68.1	No		20					
					21					
					22					
					23					
					24		2'	ML SP SM	SAA - some cementation silt odor - Lt. <del>grayish</del> olive + Brown med. sand w/ silt. Mod. odor.	
	Dry	3,040	No		25					
					26					
					27					
					28					
					29		3'	SP SM	SAA - Brown med sand w/ silt. mod. odor. Like degraded gas. - Xylene.	
	Dry	2,562	No		30					
					31					
					32					
					33					
					34	2.	2.5'	SW	very Lt. gray, med-coarse sand w/ gravel	
	Dry	1,694	No		35					
					36					
					37					



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	BH14			Project:	OH Randel #5		
Date:	4-20-17			Project Number:	12916007		
Logged By:	D. Burns			Drilled By:	GEOMAT		
Elevation:				Drilling Method:	Hollowstem Auger		
Detector:	PID			Sampling Method:	Continuous		
Gravel Pack:	NA			Seal:	NA		
Casing Type:	NA			Grout:	NA		
Screen Type:	NA			Diameter:	NA	Length:	NA
				Hole Diameter:		Depth to Liquid:	
				Diameter:	NA	Length:	NA
				Total Depth:		Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
	Damp				3			SP SM	Reddish Brown med sand w/ silt. No s/o	
		0.0	No	BH-14 @ 0-10'	4		3'			
					5				Brown med. fn. sand w/ silt. Trace carbonate. No s/o	
					6					
				PID COMP 0.0 ppm	7					
					8					
					9					
	Dry	0.0	No		10		1'	SP SM	Brown med sand w/ silt. No s/o	
					11					
				BH 14 @ 10-15	12	PID COMP 0.1				
					13					
					14					
	Dry	0.1	No		15		1'	ML SPSM	Gray sandy silt, partial cementation Lt gray w/o calcification med fin. sand w/ silt	No s/o





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Boring/Well # BH-14  
Project: O'H Randle #5  
Project #  
Date 4-20-17

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
				BH-14 @ 15'-20'	17	PID COMP 231				
					18					
					19					
	Dry	231	No slight		20		1'	SPSM	Lt. grayish Brown silty sand On the shoe: Med. gray sandy silt, <del>stiff</del> lt. dense, lt. stain & odor	
					21					
	Dry	9.1	salty odor	BH 14 @ 20'-25'	22			ML	Lt gray w/ oxidation sandy silt, partial cementation, slightly salty odor.	
					23	PID COMP 13.1	3'			
	Dry	16.0	No		24			SPSM	Lt grayish Brown silty sand No 5/10	
					25					
					26					
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					



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# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH-15	Project:	OH Randel #5
Date:	4-20-17	Project Number:	12916007
Logged By:	D. Burns	Drilled By:	GEOMAT
Elevation:		Drilling Method:	Hollowstem Auger
Detector:	PID	Sampling Method:	Continuous
Gravel Pack:	NA	Seal:	NA
Casing Type:	NA	Grout:	NA
Screen Type:	NA	Diameter:	NA
Slot:	NA	Length:	NA
Diameter:	NA	Hole Diameter:	
Length:	NA	Depth to Liquid:	
Total Depth:		Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Moist	0.4		BH-15 @ 0-10'	0					
					1					
					2					
					3	PID	3'	SPSM	Reddish Brown sand w/silt. No s/o	
					4	COMP				
	Moist		NO		5	1,554		SPSM	More Dense Reddish brown sand w/silt. No s/o	
					6					
					7					
	Dry	1.8	NO		8		35'	SPSM	Reddish brown med-coarse sand w/silt. No s/o	
					9					
	Dry	2949	YES		10			ML	Lt gray to gray silty sandy w/oxid + carbonate, mod. stain, slight odor.	
					11					
					12	PID				
	Dry	3386	YES	BH-15 @ 10-15	13	COMP	3'	SM	Lt gray to dk gray silty sand w/ some thin cemented lens. Mod stain/odor	
					14	2618				
	Moist	2785	YES		15				Lt gray sand, med-coarse mod-stain/odor	



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Boring/Well #	BH-15
Project:	OH Randel#5
Project #	
Date	4/20/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
				BH-15	17	PID				
				15-20'	18	COMP				
					19	2479				
	Dry	2479	yes		20		1'	ML	4. Brownish olive silty sand. No stain moderate odor. Olive gray sandy silty. Mod stain/odor	
					21					
				BH-15	22	PID				
				20-25'	23	COMP 2192				
	Dry	2,192			24		2'	ML	Olive gray brown silty sand. No stain, mod odor.	
					25					
					26					
					27					
					28					
					29					
	Dry/slight moist	2,568			30		<1'		possible slough, mix of brown silty sand. <del>not</del> unconsolidated	
	Dry	1,051	NO		31		2'		split brown + tan med-coarse sand w/oxidiz. spoon	
					32					
					33					
					34					
					35					
					36					
					37					



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH-16		Project:	OH Randel #5	
Date:	4-20-17		Project Number:	12916007	
Logged By:	D. Burns		Drilled By:	GEOMAT	
Elevation:	Detector: PID		Drilling Method:	Hollowstem Auger	
Gravel Pack:	NA		Seal:	NA	
Casing Type:	NA		Grout:	NA	
Screen Type:	NA		Diameter:	NA	Length: NA
	Slot: NA		Hole Diameter:		Depth to Liquid:
			Total Depth:		Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
					3					
					4					
					5					
					6	PID COMP				
					7	35.8				
					8					
					9					
					10					
					11					
					12	PID COMP				
					13	1,352				
					14					
					15					



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Boring/Well #

BH-16

Project:

Project #

OH Randel #5

Date

4/20/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17					
					18	BH-16				
					19	@ 15-20'				
					20		1'	S/PSM ML	<p>Possible slough.</p> <p>Brown silty sand, no stain, slight odor.</p> <p>Dark gray silt w/ sand in shoe.</p>	
	Dry	2,488	No <del>Yes</del>		21					
					22					
					23					
					24	BH-16				
	Dry	2,606	No		25	@ 23-25'	2'	SP SM	<p>Augered to 23'</p> <p>Split spoon</p> <p>Lt olive brown med fn sand w/ silt. No stain, slight odor.</p> <p>Coarsening to med. sand. slight odor</p>	
					26	BH-16				
	Dry	2,968	No		27	@ 25-27'	2'	SP SM	<p>SAA</p> <p>Lt. Brown + tan sand w/ silt. No stain. Mod. odor.</p>	
					28	BH-16				
	Dry	2,784	No		29	@ 27-29'	2'	SP SM	<p>Lt. Brownish gray med-coarse sand w/ silt. No stain. Mod. sweet gassy xylene odor.</p>	
					30					
					31					
					32					
					33					
					34	BH-16				
	Dry	374	No		35	@ 33-35'	2'	SP SM	<p>SAA - Lt. Brownish gray md-coarse sand w/ silt. No stain. V. slight odor.</p>	
					36					
					37					



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: **BH-17** Project: **OH Randel #5**

Date: **4-21-17** Project Number: **12916007**

Logged By: **D. Burns** Drilled By: **GEOMAT**

Elevation: Detector: **PID** Drilling Method: **Hollowstem Auger** Sampling Method: **Continuous**

Gravel Pack: **NA** Seal: **NA** Grout: **NA**

Casing Type: **NA** Diameter: **NA** Length: **NA** Hole Diameter: Depth to Liquid:

Screen Type: **NA** Slot: **NA** Diameter: **NA** Length: **NA** Total Depth: Depth to Water:

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
					3					
	Moist	0.5	No	BH-17 @ 0-10'	4		3'	SP SM	Reddish Brown sand w/ silt. No s/o	
					5					
					6					
					7					
					8					
	Moist	0.0	No		9		3'	SP SM	Lt. Brown silty sand. No s/o.	
					10			ML	Dense Lt brown silt with sand. Some carbonate + oxidation. No s/o	
					11					
					12					
	Dry	0.3	No	BH-17 @ 10-15'	13					
					14		2.5'	SP SM	Lt gray sand w/ silt. No s/o.	
					15			ML	Lt. brownish gray silty sand. V. dense. No s/o	



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Boring/Well #

BH-17

Project:

OH Randal #5

Project #

Date

4-21-17

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17					
					18					
					19					
	Moist	0.0	No	BH 17 @ 15-20	20		1'	SP	Lt gray + tan med. sand. No s/o	
					21					
					22					
					23					
	Dry	362	No	BH 17 @ 15-20	24		2'	SP SM	Lt. Brown fn. sand w/ silt. semi dense. No s/o.	
					25					
					26					
					27					
					28					
					29					
	Dry		Ne		30		2'		SAA. - Some <sup>slightly</sup> cemented siltstone lens. Lt. Brown + tan med fn sand w/ silt. No s/o	
					31					
					32					
					33					
					34					
					35					
					36					
					37					





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# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH-18	Project:	OH Randel #5
Date:	4-21-17	Project Number:	12916007
Logged By:	D. Burns	Drilled By:	GEOMAT
Elevation:		Drilling Method:	Hollowstem Auger
Detector:	PID	Sampling Method:	Continuous
Gravel Pack:	NA	Seal:	NA
Casing Type:	NA	GROUT:	NA
Screen Type:	NA	Diameter:	NA
Slot:	NA	Length:	NA
Diameter:	NA	Hole Diameter:	
Length:	NA	Depth to Liquid:	
Total Depth:		Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
	Dry	0.7	No		3		3'	SP/SM	Reddish Brown sand w/ silt. No s/o	
					4					
					5			ML	lt. gray silty sand w/ organics/carbonate No s/o	
					6					
					7					
	Dry	0.0	No		8		3'	ML	SAA: No s/o lt gray + tan.	
					9					
					10			SPSM	lt gray sand w/silt. some ox. No s/o	
					11					
					12					
					13					
	Dry	0.0	No		14		15	SP	lt. gray med. coarse sand w/ 4" coarse oxidized lens. Med fn. Brown sand. No s/o	
					15					



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Boring/Well #	BH-18
Project:	OH Randel #5
Project #	
Date	4/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17					
					18					
					19			ML	Lt. Brown sandy silt partial cement lens.	
	Dry	0.0	No		20		2'	SP/SM	Lt Brown sand w/silt. No s/o	
					21					
					22					
					23					
					24			SW	Tan medium sand well graded	
	Dry	6.4	No		25		1.5'	<del>SW</del>	No s/o. Dense partially cemented. Very very slight sweetness	
					26					
					27				Tan medium sand, slightly consolidated	
					28				No s/o	
	Dry	3.2	No		29		4'	SW		
					30					
					31				Tan med. - coarse sand w/gravel partial cement. No s/o.	
	Dry.	9.8	No		32		2'	SW		
					33					
					34					
					35					
					36					
					37					



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH-19	Project:	OH Randel #5
Date:	4-24-17	Project Number:	12916007
Logged By:	D. Burns	Drilled By:	GEOMAT
Elevation:		Drilling Method:	Hollowstem Auger
Detector:	PID	Sampling Method:	Continuous
Gravel Pack:	NA	Seal:	NA
		Grout:	NA
Casing Type:	NA	Diameter:	NA
		Length:	NA
		Hole Diameter:	
		Depth to Liquid:	
Screen Type:	NA	Diameter:	NA
		Length:	NA
		Total Depth:	
		Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
	Dry	0.2	No		3		3'	SPSM	Reddish Brown sand w/ silt No s/o	
					4					
					5					
					6					
					7					
					8				SAA. No s/o	
			No		9		3'			
	Dry	0.1	No		10			SPSM	Lt. gray. Med sand w/ silt No s/o	
					11					
					12					
			No		13			SP/SM	SAA. No s/o	
	Dry	0.0	No		14		3			
					15			ML	Brown sandy silt, some ox. No s/o	



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Boring/Well #

BH-19

Project:

OH Randel #5

Project #

Date

4/24/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17					
					18					
	Dry	0.4	No		19		25'	ML	Tan, lt. Brown silty sand. No s/o	
					20					
					21					
					22					
					23					
	Dry	5.4	No		24		25	ML	SAA. No s/o	
					25					
					26					
					27					
					28					
	Dry	109	No		29		2'	SW	Tan, lt. Brown & gray med-coarse sand. No stain, slight gas. xylene odor.	
					30					
					31					
	Dry		No	Btl-19 @ 30-35	32				SAA. Lt Brownish gray med-coarse sand. No stain, slight sweet gas smell.	
		113			33		4'	SW		
					34					
					35					
					36					
					37					



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: <b>BH-20</b>		Project: <b>OH Randel #5</b>	
Date: <b>8/21/2017</b>		Project Number: <b>12916007</b>	
Logged By: <b>Michael A. Wicker</b>		Drilled By: <b>GEOMAT</b>	
Drilling Method: <b>Hollowstem Auger</b>		Sampling Method: <b>Continuous / 2' Split-Spoon</b>	
Seal: <b>NA</b>		Grout: <b>NA</b>	
Diameter: <b>NA</b>	Length: <b>NA</b>	Hole Diameter: <b>6.25-inch</b>	Depth to Liquid: <b>NA</b>
Diameter: <b>NA</b>	Length: <b>NA</b>	Total Depth: <b>80-feet</b>	Depth to Water: <b>NA</b>

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0				<b>Silt w/ Sand</b> , loose, redish brown, low plasticity, moist, cohesive, 95% silt, 5% f. grained sand, no odor	
					1					
					2					
					3					
	Moist	0.5			4					
					5			<b>ML</b>		
	Moist	1.5			6					
					7					
	Moist	1.5			8					
					9					
	Moist	219.3			10					
					11					
					12				<b>Silty Sand</b> , loose, lt. brown - lt. gray, low plasticity, moist, sl. cohesive, 65% silt, 35% f.-med grained sand, sl. HC odor,	
	Dry	390.6			13			<b>SM</b>		
					14					
					15				- hard, dk. - lt. brown	



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Boring/Well #	BH-20
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	271.1			15					
					16					
					17				- sl. HC odor	
					18					
					19					
					20					
					21				<u>Silt w/ Sand</u> , dense, dk. brown - lt. brown, low plasticity, 80% silt, 20% f. grained sand, moderate odor	
	Dry	1,813		BH20 @ 20-25 1010	22					
					23					
					24					
					25				- strong HC odor	
					26					
	Dry	1,481		BH20 @ 25-30 1030	27					
					28			ML		
					29					
					30					
					31					
					32				- introduce water to prevent ceasing and allow further drilling	
	Dry	879.1		BH20 @ 30-35 1050	33					
					34					
					35					
					36					
					37					



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Boring/Well #	BH-20
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
	Dry	935.6		BH20 @ 35-40 1105	38					
					39					
					40					
					41					
	Dry	733.4		BH20 @ 40-45 1125	42					
					43					
					44					
					45				8/21/2017	
	Dry	1,455		BH20 @ 45-47 0900	46				8/22/2017	
					47					
	Dry	1,034		BH20 @ 47-49 0900	48			ML		
					49					
	Dry	736.3			50					
	Dry	988.4			51					
					52					
	Dry	497.3		BH20 @ 51-55 1025	53					
					54					
					55					
					56					
	Dry	404.2			57					
					58					
					59					



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Boring/Well #	BH-20
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					
					61					
					62					
					63					
					64					
					65					
					66					
					67					
					68					
					69					
					70					
					71					
					72					
					73					
					74					
					75					
					76					
					77					
					78					
					79					
					80					
					81					
					82					

BH20  
@  
60-65  
1100

Dry

519.5

LTE  
575.1  
1,300  
XTO

LTE  
1,100  
2,711  
XTO

LTE  
849.0  
2,298  
XTO

LTE  
1,044  
1,943  
XTO

ML

SC

- small lens of black staining

**Clayey Sand**, loose, lt. brown, 70% f.-coarse grained sand, 30% fines, plastic, cohesive  
- split-spoon every 5-feet due to lithology hardness  
- Use water to allow deeper drilling through hard lithology

8/22/2017  
9/6/2017

TD @ 80'





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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number: BH-21		Project: OH Randel #5	
Date: 8/21/2017		Project Number: 12916007	
Logged By: Michael A. Wicker		Drilled By: GEOMAT	
Drilling Method: Hollowstem Auger		Sampling Method: Continuous / 2' Split Spoon	
Seal: NA		Grout: NA	
Diameter: NA	Length: NA	Hole Diameter: 6.2-inch	Depth to Liquid: NA
Diameter: NA	Length: NA	Total Depth: 40-feet	Depth to Water: NA

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0				<b>Silt w/ Sand</b> , loose, redish brown, 65% silt, 35% f.-med. grained sand, sl. Moist, non-low plasticity, cohesive,	
					1					
					2					
					3					
	Sl. Moist	16.8			4					
					5					
					6			ML		
					7					
	Sl. Moist	43.8			8					
					9					
					10					
					11					
	Sl. Moist	2,523		<b>BH-21 @ 10-15 1300</b>	12			SM	<b>Silty Sand</b> , m. dense, lt. brown, 75% silt, 25% f.-med grained sand, non-plastic, non-cohesive	
					13					
					14					
					15					



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Boring/Well #	BH-21
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	1,901		BH-21 @ 15-20 1255	15				<u>Silt w/ Sand</u> , dense, dk. brown - lt. brown, 80% silt, 20% f. grained sand, non-cohesive, non-low plasticity	
					16					
					17					
					18					
					19					
					20			ML		
					21					
	Dry	1,638		BH-21 @ 20-25 1305	22					
					23					
					24					
					25				<u>Silty Sand</u> , med. dense-loose, lt. brown, 35% f.-med grained sand, 65% silt, high plasticity, cohesive, sl. HC Odor, water used to prevent auger ceasing	
					26					
	Dry	1,259		BH-21 @ 25-30 1310	27			ML		
					28					
					29					
					30				<u>Well Graded Sand</u> , lt. brown, loose, lt-dark brown, 65% f.-coarse grained sand, 35% silt, plastic, cohesive, sl. HC Odor, water used to	
					31					
	Dry	624.1		BH-21 @ 30-35 1325	32					
					33			SW		
					34					
					35					
					36					
					37					



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Boring/Well #	BH-20
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
		350.6		BH-21 @ 35-40 1355	38				Weathered Sandstone, lt. brown, non-plastic/non-cohesive	
					39					
					40					
					41				TD @ 40'	
					42					
					43					
					44					
					45					
					46					
					47					
					48					
					49					
					50					
					51					
					52					
					53					
					54					
					55					
					56					
					57					
					58					
					59					



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Boring/Well #	BH-21
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017



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**LT Environmental, Inc.**  
**848 E. 2nd Ave**  
**Durango, Colorado 81301**

### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: BH-22		Project: OH Randel #5	
Date: 8/21/2017		Project Number: 12916007	
Logged By: Michael A. Wicker		Drilled By: GEOMAT	
Drilling Method: Hollowstem Auger		Sampling Method: Continuous / 2' Split Spoon	
Seal: NA		Grout: NA	
Diameter: NA	Length: NA	Hole Diameter: 6.25-inch	Depth to Liquid: NA
Diameter: NA	Length: NA	Total Depth: 42-feet	Depth to Water: NA

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Sl. Moist	22.1			0				<b>Silt w/Sand</b> , loose, brown-reddish, 25% fi-med. grained sand , 75% silt	
					1					
					2					
					3					
					4					
					5			ML		
					6					
					7					
					8					
					9					
					10					
					11				<b>Silty Sand</b> , med-loose, dk. Brown, 30% f.-med grained sand, 70% silt, high plasticity, cohesive	
	Sl. Moist	2.4			12					
					13			SM		
					14					
					15					



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**LT Environmental, Inc.**

Boring/Well #	BH-22
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Sl. Moist	0.0			15				<b>Silty w/ Sand</b> , loose, lt. brown-gray, med. Plasticity, sl. Moist, cohesive, 80% silt, 20% f.-med grained sand - Low recovery, switch to split-spoon	
					16					
					17					
					18			SM		
					19					
					20					
	Dry	0.0			21				<b>Silt w/ Sand</b> , brown-reddish, , 80% silt, 20% f.-med grained sand, low-med plasticity, cohesive	
					22					
	Dry	0.0			23				<b>Silt</b> , 95% silt, 5% f. grained sand, non-plastic, non-cohesive	
					24			ML		
	Dry	1,523		BH-22 @ 24-26 1505	25					
					26					
	Dry	1,493		BH-22 @ 26-28 1315	27					
					28					
	Dry	1,183		BH-22 @ 28-30 1325	29				<b>Silt w/ Sand</b> , lt. brown-reddish, loose, 80% silt, 20% f.-med grained sand, low-med non-plastic, non-cohesive, sl.-mod HC odor	
					30					
	Dry	814.2		BH-22 @ 30-32 1335	31					
					32					
					33				<b>Well Graded Sand</b> , med. Dense, lt. brown, 95% f.-coarse grained sand, 5% silt, non-plastic, non-cohesive, HC odor	
	Dry	1,047		BH-22 @ 32-37 1550	34					
					35			SW		
					36					
					37					



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Boring/Well #	BH-22
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
					38				Weathered Sandstone, hard, lt. brown-reddish, f.-med grained sand, non-plastic/non-cohesive,	
					39					
					40					
					41					
					42					
		304.7		BH-22 @ 37-42 1610						
					43				TD @ 42'	
					44					
					45					
					46					
					47					
					48					
					49					
					50					
					51					
					52					
					53					
					54					
					55					
					56					
					57					
					58					
					59					



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Boring/Well #	BH-21
Project:	12916007
Project #	OH Randel #5
Date	8/21/2017



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**Durango, Colorado 81301**

**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number: BH-23		Project: OH Randel #5	
Date: 8/22/2017		Project Number: 12916007	
Logged By: Michael A. Wicker		Drilled By: GEOMAT	
Drilling Method: Hollowstem Auger		Sampling Method: Continuous / 2' Split Spoon	
Seal: NA		Grout: NA	
Diameter: NA	Length: NA	Hole Diameter: 6.25-inch	Depth to Liquid: NA
Diameter: NA	Length: NA	Total Depth: 40-feet	Depth to Water: NA

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Sl. Moist	149.7			0				<b>Silt w/Sand</b> , loose, brown-reddish, 25% f.-med. grained sand , 75% silt	
					1					
					2					
					3					
					4					
					5			ML		
					6					
					7					
					8					
					9					
					10					
					11				<b>Silty Sand</b> , med-loose, dk. Brown, 30% f.-med grained sand, 70% silt, high plasticity, cohesive	
	Sl. Moist	4.1			12			SM		
					13					
					14					
					15					



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**LT Environmental, Inc.**

Boring/Well #	BH-23
Project:	12916007
Project #	OH Randel #5
Date	8/22/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Sl. Moist	5.3			15				- lt. brown-gray, med. plasticity,	
					16					
					17					
					18			SM		
					19					
					20					
					21					
	Sl. Moist	5.5			22				<u>Silt w/ Sand</u> , lt. brown, dense, 75% silt, 25% f. grained sand, non-plastic, non-cohesive	
					23					
					24					
					25			ML		
					26					
	Dry	154.8			27					
					28				<u>Silty Sand</u> , loose-v. loose, lt. brown, 30% f.-med. grained sand, 70% silt, non-plastic, non-cohesive, HC odor	
					29					
					30					
					31					
	Dry	246.9		BH-23 @ 30-35 1310	32			SM	- sl. Odor	
					33					
					34					
					35					
					36					
					37					





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Boring/Well #	BH-23
Project:	12916007
Project #	OH Randel #5
Date	8/22/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
		349.2		BH-23 @ 35-40 1325	38					
					39					
					40					
					41				TD @ 40'	
					42					
					43					
					44					
					45					
					46					
					47					
					48					
					49					
					50					
					51					
					52					
					53					
					54					
					55					
					56					
					57					
					58					
					59					



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### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: BH-24		Project: OH Randel #5	
Date: 8/22/2017		Project Number: 12916007	
Logged By: Michael A. Wicker		Drilled By: GEOMAT	
Drilling Method: Hollowstem Auger		Sampling Method: Continuous	
Seal: NA		Grout: NA	
Diameter: NA	Length: NA	Hole Diameter: 6.25-inch	Depth to Liquid: NA
Diameter: NA	Length: NA	Total Depth: 45-feet	Depth to Water: NA

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Moist	3.6			0				<b>Silt w/Sand</b> , loose, brown-reddish, 20% f.-med. grained sand , 80% silt	
					1					
					2					
					3					
					4					
					5			<b>ML</b>		
					6					
	Sl. Moist	709.3		<b>BH-24 @ 5-10 1440</b>	7					
					8					
					9					
					10				- Staining @ 9.5' (gray-dk. gray), strong HC odor	
					11				<b>Silty Sand</b> , med-loose, dk. Brown, 25% f.-med grained sand, 75% silt, high plasticity, cohesive	
	Dry	1,475		<b>BH-24 @ 10-15 1450</b>	12			<b>SM</b>		
					13					
					14					
					15					



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**LT Environmental, Inc.**

Boring/Well #

BH-24

Project:

12916007

Project #

OH Randel #5

Date

8/22/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15				- end of gray staining, v. dense, dk. brown, non-plastic, non-cohesive	
					16					
					17					
					18					
					19					
					20					
					21					
					22					
					23					
					24					
					25					
					26			SM	- brown	
					27					
					28					
					29					
					30					
					31				- lt brown	
					32					
					33					
					34					
					35					
					36					
					37					



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Boring/Well #	BH-24
Project:	12916007
Project #	OH Randel #5
Date	8/22/2017

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
	Dry	445.1		BH-24 @ 35-40 1530	38				- lt. brown - lt. gray	
					39					
					40					
					41				- lt. brown	
	Dry	357.4		BH-23 @ 40-45 1550	42					
					43					
					44					
					45					
					46				TD @ 45'	
					47					
					48					
					49					
					50					
					51					
					52					
					53					
					54					
					55					
					56					
					57					
					58					
					59					

Location Map:



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 Arvada, Colorado 80003

## BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH 25	Project:	OH Randel #5
Date:	9-28-17	Project Number:	012916007
Logged By:	Daniel Burns	Drilled By:	Enviro-Drill
Elevation:		Drilling Method:	Hollow-Stem Auger
Detector:	PID	Sampling Method:	continuous Split Spoon
Gravel Pack:	10-20 Silica Sand	Seal:	Bentonite chips
Casing Type:	Sch 40 PVC	Grout:	NA
Screen Type:	Sch 40 PVC	Diameter:	2"
Slot:	0.010"	Length:	
		Hole Diameter:	4.25" 7.25"
		Total Depth:	SD
		Depth to Liquid:	
		Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
					0			Road base	
					2			Loam	
					4			Brown fm sand w/ silt. No	
					6	6" Recov.		stagnant odor	
					8	0 Recov.		No Recovery, large cobble stuck in shoe prevented any material from entering sample barrel.	
					10			Brown sandy silt. No s/o	
					12	3' Recov.		Lt gray w/ oxidiz. med. silty sand	
					14			No s/o	
					16	3' Recov.		SAA, but w/ slight musty sweet degraded HC odor	
					18			gray siltstn.	
					20			Brownish gray sandy silt, No s/o	
					22	4' Recov.		Dark brown fm. silty sand, slightly consolidated, dense.	
					24			No s/o	
					26			Brownish tan sandy siltstn. cemented, dense	
					28	3' Recov.		Lt gray/tan silty fm sand	
					30			sandy silt.	

Location Map:



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 4600 W. 60th Avenue  
 Arvada, Colorado 80003

# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number:	BH 25	Project:	OH Randel #5
Date:	9-28-17	Project Number:	012916007
Logged By:	Daniel Burns	Drilled By:	Enviro-Drill
Drilling Method:	Hollow-Stem Auger	Sampling Method:	Split Spoon
Seal:	Bentonite chips	Grout:	NA
Diameter:	2"	Length:	
Hole Diameter:	4.25"	Depth to Liquid:	7.25'
Screen Type:	Sch 40 PVC	Diameter:	2"
Slot:	0.010"	Length:	
Total Depth:	50	Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	112	No	BH 25 @ 30-35'	30	5' Recov.		Lt. grayish brown silty fn. sand. slightly cemented. No stain, v. slt. sweet degraded HC odor.	
	Dry	26.2	No	35-40'	32			Lt gray/tan silty med sand, silty consolidated, No stain v. slt. sweet odor.	
	Dry	2.5	No	40-45'	34			Lt. tan silty med. sand. No stain/odor.	
	Dry	8.9	No	45-50'	36			SAA. No s/o	
					38				
					40				
					42				
					44				
					46				
					48				
					50				
					52				
					54				
					56				
					58				
					60				

Location Map:



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	BH26			Project:	OH Randel #5		
Date:	9-29-17			Project Number:	012916007		
Logged By:	Daniel Burns			Drilled By:	Enviro-Drill		
Drilling Method:	Hollow-Stem Auger			Sampling Method:	Split Spoon		
Seal:	Bentonite chips			Grout:	NA		
Diameter:	2"	Length:		Hole Diameter:	7.25"	Depth to Liquid:	
Diameter:	2"	Length:		Total Depth:		Depth to Water:	

Elevation:

Detector:

PID

Gravel Pack:

10-20 Silica Sand

Casing Type:

Sch 40 PVC

Screen Type:

Sch 40 PVC

Slot:

0.010"

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
					0			Roadbase, Fill dirt	
					2	3'			
	Moist	0.6	No		4			brown silty med. sand No s/o	
					6			Lt. Brown silty med. sand. No s/o	
					8	5'		Lt. tan silty fn. sand No s/o	
	Dry	0.0	No		10			tan med sand	
					12	4'		No s/o	
					14			slight oxidation lense	
					16			Dark gray sandy siltstn.	
	Dry	0.0	No		18	4'		Brownish gray silty fn sand No s/o	
					20			Lt. Brown fn sandy silt.	
	Dry	0.0	No		22	5'		some cementation	
					24			No s/o	
					26				
					28	1'		dense, consolidated med. s. stn.	
					30			cemented rock. No stain/odor.	
								Impermeable.	

Location Map:



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	<b>BH27</b>	Project:	OH Randel #5
Date:	<b>9-29-17</b>	Project Number:	012916007
Logged By:	Daniel Burns	Drilled By:	Enviro-Drill
Elevation:		Drilling Method:	Hollow-Stem Auger
Detector:	PID	Sampling Method:	Split Spoon
Gravel Pack:	10-20 Silica Sand	Seal:	Bentonite chips
Casing Type:	Sch 40 PVC	Grout:	NA
Screen Type:	Sch 40 PVC	Diameter:	2"
		Length:	
		Hole Diameter:	4.25" 7.25"
		Depth to Liquid:	
		Total Depth:	
		Depth to Water:	

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
					0			Topsoil, Brownish red & tan	
					2	2'		fn-med. silty sand.	
					4			No s/o	
					6				
					8	4'		Brown fn-med silty sand	
					10			No s/o	
					12			SAA	
					14	3'		- Light grayish brown fn. sandy	
					16			silt. shly. cemented. No s/o	
					18			SAA	
					20	2'		- Lt Brown fn <del>sandy</del> sandy	
					22			silt. No s/o	
					24	3'		SAA.	
					26			No stain/odor	
					28	3'		- Lt. gray/tan silty med. sand	
					30			No stain v. silt. sweet H <sub>2</sub> O odor	



ion Map:



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**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	BH27			Project:	OH Randel #5		
Date:	9-30-17			Project Number:	012916007		
Logged By:	Daniel Burns			Drilled By:	Enviro-Drill		
Drilling Method:	Hollow-Stem Auger			Sampling Method:	Split Spoon		
Seal:	Bentonite chips			Grout:	NA		
Diameter:	2"	Length:		Hole Diameter:	4.25"	Depth to Liquid:	7.25
Diameter:	2"	Length:		Total Depth:	50'	Depth to Water:	

Elevation:

Detector: PID

Gravel Pack:  
10-20 Silica Sand

Casing Type:  
Sch 40 PVC

Screen Type:  
Sch 40 PVC

Slot:  
0.010"

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	59.6	No		30			Lt. gray & tan silty med sand.	
					32	3'		No stain, slt. sweet HC odor	
					34			6" lense of gray sandy silt sta.	
					36			Lt gray tan silty med. sand	
	Dry	3454	No	BH27 @ 35-40'	38	4'		Lt gray/tan med. sand.	
					40			w/ silt. No stain, mod. sweet degrading HC odor	
	Dry	1,947	No	BH27 @ 40-45'	42	2'		SAA, No stain, mod. sweet HC odor	
					44				
	Dry	832	No	BH27 @ 45-50'	46	2'		SAA. No stain, lt - mod. sweet odor	
					48			Lt grayish brown silty fns. sta. mod. dense consolidated.	
					50			Sampler shoe fell off tube in hole, unable to go deeper and still collect samples	
					52				
					54				
					56				
					58				
					60				



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# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: <b>BH-28</b>	Project: <b>OH Randel #5</b>
Date: <b>12/17/18</b>	Project Number: <b>017818016</b>
Logged By: <b>Eric Carroll</b>	Drilled By: <b>Layne</b>
Drilling Method: <b>Sonic</b>	Sampling Method: <b>Core Barrel</b>
Seal: <b>NA</b>	Grout: <b>NA</b>
Diameter: <b>2"</b>	Length: <b>8"</b>
Hole Diameter: <b>8"</b>	Depth to Liquid: <b>NA</b>
Diameter: <b>2"</b>	Length: <b>2"</b>
Total Depth: <b>NA</b>	Depth to Water: <b>NA</b>

Elevation:  
**6,423**

Detector:  
**PID**

Gravel Pack:  
**10-20 Silica Sand**

Casing Type:  
**Schedule 40 PVC**

Screen Type:  
**Schedule 40 PVC**

Slot:  
**0.010"**

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
					3					
					4					
					5					
					6					
					7					
					8					
					9					
					10					
					11					
					12					
					13					
					14					
					15					

**NO  
well  
installed**

**SM** Dark reddish brown silty sand  
no stain/odor

**CL** Firm, grey/brown, sandy clay  
no stain/odor

**BH-28 0-10'**

**moist 34.4 NO**

**moist 2.5 NO**



Advancing Opportunity

Boring/Well #

BH-28 BH-28

Project:

OH Randel #5

Project #

017818016

Date

12/17/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	moist	2.2	no		15				SAA no stain/odor	
					16			CL		
					17					
					18					
					19					
					20					
					21				Firm, yellow brown, sandy clay	
					22			CL	< 40% sand no stain/odor	
	dry	1.8	no		23					
					24					
					25					
					26				loose, lt reddish brown sand,	
					27			SP- SM	gravel, trace silt < 10% no stain/odor	
	dry	0.0	no		28					
					29					
					30					
					31					
					32					
	dry	19.8	no		33			SP	Dense, lt reddish brown, sand trace silt < 10% no stain no odor	
					34					
					35					
					36					
					37					



Advancing Opportunity

Boring/Well #

BH-28

Project:

OH Randel #5

Project #

017818016

Date

12/19/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
	Dry		NO		38				white, grey brown sand w/ silt < 25%	
					39					
					40					
					41					
	Dry		NO		42				SAA	
					43					
					44					
					45					
					46					
					47				SAA	
	Dry	12.5	NO		48					
					49					
					50					
					51					
	Dry		NO		52				SAA	
					53					
					54					
					55					
					56					
					57					
					58					
					59					



Advancing Opportunity

Boring/Well #

BH-28

Project:

OH Randel #5

Project #

017818016

Date

12/19/14

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					
	Dry		NO		61				SAA NO Stain/odor	
					62					
					63					
					64					
					65					
					66					
					67					
					68					
					69					
					70					
					71					
					72					
					73					
					74					
					75					
					76					
					77					
					78					
					79					
					80				Grey, black clay trace Sand < 10%	
					81					
	Dry	7.7	NO		82				BH = 85'	



Advancing Opportunity

848 E. 2nd Ave

Durango, Colorado 81301

**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number: **BH-29** Project: **OH Randel #5**

Date: **12/17/18** Project Number: **017818016**

Logged By: **Eric Carroll** Drilled By: **Layne**

Drilling Method: **Sonic** Sampling Method: **Core Barrel**

Seal: **NA** Grout: **NA**

Casing Type: **Schedule 40 PVC** Diameter: **2"** Length: **NA** Hole Diameter: **8"** Depth to Liquid: **NA**

Screen Type: **Schedule 40 PVC** Slot: **0.010"** Diameter: **2"** Length: **NA** Total Depth: **32'** Depth to Water: **NA**

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1			SP	DARK reddish brown silty sand <30% silt no stain/odor	NO well installed
					2					
					3					
					4					
	moist 0.4		NO		5			SC	Dense Firm yellow brown, clayey sand <30% clay trace silt no stain/odor	
					6					
					7					
					8					
					9					
					10					
					11			SM	Dense, Rust, sand trace silt interbedded clay	
					12					
					13					
	moist 1.0		NO		14			SC	Dense Firm, yellow brown, clayey sand <40% clay	
					15					





Advancing Opportunity

Boring/Well #

BH-29

Project:

OH Randel #5

Project #

017818016

Date

12/17/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
	moist	0.0	NO		17			SC	Dense, lt. brown, clayey sand < 30% clay, <del>fine</del> platy rust mottling < 5 cm thick	
					18					
					19					
					20			SC	SAA	
					21					
	moist	0.0	NE		22			SP	loose, sand and gravel	
					23					
					24				<del>Dense, white/gray, sand trace</del> Silt < 10%	
					25				<del>Star</del>	
					26					
	moist	0.0	NO		27			SC	Dense, white grey, sand	
					28				Some silt/clay < 30% fines	
					29				no stain/odor	
					30					
					31			SC	Dense, white, sand trace	
	Dry	0.8	NO		32				Silt < 10% interbedded grey clay no stain/odor	
					33					
					34					
					35					
					36					
					37					

BH-29 27-32'

TD = 32'



Advancing Opportunity

848 E. 2nd Ave

Durango, Colorado 81301

# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: **BH-31** Project: **OH Randel #5**

Date: **12/16/18 - 12-19-18** Project Number: **017818016**

Logged By: **Eric Carroll / Josh Adams** Drilled By: **Layne**

Drilling Method: **Sonic** Sampling Method: **Core Barrel**

Seal: **N/A** Grout: **N/A**

Diameter: **2"** Length: **8"** Hole Diameter: **8"** Depth to Liquid:

Diameter: **2"** Length: **2"** Total Depth: **2"** Depth to Water:



Elevation: **6,423** Detector: **PID**

Gravel Pack: **10-20 Silica Sand**

Casing Type: **Schedule 40 PVC**

Screen Type: **Schedule 40 PVC** Slot: **0.010"**

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
					3					
	moist	0.5	No		4	7			Dark reddish brown, silty Sandy < 15% silt no stain/odor	
					5					
					6					
					7					
					8					
					9					
					10					
					11					
					12					
	DRY	548	No		13				Dense, lt reddish brown, sand some silt/clay < 15% fines no staining, slight odor	
					14					
					15					





Advancing Opportunity

Boring/Well #

BH-31

Project:

OH Randel #5

Project #

017818016

Date

12/16/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15				Firm reddish brown clay some sand <15%, Slight odor	
					16					
	Dry	982	NO		17					
					18				Dense, white/grey sand some silt <15% no stain <del>strong</del> Strong odor	
					19					
					20					
					21				Firm, yellow brown, Sandy clay <30% sand no stain, Strong odor	
	DRY	2444	NO		22					
					23					
					24					
					25					
					26				SAA no stain, Strong odor	
					27					
	Dry	2018	NO		28					
					29					
					30					
					31				GAA no stain, Strong odor Sample Rushed	
	Dry	1776	NO		32				Stopped boring @ 33'	
					33					
					34					
					35					
					36					
					37					



Advancing Opportunity

Boring/Well #

BH-31

Project:

OH Randel #5

Project #

017818016

Date

12/18/19 - 12-17-18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
	Dry	386	NO		38				Dense, white/grey, sand some silt < 30%	
					39				no stain, strong odor	
					40					
					41					
					42				SAA no stain, strong odor	
	DRY	<del>386</del> 360	NO		43					
					44					
					45					
					46				SAA, no stain, strong odor	
	Dry	348	NO		47					
					48					
					49					
					50					
					51					
					52				SAA, no stain, strong odor	
	Dry	343	NO		53					
					54					
					55					
			NO		56			SM	Stopped @ 57' 12/19	
					57				resume 12-19	
	Dry	209	NO		58	57-60		SM	white/grey/brown sandstone < 25% silt, strong H <sub>2</sub> O odor mostly solid sandstone	
					59					



Advancing Opportunity

Boring/Well #

BH-31

Project:

OH Randel #5

Project #

017818016

Date

12-14-18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					
	dry	238	NO		61			SM	SAA strong odor	
	dry	257	NO		62	57-68			SAA	
					63					
	dry	2483	NO		64	57-68			SAA	
					65					
	dry	2520	NO		66	57-68		SM	SAA	
		1673			67					
	dry	2013	NO		68	57-68		SM	SAA	
	dry	1671	NO		69	68-77		SM	SAA	
					70					
	dry	1373	NO		71	68-77		SM	SAA	
					72					
	dry	2352	YES		73	68-77		SM	SAA, some black staining & odor	
					74					
	dry	1546	YES		75	68-77		SM	SAA	
					76					
	dry	1677	YES		77	68-77		SM	SAA	
					78	77-83				
	dry	1571	YES		79			SM	SAA	
					80					
	dry	2165	YES		81	77-83			Sand w/ silt ~ 25% more fines than above, light grey stain, H.C. odor	
					82					



Advancing Opportunity

Boring/Well #

BA-31

Project:

OH Randel #5

Project #

017818016

Date

12-14-18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock type	Lithology/Remarks	Well Completion
dry	18.21				83	77-83		SM	SAA w/ heavy black & grey stain	
dry	12.77		N		84	83-87		SAA	SAA, no stain	
					85					
dry	514.4		N		86	83-87		SM	light grey sand/silt	
					87				increased fines ~ 30%	
					88				Slight odor	
dry	13.9		N		89	87-96			light grey sandy silt	
					90				almost clay no	
					91				odor or stain	
dry	12.4		N		92	87-96			SAA	
					93					
dry	9.8		N		94	87-96			SAA	
					95	87-96			SAA	
dry	7.2		N	BA-31 44.26 1120	96					
					97					
					98					
					99					
					100					
					101					
					102					
					103					
					104					
					105					

ID @ 96'





Advancing Opportunity

848 E. 2nd Ave

Durango, Colorado 81301

**BORING LOG/MONITORING WELL COMPLETION DIAGRAM**

Boring/Well Number:	BH-32	Project:	OH Randel #5						
Date:	12/14	Project Number:	017818016						
Logged By:	Eric Carroll	Drilled By:	Layne						
Elevation:	6,423	Drilling Method:	Sonic	Sampling Method:	Core Barrel				
Detector:	PID	Seal:	NA	Grout:	NA				
Gravel Pack:	10-20 Silica Sand	Diameter:	2"	Length:		Hole Diameter:	8"	Depth to Liquid:	NA
Casing Type:	Schedule 40 PVC	Diameter:	2"	Length:		Total Depth:	57'	Depth to Water:	NA
Screen Type:	Schedule 40 PVC	Slot:	0.010"	Diameter:	2"	Length:			

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1					
					2					
					3					
					4					
	moist	15.1	NO	0-10'	5	I		SM	Dense, yellow brown, silty Sand >30% fines, no stain no odor	
					6					
					7					
					8					
					9					
					10					
					11					
					12					
					13			SP	very Dense, lt grey, Sand trace silt <5% no stain/odor	
	dry	0.0	NO	10'-15'	14					
					15					



Advancing Opportunity

Boring/Well #

BH-32

Project:

OH Randel #5

Project #

017818016

Date

12/14

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
	DRY	16.3	NO	15-20	17	2		SP	SAA no stain/odor	
					18					
					19					
					20					
					21			CL	Stiff orangish brown sandy clay	
	moist	0.6		20-25	22				<30% sand	
					23				no stain/odor	
					24					
					25	3				
					26					
					27			CL	Stiff dark brown sandy clay	
	moist	1.3		25-30	28				<15% sand	
					29				no stain/odor	
					30					
					31			CL	Very stiff, brown, clay	
	moist	0.1			32				<15% sand	
					33				no stain/odor	
					34	4				
					35					
					36			CL	Stiff brown sandy clay	
	moist	0.6			37				<30% sand	
									no stain/odor	



Advancing Opportunity

Boring/Well #

BH-32

Project:

OH Randel #5

Project #

017818016

Date

12/14

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
					38					
					39					
					40					
					41					
					42			SM	Dense, lt brown, silty Sand	
					43				< 30% fines	
					44				no stain/odor	
					45					
					46					
					47			SM	SAA no stain/odor	
					48					
					49					
					50					
					51					
					52			SM	SAA no stain/odor	
					53					
					54					
					55					
					56					
					57					
					58					
					59					



Advancing Opportunity

Boring/Well #

BH-32

Project:

OH Randel #5

Project #

017818016

Date

12/18/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					
					61					
	Dry	98.6	No		62			SP	Dense, 1% reddish brown sand trace silt < 10% interbedded Clay < 10cm thick no stain, slight odor	
					63					
					64					
					65					
					66			SP	SAA, no stain, slight odor	
					67					
	Dry	94.3	No		68					
					69					
					70					
					71			SP	SAA, no stain, slight odor	
					72					
	Dry	102.3	No		73					
					74					
					75					
					76			SM	Dense, 1% reddish brown, sand some silt < 30%. coal inclusions	
					77					
	Dry	108.9			78					
					79					
					80					
					81			SM	SAA, no stain/odor	
	Dry	70.3			82					





Advancing Opportunity

Boring/Well #

BH-32

Project:

OH Randel #5

Project #

017818016

Date

12/18/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					83					
					84					
					85					
	Dry	66.1	68.1 NO		86			SM	SAA, no stain/odor	
					87					
					88					
					89					
					90					
					91					
	Dry	10.2	NO		92			CL	Very firm, dark grey, Clay, trace sand < 5% NO stain/odor	
					93					
					94					
					95					
					96					
					97			CL	SAA no stain/odor	
	Dry	1.3	NO		98					
					99					
					100					
					101				TD = 100'	
					102					
					103					
					104					
					105					



Advancing Opportunity

848 E. 2nd Ave

Durango, Colorado 81301

# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: <b>BH-33</b>	Project: <b>OH Randel #5</b>
Date: <b>12/13/2018</b>	Project Number: <b>017818016</b>
Logged By: <b>Eric Carroll</b>	Drilled By: <b>Layne</b>
Drilling Method: <b>Sonic</b>	Sampling Method: <b>Core Barrel</b>
Seal: <b>NA</b>	Grout: <b>NA</b>
Diameter: <b>2"</b>	Length: <b>2"</b>
Hole Diameter: <b>8"</b>	Depth to Liquid: <b>NA</b>
Diameter: <b>2"</b>	Length: <b>2"</b>
Total Depth: <b>105'</b>	Depth to Water: <b>NA</b>

Elevation:  
**6,423**

Detector:  
**PID**

Gravel Pack:  
**10-20 Silica Sand**

Casing Type:  
**Schedule 40 PVC**

Screen Type:  
**Schedule 40 PVC**

Slot:  
**0.010"**

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	0.0	NO		0			SM	Road base, silty sand, reddish brown	
					1					
					2					
					3					
					4					
					5			SM	Reddish brown, silty sand, < 30% silt, no stain/odor	
					6					
					7					
					8					
					9					
					10					
					11					
					12					
					13					
					14			SM	lt. yellow brown, silty sand, < 30% silt, rust mottling < 1" diameter	
					15				no stain/odor	



Advancing Opportunity

Boring/Well #

BH-33

Project:

OH Randel #5

Project #

017818016

Date

12/13

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17			SP	Dense, white/grey, Sand, trace Silt <10% No Stain/odor	
	moist	2.2	NO		18					
					19					
					20					
					21					
					22					
	Dry	8.4	NO		23			SC	Firm, lt brown, eta Sandy clay <30% Sand No Stain/odor	
					24					
					25					
					26					
					27			SP	very dense, grey white, Sand trace silt <10% no stain/odor	
	Dry	6.2	NO		28					
					29					
					30					
					31					
					32					
	Dry	11.4	NO		33			SP	Dense, lt reddish brown, Sand no stain/odor Strong odor	
					34					
					35					
					36					
	Dry	30.8	NO		37			SP	SAA Strong odor	

BH-33 35-40'



Advancing Opportunity

Boring/Well #

BH-33

Project:

OH Randel #5

Project #

017818016

Date

12/13/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
					38					
					39					
					40					
					41					
	Dry	48.1	NO		42			SP	Dense, whit/grey, sand, interbedded clay < 1" thick	
					43			CL	no stain slight odor	
					44					
					45					
					46					
					47			SP	SAA, slight odor	
	Dry	37.0	NP		48			CL		
					49					
					50					
					51					
					52			SP		
	Dry	106.8	NO		53			CL	SAA, slight odor	
					54					
					55					
					56					
					57					
	Dry	83.6	NO		58			SP	SAA, slight odor	
					59			CL		



Advancing Opportunity

Boring/Well #

BH-33

Project:

OH Randel #5

Project #

017818016

Date

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					
					61					
	Dry	1076	NO		62			SP	Dense, lt reddish brown, Sand trace silt <10% no stain Strong odor	
					63					
					64					
					65					
					66					
					67					
	Dry	867	NO		68			SP	SAA Strong odor	
					69					
					70					
					71					
					72					
	Dry	832	NO		73			SP	Dense, lt reddish white, Sand coal pieces <1" diameter	
					74					
					75					
					76					
					77					
	Dry	418			78			SP	Dense, lt reddish white, Sand trace silt <10%	
					79					
					80					
					81					
					82					

BH-33 125-130'



Advancing Opportunity

Boring/Well #

BH-33

Project:

OH Randel #5

Project #

017818016

Date

12/17/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					83					
	DRY	404	NO		84			SP	Dense, lt reddish brown, sand trace silt < 10% no stain, strong odor	
					85					
					86				SAA	
					87					
	DRY	209	NO		88					
					89			CL	very firm, dark grey silty clay	
					90					
					91					
		63.1			92			CL	very firm, dark grey, clay trace silt, no stain/odor	
					93					
					94					
					95					
					96					
	DRY	47.3	NO		97			CL	SAA no stain/odor	
					98					
					99					
					100					
					101					
					102					
					103			CL	SAA no stain/odor	
	DRY	1.6	NO		104					
					105				TD=105'	





Advancing Opportunity

848 E. 2nd Ave

Durango, Colorado 81301

### BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: <b>BH-34</b>	Project: <b>OH Randel #5</b>
Date: <b>12/15/18</b>	Project Number: <b>017818016</b>
Logged By: <b>Eric Carroll</b>	Drilled By: <b>Layne</b>
Drilling Method: <b>Sonic</b>	Sampling Method: <b>Core Barrel</b>
Seal: <b>NA</b>	Grout: <b>NA</b>
Casing Type: <b>Schedule 40 PVC</b>	Diameter: <b>2"</b>
Screen Type: <b>Schedule 40 PVC</b>	Slot: <b>0.010"</b>
Hole Diameter: <b>8"</b>	Depth to Liquid: <b>NA</b>
Total Depth: <b>16'</b>	Depth to Water: <b>NA</b>

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	moist	0.0	NO		0					
					1			SM	Dark red brown silty sand no stain/odor	NO well installed
					2					
					3					
					4					
					5	1				
	moist	0.0	NO		6			SM	Dense yellow brown, silty sand <30% silt no stain/odor	
					7					
					8					
					9					
					10					
					11			SP	Dense lt grey/white sand interbedded w/ clay <1" thick no stain/odor	
					12			CL		
	moist	0.0	NO		13	2				
					14					
					15					



Advancing Opportunity

Boring/Well #

BH-34

Project:

OH Randel #5

Project #

017818016

Date

12/14/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15			SP	loose, white, sand, interbedded	
					16			CL	Clay < 1/8" thick	
	moist	0.0	NO		17	3				
					18			CL	Firm, dark brown, Sandy clay	
					19				< 30% sand	
					20				no stain/odor	
					21					
					22	4		CL	loose, lt brown, sandy clay	
	moist	0.0	NP		23				w/ gravel < 30% sand gravel	
					24				no stain/odor	
					25					
					26			SP	Dense, white, sand trace	
	moist	0.0	NO		27	4			silt < 10%	
					28				no stain/odor	
					29					
					30					
					31			SP	SAA	
	Dry	108.3	NO		32				no stain, slight odor	
					33	5				
					34					
					35					
					36			SP	SAA	
	Dry	67.4	NO		37	5			no stain, slight odor	





Advancing Opportunity

Boring/Well #

BH-34

Project:

OH Randel #5

Project #

017818016

Date

12/15/19

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
					38					
					39					
					40					
	Dry	36.4	NO		41			SP	Dense, White/grey, Sand, some Silt < 15% no stain/odor	
					42					
					43					
					44					
					45					
	Dry	19.7	NO		46			SP	Dense, White/grey, Sand trace Silt < 5% no stain/odor	
					47					
					48					
					49					
					50					
					51					
	Dry	950.2	NO		52			SP	Dense, reddish brown, Sand some clay < 15% no stain, slight odor	
					53					
					54					
					55					
					56					
					57					
	Dry	1118	NO		58			SP	Very dense White/grey Sand trace fines < 5% no stain, strong odor	
					59					



Advancing Opportunity

Boring/Well #

BH-34

Project:

OH Randel #5

Project #

017818016

Date

12/15/18

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					60					
					61					
	Dry	1047	NO		62			SP	SAA no stain, strong odor	
					63					
					64					
					65					
					66					
	Dry	987	NO		67			SP	SAA no stain, strong odor	
					68					
					69					
					70					
					71					
	Dry	888	NO		72			SC	Dense reddish brown, <del>SAA</del> Clayey sand 715% clay no stain, strong odor	
					73					
					74					
					75					
					76			SC	very dense, white grey <sup>clayey</sup> sand 215% fines no stain, strong odor	
					77					
	Dry	943	NO		78					
					79			SP	<del>Black</del> white sand with pyrite inclusions. <del>clay</del> Black reduced clay layers < 1" thick	
					80					
					81					
					82				TD 76'	



Advancing Opportunity

848 E. 2nd Ave

Durango, Colorado 81301

# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: **BH-35** Project: **OH Randel #5**

Date: **12/15/18** Project Number: **017818016**

Logged By: **Eric Carroll** Drilled By: **Layne**

Elevation: **6,423** Detector: **PID** Drilling Method: **Sonic** Sampling Method: **Core Barrel**

Gravel Pack: **10-20 Silica Sand** Seal: **NA** Grout: **NA**

Casing Type: **Schedule 40 PVC** Diameter: **2"** Length: **NA** Hole Diameter: **5"** Depth to Liquid: **NA**

Screen Type: **Schedule 40 PVC** Slot: **0.010"** Diameter: **2"** Length: **NA** Total Depth: **60'** Depth to Water: **NA**

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					0					
					1			SM	loose, Dark reddish brown silty Sand no stain/odor	No well installed
					2					
					3					
					4					
	moist	31.1	NO		5	1		SM	loose yellow brown silty Sand no stain/odor	
					6					
					7					
					8					
					9					
					10					
					11					
					12					
					13	2		SM	SAA no stain/odor	
					14					
					15					



Advancing Opportunity

Boring/Well #

BA-35

Project:

OH Randel #5

Project #

017818016

Date

12/15

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
	moist	6.2	NP		17	2		SC	lt reddish brown, sandy clay < 30% sand no stain/odor	
					18					
					19					
					20					
	moist	0.0	NP		21			SC	lt brown, dense clayey sand < 30% clay no stain/odor	
					22					
					23					
					24					
					25	3				
					26			SC	SAA	
	moist	0.0	NP		27					
					28					
					29					
					30					
	moist	41.8	NP		31			SC	SAA no stain/odor	
					32	4				
					33					
					34					
					35					
					36					
					37					



Advancing Opportunity

Boring/Well #

BH-3B

Project:

OH Randel #5

Project #

017818016

Date

12/15

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
	Dry	21.6	NO		38	4		SP	Dense, white/grey, Sand some silt <10%	
					39				NO stain/odor	
					40					
					41			SP	SAA	
	DRY	36.0	NO		42				NO stain/odor	
					43					
					44					
					45					
					46					
					47			SP	SAA no stain/odor	
	DRY	73.1	NO		48					
					49					
					50					
					51					
	DRY	70.3	NO		52			SP	SAA no stain/odor	
					53					
					54					
					55					
					56					
					57			SP	SAA no stain/odor	
	DRY	16.1	NO		58					
					59				TD = 60'	



Advancing Opportunity

848 E. 2nd Ave

Durango, Colorado 81301

# BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: **BH-36** Project: **OH Randel #5**

Date: **12/16/18** Project Number: **017818016**

Logged By: **Eric Carroll** Drilled By: **Layne**

Elevation: **6,423** Detector: **PID** Drilling Method: **Sonic** Sampling Method: **Core Barrel**

Gravel Pack: **10-20 Silica Sand** Seal: **NA** Grout: **NA**

Casing Type: **Schedule 40 PVC** Diameter: **2"** Length: **NA** Hole Diameter: **8"** Depth to Liquid: **NA**

Screen Type: **Schedule 40 PVC** Slot: **0.010"** Diameter: **2"** Length: **NA** Total Depth: **60'** Depth to Water: **NA**

Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	moist	0.7	NO		0			SM	DARK, reddish brown, Silty Sand < 30% silt	NO well installed
					1					
					2					
					3					
					4					
					5	7				
					6			SM	lt reddish brown, silty sand < 30% silt	
	moist	0.0	NO		7				no stain/odor	
					8					
					9					
					10					
					11					
					12					
					13					
					14	2		SM	SAA no stain/odor	
	moist	0.7	NO		15					





Advancing Opportunity

Boring/Well #

BH-36

Project:

OH Randel #5

Project #

017818016

Date

12/16/14

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
	moist	0.6	no		16	2		CL	firm, yellow Brown, sandy clay ~30% sand, no stain/odor	
					17					
					18					
					19					
					20					
					21			CL	SAA no stain/odor	
					22					
	moist	0.5	NO		23					
					24					
					25					
					26					
					27			CL	SAA no stain/odor	
	moist	0.0	NP		28					
					29					
					30					
					31			SP	Dense, reddish brown sand some silt < 15% no stain/odor	
					32					
	dry	0.0	NO		33					
					34					
					35					
					36					
					37					



Advancing Opportunity

Boring/Well #

BH-36

Project:

OH Randel #5

Project #

017818016

Date

12/16/16

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					37					
	Dry	25.5	No		38			SP	Dense, white/grey, Sand, trace silt < 10% no stain/odor	
					39					
					40					
					41					
	Dry	24.2	No		42			SP	SAA no stain/odor	
					43					
					44					
					45					
					46			SM	Dense, reddish brown, sand some silt < 30% no stain/odor	
	Dry	23.8	No		47					
					48					
					49					
					50					
	Dry	58.0	NO		51			SP-SM	Dense reddish brown sand, some silt & clay < 15% interbedded white clay < 1" thick no stain/odor	
					52					
					53					
					54					
					55					
					56			SP-SM	SAA, no stain/odor	
					57					
	Dry	47.2	NO		58					
					59				TD = 60'	







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

July 07, 2016

Ashley Ager  
XTO Energy  
382 County Road 3100  
Aztec, NM 87410  
TEL: (505) 787-0519  
FAX (505) 333-3280

RE: OH Randel #5

OrderNo.: 1607132

Dear Ashley Ager:

Hall Environmental Analysis Laboratory received 3 sample(s) on 7/6/2016 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](http://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 #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1607132**

Date Reported: **7/7/2016**

**CLIENT:** XTO Energy

**Client Sample ID:** HA 5 @ 16'

**Project:** OH Randel #5

**Collection Date:** 7/5/2016 11:55:00 AM

**Lab ID:** 1607132-001

**Matrix:** SOIL

**Received Date:** 7/6/2016 7:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>TOM</b>
Diesel Range Organics (DRO)	150	10		mg/Kg	1	7/6/2016 10:55:46 AM	26242
Surr: DNOP	90.4	70-130		%Rec	1	7/6/2016 10:55:46 AM	26242
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	310	21		mg/Kg	5	7/6/2016 11:30:14 AM	26229
Surr: BFB	354	80-120	S	%Rec	5	7/6/2016 11:30:14 AM	26229
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	0.21	0.10		mg/Kg	5	7/6/2016 11:30:14 AM	26229
Toluene	3.5	0.21		mg/Kg	5	7/6/2016 11:30:14 AM	26229
Ethylbenzene	1.3	0.21		mg/Kg	5	7/6/2016 11:30:14 AM	26229
Xylenes, Total	15	0.42		mg/Kg	5	7/6/2016 11:30:14 AM	26229
Surr: 4-Bromofluorobenzene	120	80-120	S	%Rec	5	7/6/2016 11:30:14 AM	26229

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1607132

Date Reported: 7/7/2016

**CLIENT:** XTO Energy

**Client Sample ID:** HA 5 @ 21.5'

**Project:** OH Randel #5

**Collection Date:** 7/5/2016 1:00:00 PM

**Lab ID:** 1607132-002

**Matrix:** SOIL

**Received Date:** 7/6/2016 7:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>TOM</b>
Diesel Range Organics (DRO)	66	10		mg/Kg	1	7/6/2016 11:17:24 AM	26242
Surr: DNOP	91.7	70-130		%Rec	1	7/6/2016 11:17:24 AM	26242
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	260	20		mg/Kg	5	7/6/2016 11:53:42 AM	26229
Surr: BFB	299	80-120	S	%Rec	5	7/6/2016 11:53:42 AM	26229
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.10		mg/Kg	5	7/6/2016 11:53:42 AM	26229
Toluene	2.4	0.20		mg/Kg	5	7/6/2016 11:53:42 AM	26229
Ethylbenzene	1.0	0.20		mg/Kg	5	7/6/2016 11:53:42 AM	26229
Xylenes, Total	12	0.41		mg/Kg	5	7/6/2016 11:53:42 AM	26229
Surr: 4-Bromofluorobenzene	114	80-120		%Rec	5	7/6/2016 11:53:42 AM	26229

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1607132

Date Reported: 7/7/2016

**CLIENT:** XTO Energy

**Client Sample ID:** HA 1 @ 20'

**Project:** OH Randel #5

**Collection Date:** 7/5/2016 4:00:00 PM

**Lab ID:** 1607132-003

**Matrix:** SOIL

**Received Date:** 7/6/2016 7:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>TOM</b>
Diesel Range Organics (DRO)	17	9.9		mg/Kg	1	7/6/2016 11:39:25 AM	26242
Surr: DNOP	90.7	70-130		%Rec	1	7/6/2016 11:39:25 AM	26242
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	810	65		mg/Kg	20	7/6/2016 12:17:10 PM	26229
Surr: BFB	166	80-120	S	%Rec	20	7/6/2016 12:17:10 PM	26229
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	5.1	0.32		mg/Kg	20	7/6/2016 12:17:10 PM	26229
Toluene	56	0.65		mg/Kg	20	7/6/2016 12:17:10 PM	26229
Ethylbenzene	7.3	0.65		mg/Kg	20	7/6/2016 12:17:10 PM	26229
Xylenes, Total	74	1.3		mg/Kg	20	7/6/2016 12:17:10 PM	26229
Surr: 4-Bromofluorobenzene	113	80-120		%Rec	20	7/6/2016 12:17:10 PM	26229

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1607132

07-Jul-16

Client: XTO Energy

Project: OH Randel #5

Sample ID	LCS-26242		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 26242		RunNo: 35436					
Prep Date:	7/6/2016		Analysis Date: 7/6/2016		SeqNo: 1096556		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	42	10	50.00	0	84.1	62.6	124			
Surr: DNOP	4.4		5.000		87.7	70	130			

Sample ID	MB-26242		SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS		Batch ID: 26242		RunNo: 35436					
Prep Date:	7/6/2016		Analysis Date: 7/6/2016		SeqNo: 1096557		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Surr: DNOP	9.5		10.00		95.4	70	130			

Sample ID	MB-26224		SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS		Batch ID: 26224		RunNo: 35437					
Prep Date:	7/5/2016		Analysis Date: 7/6/2016		SeqNo: 1096560		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	9.5		10.00		94.6	70	130			

Sample ID	LCS-26224		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 26224		RunNo: 35437					
Prep Date:	7/5/2016		Analysis Date: 7/6/2016		SeqNo: 1096561		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.1		5.000		82.6	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  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1607132

07-Jul-16

**Client:** XTO Energy  
**Project:** OH Randel #5

Sample ID <b>MB-26229</b>	SampType: <b>MBLK</b>			TestCode: <b>EPA Method 8015D: Gasoline Range</b>						
Client ID: <b>PBS</b>	Batch ID: <b>26229</b>			RunNo: <b>35443</b>						
Prep Date: <b>7/5/2016</b>	Analysis Date: <b>7/6/2016</b>			SeqNo: <b>1097615</b>		Units: <b>mg/Kg</b>				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	960		1000		95.5	80	120			

Sample ID <b>LCS-26229</b>	SampType: <b>LCS</b>			TestCode: <b>EPA Method 8015D: Gasoline Range</b>						
Client ID: <b>LCSS</b>	Batch ID: <b>26229</b>			RunNo: <b>35443</b>						
Prep Date: <b>7/5/2016</b>	Analysis Date: <b>7/6/2016</b>			SeqNo: <b>1097616</b>		Units: <b>mg/Kg</b>				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	26	5.0	25.00	0	105	80	120			
Surr: BFB	1100		1000		108	80	120			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1607132

07-Jul-16

Client: XTO Energy

Project: OH Randel #5

Sample ID	MB-26229		SampType: MBLK		TestCode: EPA Method 8021B: Volatiles					
Client ID:	PBS		Batch ID: 26229		RunNo: 35443					
Prep Date:	7/5/2016		Analysis Date: 7/6/2016		SeqNo: 1097633		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	0.93		1.000		92.8	80	120			

Sample ID	LCS-26229		SampType: LCS		TestCode: EPA Method 8021B: Volatiles					
Client ID:	LCSS		Batch ID: 26229		RunNo: 35443					
Prep Date:	7/5/2016		Analysis Date: 7/6/2016		SeqNo: 1097635		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.98	0.025	1.000	0	97.8	75.3	123			
Toluene	0.97	0.050	1.000	0	96.9	80	124			
Ethylbenzene	0.99	0.050	1.000	0	99.4	82.8	121			
Xylenes, Total	3.0	0.10	3.000	0	99.2	83.9	122			
Surr: 4-Bromofluorobenzene	0.99		1.000		98.6	80	120			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified





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: XTO Energy

Work Order Number: 1607132

RcptNo: 1

Received by/date:

AT 07/06/16

Logged By: Anne Thorne

7/6/2016 7:35:00 AM

Anne Thorne

Completed By: Anne Thorne

7/6/2016

Anne Thorne

Reviewed By:

TO

07/06/16

### Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

### Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐

# of preserved  
bottles checked  
for pH:

( $<2$  or  $>12$  unless noted)

Adjusted? \_\_\_\_\_

Checked by: \_\_\_\_\_

### Special Handling (if applicable)

16. 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:

17. Additional remarks:

### 18. Cooler Information

Cooler No	Temp. $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			

[www.hallenvironmental.com](http://www.hallenvironmental.com)

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

BTEX + MTBE + TMBs (8021)
BTEX + MTBE + TMBE + TMBs (8021)
BTEX + MTBE + TMBE (Gas only)
TPH 8015B (GRO / DRO / MRO)
TPH (Method 418.1)
EDB (Method 504.1)
PAH's (8310 or 8270 SIMS)
RCRA 8 Metals
Anions (F <sup>-</sup> , Cl <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , PO <sub>4</sub> <sup>3-</sup> , SO <sub>4</sub> <sup>2-</sup> )
8081 Pesticides / 8082 PCB's
8260B (VOA)
8270 (Semi-VOA)
Air Bubbles (Y or N)

Project Manager:	Ashley Ayer
Sampler:	Josh Adams & Alex Crooks
On Ice:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Sample Temperature:	1.0

Container Type and #	Preservative Type	HEAL No.
1/402 jar	COOL	11607132
1/402 jar	COOL	201
1/402 jar	COOL	202
1/402 jar	COOL	203

Date	Time	Matrix	Sample Request ID
5/16	1155	S011	HA SQA 16'
5/16	1300	S011	HA SQA 21.5'
5/16	1600	S011	HA SQA 20'

[illegible][illegible]

Date:	Time:	Relinquished by:	Received by:	Date:	Time:
5/16	1715	[Signature]	[Signature]	7/5/16	1715
5/16	1841	[Signature]	[Signature]	07/06/16	1735

Remarks: HASQ 16' = FARAC - 7516 - 155  
HASQ 215' = FARAC - 7516 - 1300  
HASQ 20' = FARAC - 7516 - 1600

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



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

August 09, 2016

James McDaniel  
XTO Energy  
382 County Road 3100  
Aztec, NM 87410  
TEL: (505) 787-0519  
FAX (505) 333-3280

RE: OH Randel #5

OrderNo.: 1608126

Dear James McDaniel:

Hall Environmental Analysis Laboratory received 6 sample(s) on 8/3/2016 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](http://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 #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608126

Date Reported: 8/9/2016

**CLIENT:** XTO Energy

**Client Sample ID:** BH-6@9'

**Project:** OH Randel #5

**Collection Date:** 8/2/2016 1:00:00 PM

**Lab ID:** 1608126-001

**Matrix:** SOIL

**Received Date:** 8/3/2016 7:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>KJH</b>
Diesel Range Organics (DRO)	140	9.7		mg/Kg	1	8/3/2016 1:23:47 PM	26760
Surr: DNOP	105	70-130		%Rec	1	8/3/2016 1:23:47 PM	26760
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	840	99		mg/Kg	20	8/5/2016 2:53:37 PM	26763
Surr: BFB	302	49.4-163	S	%Rec	20	8/5/2016 2:53:37 PM	26763
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.49		mg/Kg	20	8/5/2016 2:53:37 PM	26763
Toluene	1.8	0.99		mg/Kg	20	8/5/2016 2:53:37 PM	26763
Ethylbenzene	1.7	0.99		mg/Kg	20	8/5/2016 2:53:37 PM	26763
Xylenes, Total	20	2.0		mg/Kg	20	8/5/2016 2:53:37 PM	26763
Surr: 4-Bromofluorobenzene	108	80-120		%Rec	20	8/5/2016 2:53:37 PM	26763

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608126

Date Reported: 8/9/2016

**CLIENT:** XTO Energy

**Client Sample ID:** BH-6@18'

**Project:** OH Randel #5

**Collection Date:** 8/2/2016 1:05:00 PM

**Lab ID:** 1608126-002

**Matrix:** SOIL

**Received Date:** 8/3/2016 7:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>KJH</b>
Diesel Range Organics (DRO)	120	9.5		mg/Kg	1	8/3/2016 2:29:08 PM	26760
Surr: DNOP	107	70-130		%Rec	1	8/3/2016 2:29:08 PM	26760
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	1000	98		mg/Kg	20	8/5/2016 3:17:13 PM	26763
Surr: BFB	226	49.4-163	S	%Rec	20	8/5/2016 3:17:13 PM	26763
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.49		mg/Kg	20	8/5/2016 3:17:13 PM	26763
Toluene	7.3	0.98		mg/Kg	20	8/5/2016 3:17:13 PM	26763
Ethylbenzene	2.4	0.98		mg/Kg	20	8/5/2016 3:17:13 PM	26763
Xylenes, Total	27	2.0		mg/Kg	20	8/5/2016 3:17:13 PM	26763
Surr: 4-Bromofluorobenzene	105	80-120		%Rec	20	8/5/2016 3:17:13 PM	26763

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608126

Date Reported: 8/9/2016

**CLIENT:** XTO Energy

**Client Sample ID:** BH-7@11'

**Project:** OH Randel #5

**Collection Date:** 8/2/2016 12:50:00 PM

**Lab ID:** 1608126-003

**Matrix:** MEOH (SOIL)

**Received Date:** 8/3/2016 7:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>KJH</b>
Diesel Range Organics (DRO)	400	10		mg/Kg	1	8/3/2016 10:03:18 AM	26760
Surr: DNOP	103	70-130		%Rec	1	8/3/2016 10:03:18 AM	26760
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	1700	84		mg/Kg	20	8/3/2016 9:32:24 AM	26741
Surr: BFB	617	49.4-163	S	%Rec	20	8/3/2016 9:32:24 AM	26741
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.42		mg/Kg	20	8/3/2016 9:32:24 AM	26741
Toluene	2.6	0.84		mg/Kg	20	8/3/2016 9:32:24 AM	26741
Ethylbenzene	3.6	0.84		mg/Kg	20	8/3/2016 9:32:24 AM	26741
Xylenes, Total	39	1.7		mg/Kg	20	8/3/2016 9:32:24 AM	26741
Surr: 4-Bromofluorobenzene	127	80-120	S	%Rec	20	8/3/2016 9:32:24 AM	26741

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608126

Date Reported: 8/9/2016

**CLIENT:** XTO Energy

**Client Sample ID:** BH-7@12'

**Project:** OH Randel #5

**Collection Date:** 8/2/2016 12:55:00 PM

**Lab ID:** 1608126-004

**Matrix:** MEOH (SOIL)

**Received Date:** 8/3/2016 7:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>KJH</b>
Diesel Range Organics (DRO)	350	10		mg/Kg	1	8/3/2016 10:25:02 AM	26760
Surr: DNOP	102	70-130		%Rec	1	8/3/2016 10:25:02 AM	26760
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	2600	84		mg/Kg	20	8/3/2016 9:55:52 AM	26741
Surr: BFB	691	49.4-163	S	%Rec	20	8/3/2016 9:55:52 AM	26741
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.42		mg/Kg	20	8/3/2016 9:55:52 AM	26741
Toluene	9.4	0.84		mg/Kg	20	8/3/2016 9:55:52 AM	26741
Ethylbenzene	8.3	0.84		mg/Kg	20	8/3/2016 9:55:52 AM	26741
Xylenes, Total	94	1.7		mg/Kg	20	8/3/2016 9:55:52 AM	26741
Surr: 4-Bromofluorobenzene	137	80-120	S	%Rec	20	8/3/2016 9:55:52 AM	26741

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608126

Date Reported: 8/9/2016

**CLIENT:** XTO Energy

**Client Sample ID:** BH-8@16'

**Project:** OH Randel #5

**Collection Date:** 8/2/2016 12:45:00 PM

**Lab ID:** 1608126-005

**Matrix:** SOIL

**Received Date:** 8/3/2016 7:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>KJH</b>
Diesel Range Organics (DRO)	340	9.5		mg/Kg	1	8/3/2016 2:50:55 PM	26760
Surr: DNOP	107	70-130		%Rec	1	8/3/2016 2:50:55 PM	26760
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	560	94		mg/Kg	20	8/4/2016 6:27:38 PM	26763
Surr: BFB	296	49.4-163	S	%Rec	20	8/4/2016 6:27:38 PM	26763
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.47		mg/Kg	20	8/4/2016 6:27:38 PM	26763
Toluene	ND	0.94		mg/Kg	20	8/4/2016 6:27:38 PM	26763
Ethylbenzene	1.3	0.94		mg/Kg	20	8/4/2016 6:27:38 PM	26763
Xylenes, Total	12	1.9		mg/Kg	20	8/4/2016 6:27:38 PM	26763
Surr: 4-Bromofluorobenzene	109	80-120		%Rec	20	8/4/2016 6:27:38 PM	26763

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1608126

Date Reported: 8/9/2016

**CLIENT:** XTO Energy

**Client Sample ID:** BH-9@16'

**Project:** OH Randel #5

**Collection Date:** 8/2/2016 12:40:00 PM

**Lab ID:** 1608126-006

**Matrix:** MEOH (SOIL)

**Received Date:** 8/3/2016 7:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>KJH</b>
Diesel Range Organics (DRO)	240	9.5		mg/Kg	1	8/3/2016 10:46:38 AM	26760
Surr: DNOP	94.4	70-130		%Rec	1	8/3/2016 10:46:38 AM	26760
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	2200	210		mg/Kg	50	8/3/2016 10:19:20 AM	26741
Surr: BFB	237	49.4-163	S	%Rec	50	8/3/2016 10:19:20 AM	26741
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	1.0		mg/Kg	50	8/3/2016 10:19:20 AM	26741
Toluene	23	2.1		mg/Kg	50	8/3/2016 10:19:20 AM	26741
Ethylbenzene	8.7	2.1		mg/Kg	50	8/3/2016 10:19:20 AM	26741
Xylenes, Total	100	4.1		mg/Kg	50	8/3/2016 10:19:20 AM	26741
Surr: 4-Bromofluorobenzene	108	80-120		%Rec	50	8/3/2016 10:19:20 AM	26741

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608126

09-Aug-16

Client: XTO Energy

Project: OH Randel #5

Sample ID	LCS-26760		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 26760		RunNo: 36186					
Prep Date:	8/3/2016		Analysis Date: 8/3/2016		SeqNo: 1120950		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	40	10	50.00	0	79.1	62.6	124			
Surr: DNOP	4.5		5.000		90.1	70	130			

Sample ID	MB-26760		SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS		Batch ID: 26760		RunNo: 36186					
Prep Date:	8/3/2016		Analysis Date: 8/3/2016		SeqNo: 1120951		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Surr: DNOP	8.5		10.00		85.0	70	130			

Sample ID	1608126-001AMS		SampType: MS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	BH-6@9'		Batch ID: 26760		RunNo: 36185					
Prep Date:	8/3/2016		Analysis Date: 8/3/2016		SeqNo: 1121248		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	170	9.8	49.12	138.0	60.9	33.9	141			
Surr: DNOP	5.3		4.912		107	70	130			

Sample ID	1608126-001AMSD		SampType:	MSD		TestCode:	EPA Method 8015M/D: Diesel Range Organics				
Client ID:	BH-6@9'		Batch ID:	26760		RunNo:	36185				
Prep Date:	8/3/2016		Analysis Date:	8/3/2016		SeqNo:	1121249		Units: mg/Kg		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Diesel Range Organics (DRO)	150	9.2	46.21	138.0	33.3	33.9	141	9.01	20	S	
Surr: DNOP	4.9		4.621		106	70	130	0	0		

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608126

09-Aug-16

Client: XTO Energy

Project: OH Randel #5

Sample ID	MB-26741		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 26741		RunNo: 36191					
Prep Date:	8/2/2016		Analysis Date: 8/3/2016		SeqNo: 1121472		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	960		1000		96.4	49.4	163			

Sample ID	LCS-26741		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 26741		RunNo: 36191					
Prep Date:	8/2/2016		Analysis Date: 8/3/2016		SeqNo: 1121473		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	26	5.0	25.00	0	102	80	120			
Surr: BFB	1100		1000		106	49.4	163			

Sample ID	MB-26763		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 26763		RunNo: 36215					
Prep Date:	8/3/2016		Analysis Date: 8/4/2016		SeqNo: 1122450		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	970		1000		97.0	49.4	163			

Sample ID	LCS-26763		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 26763		RunNo: 36215					
Prep Date:	8/3/2016		Analysis Date: 8/4/2016		SeqNo: 1122452		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	26	5.0	25.00	0	102	80	120			
Surr: BFB	1000		1000		105	49.4	163			

### 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  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1608126

09-Aug-16

Client: XTO Energy

Project: OH Randel #5

Sample ID	<b>MB-26741</b>		SampType:	<b>MBLK</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>PBS</b>		Batch ID:	<b>26741</b>		RunNo:	<b>36191</b>			
Prep Date:	<b>8/2/2016</b>		Analysis Date:	<b>8/3/2016</b>		SeqNo:	<b>1121479</b>	Units:	<b>mg/Kg</b>	
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		91.5	80	120			

Sample ID	<b>LCS-26741</b>		SampType:	<b>LCS</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>LCSS</b>		Batch ID:	<b>26741</b>		RunNo:	<b>36191</b>			
Prep Date:	<b>8/2/2016</b>		Analysis Date:	<b>8/3/2016</b>		SeqNo:	<b>1121480</b>	Units:	<b>mg/Kg</b>	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.0	0.025	1.000	0	101	75.3	123			
Toluene	0.98	0.050	1.000	0	97.6	80	124			
Ethylbenzene	1.0	0.050	1.000	0	101	82.8	121			
Xylenes, Total	3.0	0.10	3.000	0	100	83.9	122			
Surr: 4-Bromofluorobenzene	0.96		1.000		96.5	80	120			

Sample ID	<b>MB-26763</b>		SampType:	<b>MBLK</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>PBS</b>		Batch ID:	<b>26763</b>		RunNo:	<b>36215</b>			
Prep Date:	<b>8/3/2016</b>		Analysis Date:	<b>8/4/2016</b>		SeqNo:	<b>1122473</b>	Units:	<b>mg/Kg</b>	
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	0.92		1.000		91.5	80	120			

Sample ID	<b>LCS-26763</b>		SampType:	<b>LCS</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>LCSS</b>		Batch ID:	<b>26763</b>		RunNo:	<b>36215</b>			
Prep Date:	<b>8/3/2016</b>		Analysis Date:	<b>8/4/2016</b>		SeqNo:	<b>1122474</b>	Units:	<b>mg/Kg</b>	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.94	0.025	1.000	0	94.4	75.3	123			
Toluene	0.92	0.050	1.000	0	91.9	80	124			
Ethylbenzene	0.96	0.050	1.000	0	95.8	82.8	121			
Xylenes, Total	2.9	0.10	3.000	0	96.4	83.9	122			
Surr: 4-Bromofluorobenzene	0.95		1.000		95.0	80	120			

### 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  
R RPD outside accepted recovery limits  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



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: XTO Energy

Work Order Number: 1608126

RcptNo: 1

Received by/date:

Logged By: Lindsay Mangin

8/3/2016 7:20:00 AM

Completed By: Lindsay Mangin

8/3/2016 7:44:40 AM

Reviewed By:

T.O

08/03/16

*Lindsay Mangin*  
*Lindsay Mangin*

### Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

### Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?  
(Note discrepancies on chain of custody) Yes ☒ No ☐ # of preserved bottles checked for pH: ☐ ( $<2$  or  $>12$  unless noted)
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐ Adjusted? ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?  
(If no, notify customer for authorization.) Yes ☒ No ☐ Checked by: ☐

### Special Handling (if applicable)

16. 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:

17. Additional remarks:

### 18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.7	Good	Yes			

# Chain-of-Custody Record

Client: XTO Energy Inc  
 Contact: James McDaniel  
 Billing Address: 382 County Road 3100  
Aztec, NM 87410  
 Phone #: 505-419-0315  
 Email or Fax#: \_\_\_\_\_  
 VQC Package: ☒ Standard ☐ Level 4 (Full Validation)  
 Accreditation: ☐ NELAP ☐ Other \_\_\_\_\_  
 EDD (Type) \_\_\_\_\_

Turn-Around Time: See Remarks  
☒ Standard ☒ Rush Same Day  
 Project Name: OH Rande 1 #5  
 Project #: 012916007  
 Project Manager: Devin Hennemann  
 Sampler: Devin Hennemann / Josh Adams  
 On Ice: ☒ Yes ☐ No  
 Sample Temperature: 1.7

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.
12-16	1300	soil	BH-6 @ 9'	(1) 4oz.	cool	1608126
	1305		BH-6 @ 18'			-001
	1250		BH-7 @ 11'			-002
	1255		BH-7 @ 12'			-003
	1245		BH-8 @ 16'			-004
	1240		BH-9 @ 16'			-005
						-006

Relinquished by: [Signature]  
 Date: 12/16/11  
 Relinquished by: [Signature]  
 Date: 12/16/11

Received by: [Signature]  
 Date: 12/16/11  
 Received by: [Signature]  
 Date: 12/16/11



## HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com  
 4901 Hawkins NE - Albuquerque, NM 87109  
 Tel. 505-345-3975 Fax 505-345-4107

Analysis Request									
<input checked="" type="checkbox"/>	BTEX + MTBE + TMBs (8021)	<input checked="" type="checkbox"/>	BTEX + MTBE + TPH (Gas only)	<input checked="" type="checkbox"/>	TPH 8015B (GRO / DRO / MRO)	<input checked="" type="checkbox"/>	TPH (Method 418.1)	<input checked="" type="checkbox"/>	EDB (Method 504.1)
<input checked="" type="checkbox"/>	PAHs (8310 or 8270 SIMS)	<input checked="" type="checkbox"/>	RCRA 8 Metals	<input checked="" type="checkbox"/>	Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	<input checked="" type="checkbox"/>	8081 Pesticides / 8082 PCBs	<input checked="" type="checkbox"/>	8260B (VOA)
<input checked="" type="checkbox"/>	8270 (Semi-VOA)	<input checked="" type="checkbox"/>	Air Bubbles (Y or N)	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

Remarks: Same day on BH-7 & BH-9 only



## XTO Energy - San Juan Division

Sample Delivery Group: L905176  
Samples Received: 04/26/2017  
Project Number:  
Description:  
Site: OH RANDEL #5  
Report To: James McDaniel  
382 County Road 3100  
Aztec, NM 87410

Entire Report Reviewed By:



Daphne Richards  
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



<sup>1</sup> Cp: Cover Page	1
<sup>2</sup> Tc: Table of Contents	2
<sup>3</sup> Ss: Sample Summary	4
<sup>4</sup> Cn: Case Narrative	9
<sup>5</sup> Sr: Sample Results	10
BH-11 20-25' L905176-01	10
BH-12 0-10' L905176-02	11
BH-12 10-15' L905176-03	12
BH-12 15-20' L905176-04	13
BH-12 20-25' L905176-05	14
BH-12 25-30' L905176-06	15
BH-12 30-35' L905176-07	16
BH-13 0-10' L905176-08	17
BH-13 10-15' L905176-09	18
BH-13 15-20' L905176-10	19
BH-13 20-25' L905176-11	20
BH-13 25-30' L905176-12	21
BH-13 30-35' L905176-13	22
BH-14 15-20' L905176-14	23
BH-14 20-25' L905176-15	24
BH-15 0-10' L905176-16	25
BH-15 10-15' L905176-17	26
BH-15 15-20' L905176-18	27
BH-15 20-25' L905176-19	28
BH-15 30-32' L905176-20	29
BH-16 0-10' L905176-21	30
BH-16 10-15' L905176-22	31
BH-16 15-20' L905176-23	32
BH-16 23-25' L905176-24	33
BH-16 25-27' L905176-25	34
BH-16 27-29' L905176-26	35
BH-16 33-35' L905176-27	36
BH-17 20-25' L905176-28	37
BH-18 30-32' L905176-29	38
BH-19 30-35' L905176-30	39
<sup>6</sup> Qc: Quality Control Summary	40
Total Solids by Method 2540 G-2011	40
Volatile Organic Compounds (GC) by Method 8015/8021	43
Semi-Volatile Organic Compounds (GC) by Method 8015	47
<sup>7</sup> Gl: Glossary of Terms	49







<sup>8</sup>Al: Accreditations & Locations

50

<sup>9</sup>Sc: Chain of Custody

51

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## BH-11 20-25' L905176-01 Solid

			Collected by D. Burns	Collected date/time 04/19/17 12:15	Received date/time 04/26/17 12:15
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	.99	05/02/17 09:39	05/03/17 16:49	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 09:26	ACM

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

## BH-12 0-10' L905176-02 Solid

			Collected by D. Burns	Collected date/time 04/19/17 13:00	Received date/time 04/26/17 12:15
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	.97	05/02/17 09:39	05/03/17 17:11	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 10:07	ACM

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

## BH-12 10-15' L905176-03 Solid

			Collected by D. Burns	Collected date/time 04/19/17 13:15	Received date/time 04/26/17 12:15
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	200	05/02/17 09:39	05/03/17 13:29	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 10:20	ACM

<sup>8</sup> Al

<sup>9</sup> Sc

## BH-12 15-20' L905176-04 Solid

			Collected by D. Burns	Collected date/time 04/19/17 13:25	Received date/time 04/26/17 12:15
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	.93	05/02/17 09:39	05/03/17 17:33	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 10:34	ACM
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	10	05/01/17 21:13	05/02/17 12:10	ACM

## BH-12 20-25' L905176-05 Solid

			Collected by D. Burns	Collected date/time 04/19/17 13:40	Received date/time 04/26/17 12:15
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	.98	05/02/17 09:39	05/03/17 17:55	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 10:47	ACM

## BH-12 25-30' L905176-06 Solid

			Collected by D. Burns	Collected date/time 04/19/17 14:00	Received date/time 04/26/17 12:15
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	196	05/02/17 09:39	05/03/17 23:15	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 11:01	ACM



## BH-12 30-35' L905176-07 Solid

Collected by  
D. BurnsCollected date/time  
04/19/17 14:35Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	2475	05/02/17 09:39	05/03/17 23:36	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 15:10	ACM
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	20	05/01/17 21:13	05/02/17 15:24	ACM

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## BH-13 0-10' L905176-08 Solid

Collected by  
D. BurnsCollected date/time  
04/19/17 15:40Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	.98	05/02/17 09:39	05/03/17 23:36	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 11:15	ACM

## BH-13 10-15' L905176-09 Solid

Collected by  
D. BurnsCollected date/time  
04/19/17 15:50Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	.98	05/02/17 09:39	05/03/17 19:23	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 11:28	ACM

## BH-13 15-20' L905176-10 Solid

Collected by  
D. BurnsCollected date/time  
04/19/17 16:00Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974587	1	04/28/17 09:43	04/28/17 09:54	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	1	05/02/17 09:39	05/03/17 19:45	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 11:42	ACM

## BH-13 20-25' L905176-11 Solid

Collected by  
D. BurnsCollected date/time  
04/19/17 16:10Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	200	05/02/17 09:39	05/03/17 23:57	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 11:57	ACM

## BH-13 25-30' L905176-12 Solid

Collected by  
D. BurnsCollected date/time  
04/19/17 16:20Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	200	05/02/17 09:39	05/03/17 20:29	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 13:06	ACM



## BH-13 30-35' L905176-13 Solid

Collected by  
D. BurnsCollected date/time  
04/19/17 16:35Received date/time  
04/26/17 12:15<sup>1</sup> Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	194	05/02/17 09:39	05/03/17 20:51	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 13:18	ACM

<sup>2</sup> Tc<sup>3</sup> Ss

## BH-14 15-20' L905176-14 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 09:30Received date/time  
04/26/17 12:15<sup>4</sup> Cn

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015	WG975972	.97	05/02/17 09:39	05/03/17 21:13	BMB
Volatile Organic Compounds (GC) by Method 8021	WG975972	.98	05/02/17 09:39	05/04/17 04:25	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 13:33	ACM

<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl

## BH-14 20-25' L905176-15 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 09:45Received date/time  
04/26/17 12:15<sup>8</sup> Al

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	.94	05/02/17 09:39	05/03/17 23:58	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 13:46	ACM

<sup>9</sup> Sc

## BH-15 0-10' L905176-16 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 11:30Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	49.5	05/02/17 09:39	05/04/17 18:39	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 14:00	ACM

## BH-15 10-15' L905176-17 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 11:40Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	98	05/02/17 09:39	05/04/17 19:01	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 14:14	ACM

## BH-15 15-20' L905176-18 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 11:45Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	196	05/02/17 09:39	05/04/17 01:05	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 14:27	ACM

# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## BH-15 20-25' L905176-19 Solid

Collected by  
D. Burns

Collected date/time  
04/20/17 12:00

Received date/time  
04/26/17 12:15

<sup>1</sup> Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	198	05/02/17 09:39	05/04/17 01:27	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 14:41	ACM

<sup>2</sup> Tc

<sup>3</sup> Ss

## BH-15 30-32' L905176-20 Solid

Collected by  
D. Burns

Collected date/time  
04/20/17 13:20

Received date/time  
04/26/17 12:15

<sup>4</sup> Cn

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974589	1	04/27/17 15:10	04/27/17 15:28	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975972	49	05/02/17 09:39	05/04/17 19:24	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975037	1	05/01/17 21:13	05/02/17 14:55	ACM

<sup>5</sup> Sr

<sup>6</sup> Qc

## BH-16 0-10' L905176-21 Solid

Collected by  
D. Burns

Collected date/time  
04/20/17 14:20

Received date/time  
04/26/17 12:15

<sup>7</sup> Gl

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	.98	05/02/17 09:39	05/03/17 03:38	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 13:39	KLM

<sup>8</sup> Al

<sup>9</sup> Sc

## BH-16 10-15' L905176-22 Solid

Collected by  
D. Burns

Collected date/time  
04/20/17 14:30

Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	.95	05/02/17 09:39	05/03/17 04:00	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 13:53	KLM

## BH-16 15-20' L905176-23 Solid

Collected by  
D. Burns

Collected date/time  
04/20/17 14:40

Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	495	05/02/17 09:39	05/04/17 19:46	BMB
Volatile Organic Compounds (GC) by Method 8021	WG975980	24.75	05/02/17 09:39	05/04/17 02:33	GLN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 13:26	KLM

## BH-16 23-25' L905176-24 Solid

Collected by  
D. Burns

Collected date/time  
04/20/17 15:15

Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	200	05/02/17 09:39	05/03/17 01:03	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 12:58	KLM

ACCOUNT:

XTO Energy - San Juan Division

PROJECT:

SDG:

L905176

DATE/TIME:

05/05/17 14:28

PAGE:

7 of 54



## BH-16 25-27' L905176-25 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 15:30Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	200	05/02/17 09:39	05/03/17 04:44	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 13:12	KLM

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## BH-16 27-29' L905176-26 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 15:40Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015	WG975980	500	05/02/17 09:39	05/04/17 20:08	BMB
Volatile Organic Compounds (GC) by Method 8021	WG975980	25	05/02/17 09:39	05/04/17 02:55	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 12:31	KLM

## BH-16 33-35' L905176-27 Solid

Collected by  
D. BurnsCollected date/time  
04/20/17 16:05Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	.97	05/02/17 09:39	05/03/17 05:28	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 11:50	KLM

## BH-17 20-25' L905176-28 Solid

Collected by  
D. BurnsCollected date/time  
04/21/17 10:30Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	1	05/02/17 09:39	05/03/17 05:50	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 12:45	KLM

## BH-18 30-32' L905176-29 Solid

Collected by  
D. BurnsCollected date/time  
04/24/17 09:00Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	.98	05/02/17 09:39	05/04/17 03:17	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 12:18	KLM

## BH-19 30-35' L905176-30 Solid

Collected by  
D. BurnsCollected date/time  
04/24/17 10:25Received date/time  
04/26/17 12:15

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG974591	1	04/27/17 14:57	04/27/17 15:05	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG975980	.97	05/02/17 09:39	05/04/17 03:40	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG975038	1	04/29/17 12:28	05/01/17 12:04	KLM



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne Richards  
Technical Service Representative

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.9		1	04/28/2017 09:54	<a href="#">WG974587</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000612	.99	05/03/2017 16:49	<a href="#">WG975972</a>
Toluene	ND		0.00612	.99	05/03/2017 16:49	<a href="#">WG975972</a>
Ethylbenzene	ND		0.000612	.99	05/03/2017 16:49	<a href="#">WG975972</a>
Total Xylene	0.00220	<a href="#">B</a>	0.00184	.99	05/03/2017 16:49	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	ND		0.122	.99	05/03/2017 16:49	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	99.4		77.0-120		05/03/2017 16:49	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	91.9		75.0-128		05/03/2017 16:49	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.95	1	05/02/2017 09:26	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.95	1	05/02/2017 09:26	<a href="#">WG975037</a>
(S) o-Terphenyl	70.0		18.0-148		05/02/2017 09:26	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.1		1	04/28/2017 09:54	<a href="#">WG974587</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000538	.97	05/03/2017 17:11	<a href="#">WG975972</a>
Toluene	ND		0.00538	.97	05/03/2017 17:11	<a href="#">WG975972</a>
Ethylbenzene	ND		0.000538	.97	05/03/2017 17:11	<a href="#">WG975972</a>
Total Xylene	ND		0.00161	.97	05/03/2017 17:11	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	ND		0.108	.97	05/03/2017 17:11	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	101		77.0-120		05/03/2017 17:11	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	92.2		75.0-128		05/03/2017 17:11	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	5.66		4.44	1	05/02/2017 10:07	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.44	1	05/02/2017 10:07	<a href="#">WG975037</a>
(S) o-Terphenyl	68.5		18.0-148		05/02/2017 10:07	<a href="#">WG975037</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	91.1		1	04/28/2017 09:54	<a href="#">WG974587</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.110	200	05/03/2017 13:29	<a href="#">WG975972</a>
Toluene	ND		1.10	200	05/03/2017 13:29	<a href="#">WG975972</a>
Ethylbenzene	0.403		0.110	200	05/03/2017 13:29	<a href="#">WG975972</a>
Total Xylene	2.11	<u>B</u>	0.329	200	05/03/2017 13:29	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	401		22.0	200	05/03/2017 13:29	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	103		77.0-120		05/03/2017 13:29	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	93.3		75.0-128		05/03/2017 13:29	<a href="#">WG975972</a>

## Sample Narrative:

8015/8021 L905176-03 WG975972: Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	39.7		4.39	1	05/02/2017 10:20	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.39	1	05/02/2017 10:20	<a href="#">WG975037</a>
(S) o-Terphenyl	70.7		18.0-148		05/02/2017 10:20	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.9		1	04/28/2017 09:54	<a href="#">WG974587</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.000728		0.000535	.93	05/03/2017 17:33	<a href="#">WG975972</a>
Toluene	0.00750		0.00535	.93	05/03/2017 17:33	<a href="#">WG975972</a>
Ethylbenzene	0.00379		0.000535	.93	05/03/2017 17:33	<a href="#">WG975972</a>
Total Xylene	0.0779		0.00161	.93	05/03/2017 17:33	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	2.36		0.107	.93	05/03/2017 17:33	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	101		77.0-120		05/03/2017 17:33	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	91.9		75.0-128		05/03/2017 17:33	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	508		46.0	10	05/02/2017 12:10	<a href="#">WG975037</a>
C28-C40 Oil Range	8.00		4.60	1	05/02/2017 10:34	<a href="#">WG975037</a>
(S) o-Terphenyl	72.6		18.0-148		05/02/2017 10:34	<a href="#">WG975037</a>
(S) o-Terphenyl	63.2		18.0-148		05/02/2017 12:10	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	89.4		1	04/28/2017 09:54	<a href="#">WG974587</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.00535		0.000548	.98	05/03/2017 17:55	<a href="#">WG975972</a>
Toluene	0.0218		0.00548	.98	05/03/2017 17:55	<a href="#">WG975972</a>
Ethylbenzene	0.0114		0.000548	.98	05/03/2017 17:55	<a href="#">WG975972</a>
Total Xylene	0.156		0.00164	.98	05/03/2017 17:55	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	4.02		0.110	.98	05/03/2017 17:55	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	99.4		77.0-120		05/03/2017 17:55	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	91.8		75.0-128		05/03/2017 17:55	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	67.1		4.48	1	05/02/2017 10:47	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.48	1	05/02/2017 10:47	<a href="#">WG975037</a>
(S) o-Terphenyl	62.1		18.0-148		05/02/2017 10:47	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	89.2		1	04/28/2017 09:54	<a href="#">WG974587</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.149		0.110	196	05/03/2017 23:15	<a href="#">WG975972</a>
Toluene	2.98		1.10	196	05/03/2017 23:15	<a href="#">WG975972</a>
Ethylbenzene	2.82		0.110	196	05/03/2017 23:15	<a href="#">WG975972</a>
Total Xylene	55.5		0.330	196	05/03/2017 23:15	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	1260		22.0	196	05/03/2017 23:15	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	102		77.0-120		05/03/2017 23:15	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		05/03/2017 23:15	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	275		4.48	1	05/02/2017 11:01	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.48	1	05/02/2017 11:01	<a href="#">WG975037</a>
(S) o-Terphenyl	70.2		18.0-148		05/02/2017 11:01	<a href="#">WG975037</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	92.8		1	04/28/2017 09:54	<a href="#">WG974587</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	66.3		1.33	2475	05/03/2017 23:36	<a href="#">WG975972</a>
Toluene	392		13.3	2475	05/03/2017 23:36	<a href="#">WG975972</a>
Ethylbenzene	39.8		1.33	2475	05/03/2017 23:36	<a href="#">WG975972</a>
Total Xylene	558		4.00	2475	05/03/2017 23:36	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	11400		267	2475	05/03/2017 23:36	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	93.5		77.0-120		05/03/2017 23:36	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	103		75.0-128		05/03/2017 23:36	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	687		86.2	20	05/02/2017 15:24	<a href="#">WG975037</a>
C28-C40 Oil Range	26.7		4.31	1	05/02/2017 15:10	<a href="#">WG975037</a>
(S) o-Terphenyl	81.2		18.0-148		05/02/2017 15:10	<a href="#">WG975037</a>
(S) o-Terphenyl	54.8	<a href="#">J7</a>	18.0-148		05/02/2017 15:24	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.0		1	04/28/2017 09:54	<a href="#">WG974587</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000570	.98	05/03/2017 23:36	<a href="#">WG975972</a>
Toluene	ND		0.00570	.98	05/03/2017 23:36	<a href="#">WG975972</a>
Ethylbenzene	ND		0.000570	.98	05/03/2017 23:36	<a href="#">WG975972</a>
Total Xylene	ND		0.00171	.98	05/03/2017 23:36	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	ND		0.114	.98	05/03/2017 23:36	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	101		77.0-120		05/03/2017 23:36	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	92.3		75.0-128		05/03/2017 23:36	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.65	1	05/02/2017 11:15	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.65	1	05/02/2017 11:15	<a href="#">WG975037</a>
(S) o-Terphenyl	65.0		18.0-148		05/02/2017 11:15	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.5		1	04/28/2017 09:54	<a href="#">WG974587</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.00113		0.000567	.98	05/03/2017 19:23	<a href="#">WG975972</a>
Toluene	ND		0.00567	.98	05/03/2017 19:23	<a href="#">WG975972</a>
Ethylbenzene	ND		0.000567	.98	05/03/2017 19:23	<a href="#">WG975972</a>
Total Xylene	0.0444		0.00170	.98	05/03/2017 19:23	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	1.32		0.113	.98	05/03/2017 19:23	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	98.3		77.0-120		05/03/2017 19:23	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	90.1		75.0-128		05/03/2017 19:23	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.63	1	05/02/2017 11:28	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.63	1	05/02/2017 11:28	<a href="#">WG975037</a>
(S) o-Terphenyl	72.6		18.0-148		05/02/2017 11:28	<a href="#">WG975037</a>





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.7		1	04/28/2017 09:54	<a href="#">WG974587</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000590	1	05/03/2017 19:45	<a href="#">WG975972</a>
Toluene	ND		0.00590	1	05/03/2017 19:45	<a href="#">WG975972</a>
Ethylbenzene	ND		0.000590	1	05/03/2017 19:45	<a href="#">WG975972</a>
Total Xylene	0.0132		0.00177	1	05/03/2017 19:45	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	0.672		0.118	1	05/03/2017 19:45	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	98.9		77.0-120		05/03/2017 19:45	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	90.1		75.0-128		05/03/2017 19:45	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	8.14		4.72	1	05/02/2017 11:42	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.72	1	05/02/2017 11:42	<a href="#">WG975037</a>
(S) o-Terphenyl	58.1		18.0-148		05/02/2017 11:42	<a href="#">WG975037</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	88.1		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.114	200	05/03/2017 23:57	<a href="#">WG975972</a>
Toluene	ND		1.14	200	05/03/2017 23:57	<a href="#">WG975972</a>
Ethylbenzene	1.59		0.114	200	05/03/2017 23:57	<a href="#">WG975972</a>
Total Xylene	31.6		0.341	200	05/03/2017 23:57	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	698		22.7	200	05/03/2017 23:57	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	103		77.0-120		05/03/2017 23:57	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		05/03/2017 23:57	<a href="#">WG975972</a>

## Sample Narrative:

8015/8021 L905176-11 WG975972: Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	120		4.54	1	05/02/2017 11:57	<a href="#">WG975037</a>
C28-C40 Oil Range	5.29		4.54	1	05/02/2017 11:57	<a href="#">WG975037</a>
(S) o-Terphenyl	67.2		18.0-148		05/02/2017 11:57	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.8		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.871		0.114	200	05/03/2017 20:29	<a href="#">WG975972</a>
Toluene	27.9		1.14	200	05/03/2017 20:29	<a href="#">WG975972</a>
Ethylbenzene	6.39		0.114	200	05/03/2017 20:29	<a href="#">WG975972</a>
Total Xylene	59.5		0.342	200	05/03/2017 20:29	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	1380		22.8	200	05/03/2017 20:29	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	90.8		77.0-120		05/03/2017 20:29	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	92.0		75.0-128		05/03/2017 20:29	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	277		4.56	1	05/02/2017 13:06	<a href="#">WG975037</a>
C28-C40 Oil Range	9.51		4.56	1	05/02/2017 13:06	<a href="#">WG975037</a>
(S) o-Terphenyl	67.5		18.0-148		05/02/2017 13:06	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	93.1		1	04/27/2017 15:28	<a href="#">WG974589</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	5.31		0.104	194	05/03/2017 20:51	<a href="#">WG975972</a>
Toluene	45.6		1.04	194	05/03/2017 20:51	<a href="#">WG975972</a>
Ethylbenzene	8.48		0.104	194	05/03/2017 20:51	<a href="#">WG975972</a>
Total Xylene	70.1		0.313	194	05/03/2017 20:51	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	1950		20.8	194	05/03/2017 20:51	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	92.3		77.0-120		05/03/2017 20:51	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	96.1		75.0-128		05/03/2017 20:51	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	240		4.30	1	05/02/2017 13:18	<a href="#">WG975037</a>
C28-C40 Oil Range	7.61		4.30	1	05/02/2017 13:18	<a href="#">WG975037</a>
(S) o-Terphenyl	70.0		18.0-148		05/02/2017 13:18	<a href="#">WG975037</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	83.7		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.00116		0.000586	.98	05/04/2017 04:25	<a href="#">WG975972</a>
Toluene	ND		0.00586	.98	05/04/2017 04:25	<a href="#">WG975972</a>
Ethylbenzene	0.0175		0.000586	.98	05/04/2017 04:25	<a href="#">WG975972</a>
Total Xylene	0.0491		0.00176	.98	05/04/2017 04:25	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	0.966		0.116	.97	05/03/2017 21:13	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	97.9		77.0-120		05/03/2017 21:13	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	100		77.0-120		05/04/2017 04:25	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	90.1		75.0-128		05/03/2017 21:13	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	91.3		75.0-128		05/04/2017 04:25	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.78	1	05/02/2017 13:33	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.78	1	05/02/2017 13:33	<a href="#">WG975037</a>
(S) o-Terphenyl	62.7		18.0-148		05/02/2017 13:33	<a href="#">WG975037</a>

1	Cp
2	Tc
3	Ss
4	Cn
5	Sr
6	Qc
7	Gl
8	Al
9	Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.8		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000529	.94	05/03/2017 23:58	<a href="#">WG975972</a>
Toluene	ND		0.00529	.94	05/03/2017 23:58	<a href="#">WG975972</a>
Ethylbenzene	ND		0.000529	.94	05/03/2017 23:58	<a href="#">WG975972</a>
Total Xylene	0.00185	<a href="#">B</a>	0.00159	.94	05/03/2017 23:58	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	ND		0.106	.94	05/03/2017 23:58	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	102		77.0-120		05/03/2017 23:58	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	92.0		75.0-128		05/03/2017 23:58	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.50	1	05/02/2017 13:46	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.50	1	05/02/2017 13:46	<a href="#">WG975037</a>
(S) o-Terphenyl	71.0		18.0-148		05/02/2017 13:46	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	89.2		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.0277	49.5	05/04/2017 18:39	<a href="#">WG975972</a>
Toluene	ND		0.277	49.5	05/04/2017 18:39	<a href="#">WG975972</a>
Ethylbenzene	ND		0.0277	49.5	05/04/2017 18:39	<a href="#">WG975972</a>
Total Xylene	2.04		0.0832	49.5	05/04/2017 18:39	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	61.8		5.55	49.5	05/04/2017 18:39	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	103		77.0-120		05/04/2017 18:39	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	93.5		75.0-128		05/04/2017 18:39	<a href="#">WG975972</a>

## Sample Narrative:

8015/8021 L905176-16 WG975972: Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	50.5		4.48	1	05/02/2017 14:00	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.48	1	05/02/2017 14:00	<a href="#">WG975037</a>
(S) o-Terphenyl	74.5		18.0-148		05/02/2017 14:00	<a href="#">WG975037</a>

1	Cp
2	Tc
3	Ss
4	Cn
5	Sr
6	Qc
7	Gl
8	Al
9	Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.6		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.0572	98	05/04/2017 19:01	<a href="#">WG975972</a>
Toluene	3.87		0.572	98	05/04/2017 19:01	<a href="#">WG975972</a>
Ethylbenzene	2.82		0.0572	98	05/04/2017 19:01	<a href="#">WG975972</a>
Total Xylene	29.7		0.172	98	05/04/2017 19:01	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	651		11.4	98	05/04/2017 19:01	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	100		77.0-120		05/04/2017 19:01	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	92.2		75.0-128		05/04/2017 19:01	<a href="#">WG975972</a>

## Sample Narrative:

8015/8021 L905176-17 WG975972: Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	147		4.67	1	05/02/2017 14:14	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.67	1	05/02/2017 14:14	<a href="#">WG975037</a>
(S) o-Terphenyl	74.3		18.0-148		05/02/2017 14:14	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	80.4		1	04/27/2017 15:28	<a href="#">WG974589</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.525		0.122	196	05/04/2017 01:05	<a href="#">WG975972</a>
Toluene	10.7		1.22	196	05/04/2017 01:05	<a href="#">WG975972</a>
Ethylbenzene	5.23		0.122	196	05/04/2017 01:05	<a href="#">WG975972</a>
Total Xylene	55.0		0.366	196	05/04/2017 01:05	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	1270		24.4	196	05/04/2017 01:05	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	92.5		77.0-120		05/04/2017 01:05	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	91.3		75.0-128		05/04/2017 01:05	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	286		4.97	1	05/02/2017 14:27	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.97	1	05/02/2017 14:27	<a href="#">WG975037</a>
(S) o-Terphenyl	72.9		18.0-148		05/02/2017 14:27	<a href="#">WG975037</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.5		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.117		0.112	198	05/04/2017 01:27	<a href="#">WG975972</a>
Toluene	10.2		1.12	198	05/04/2017 01:27	<a href="#">WG975972</a>
Ethylbenzene	4.63		0.112	198	05/04/2017 01:27	<a href="#">WG975972</a>
Total Xylene	53.1		0.335	198	05/04/2017 01:27	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	1110		22.4	198	05/04/2017 01:27	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	99.4		77.0-120		05/04/2017 01:27	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	90.9		75.0-128		05/04/2017 01:27	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	366		4.52	1	05/02/2017 14:41	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.52	1	05/02/2017 14:41	<a href="#">WG975037</a>
(S) o-Terphenyl	82.4		18.0-148		05/02/2017 14:41	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.3		1	04/27/2017 15:28	<a href="#">WG974589</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.812		0.0271	49	05/04/2017 19:24	<a href="#">WG975972</a>
Toluene	3.53		0.271	49	05/04/2017 19:24	<a href="#">WG975972</a>
Ethylbenzene	1.16		0.0271	49	05/04/2017 19:24	<a href="#">WG975972</a>
Total Xylene	12.5		0.0814	49	05/04/2017 19:24	<a href="#">WG975972</a>
TPH (GC/FID) Low Fraction	549		5.43	49	05/04/2017 19:24	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(FID)	92.4		77.0-120		05/04/2017 19:24	<a href="#">WG975972</a>
(S) a,a,a-Trifluorotoluene(PID)	91.3		75.0-128		05/04/2017 19:24	<a href="#">WG975972</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	25.6		4.43	1	05/02/2017 14:55	<a href="#">WG975037</a>
C28-C40 Oil Range	ND		4.43	1	05/02/2017 14:55	<a href="#">WG975037</a>
(S) o-Terphenyl	68.4		18.0-148		05/02/2017 14:55	<a href="#">WG975037</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.8		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000552	.98	05/03/2017 03:38	<a href="#">WG975980</a>
Toluene	ND		0.00552	.98	05/03/2017 03:38	<a href="#">WG975980</a>
Ethylbenzene	ND		0.000552	.98	05/03/2017 03:38	<a href="#">WG975980</a>
Total Xylene	0.00315	<a href="#">B</a>	0.00165	.98	05/03/2017 03:38	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	ND		0.110	.98	05/03/2017 03:38	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	101		77.0-120		05/03/2017 03:38	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	91.6		75.0-128		05/03/2017 03:38	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	7.67		4.50	1	05/01/2017 13:39	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.50	1	05/01/2017 13:39	<a href="#">WG975038</a>
(S) o-Terphenyl	94.6		18.0-148		05/01/2017 13:39	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.1		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000558	.95	05/03/2017 04:00	<a href="#">WG975980</a>
Toluene	0.00694		0.00558	.95	05/03/2017 04:00	<a href="#">WG975980</a>
Ethylbenzene	0.0352		0.000558	.95	05/03/2017 04:00	<a href="#">WG975980</a>
Total Xylene	0.442		0.00167	.95	05/03/2017 04:00	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	11.5		0.112	.95	05/03/2017 04:00	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	88.9		77.0-120		05/03/2017 04:00	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	91.0		75.0-128		05/03/2017 04:00	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	22.7		4.70	1	05/01/2017 13:53	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.70	1	05/01/2017 13:53	<a href="#">WG975038</a>
(S) o-Terphenyl	95.1		18.0-148		05/01/2017 13:53	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	84.1		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.143		0.0147	24.75	05/04/2017 02:33	<a href="#">WG975980</a>
Toluene	7.02		0.147	24.75	05/04/2017 02:33	<a href="#">WG975980</a>
Ethylbenzene	3.79		0.0147	24.75	05/04/2017 02:33	<a href="#">WG975980</a>
Total Xylene	60.2		0.883	495	05/04/2017 19:46	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	1150		58.9	495	05/04/2017 19:46	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	99.6		77.0-120		05/04/2017 19:46	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	91.5		75.0-128		05/04/2017 02:33	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	92.2		75.0-128		05/04/2017 19:46	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	97.8		4.76	1	05/01/2017 13:26	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.76	1	05/01/2017 13:26	<a href="#">WG975038</a>
(S) o-Terphenyl	91.2		18.0-148		05/01/2017 13:26	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.1		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.115	200	05/03/2017 01:03	<a href="#">WG975980</a>
Toluene	2.37		1.15	200	05/03/2017 01:03	<a href="#">WG975980</a>
Ethylbenzene	1.36		0.115	200	05/03/2017 01:03	<a href="#">WG975980</a>
Total Xylene	17.6		0.344	200	05/03/2017 01:03	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	399		23.0	200	05/03/2017 01:03	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	98.7		77.0-120		05/03/2017 01:03	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	91.0		75.0-128		05/03/2017 01:03	<a href="#">WG975980</a>

## Sample Narrative:

8015/8021 L905176-24 WG975980: Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	169		4.59	1	05/01/2017 12:58	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.59	1	05/01/2017 12:58	<a href="#">WG975038</a>
(S) o-Terphenyl	99.8		18.0-148		05/01/2017 12:58	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.4		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.252		0.113	200	05/03/2017 04:44	<a href="#">WG975980</a>
Toluene	11.5		1.13	200	05/03/2017 04:44	<a href="#">WG975980</a>
Ethylbenzene	4.43		0.113	200	05/03/2017 04:44	<a href="#">WG975980</a>
Total Xylene	47.5		0.339	200	05/03/2017 04:44	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	997		22.6	200	05/03/2017 04:44	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	94.1		77.0-120		05/03/2017 04:44	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	90.9		75.0-128		05/03/2017 04:44	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	217		4.53	1	05/01/2017 13:12	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.53	1	05/01/2017 13:12	<a href="#">WG975038</a>
(S) o-Terphenyl	99.7		18.0-148		05/01/2017 13:12	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.6		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.107		0.0141	25	05/04/2017 02:55	<a href="#">WG975980</a>
Toluene	5.72		0.141	25	05/04/2017 02:55	<a href="#">WG975980</a>
Ethylbenzene	2.14		0.0141	25	05/04/2017 02:55	<a href="#">WG975980</a>
Total Xylene	17.2		0.0423	25	05/04/2017 02:55	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	600		56.4	500	05/04/2017 20:08	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	93.1		77.0-120		05/04/2017 02:55	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	100		77.0-120		05/04/2017 20:08	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	90.5		75.0-128		05/04/2017 02:55	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	92.2		75.0-128		05/04/2017 20:08	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	51.0		4.51	1	05/01/2017 12:31	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.51	1	05/01/2017 12:31	<a href="#">WG975038</a>
(S) o-Terphenyl	98.5		18.0-148		05/01/2017 12:31	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.6		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.0252		0.000535	.97	05/03/2017 05:28	<a href="#">WG975980</a>
Toluene	0.242		0.00535	.97	05/03/2017 05:28	<a href="#">WG975980</a>
Ethylbenzene	0.0393		0.000535	.97	05/03/2017 05:28	<a href="#">WG975980</a>
Total Xylene	0.343		0.00161	.97	05/03/2017 05:28	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	5.34		0.107	.97	05/03/2017 05:28	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	88.3		77.0-120		05/03/2017 05:28	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	93.5		75.0-128		05/03/2017 05:28	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	32.9		4.41	1	05/01/2017 11:50	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.41	1	05/01/2017 11:50	<a href="#">WG975038</a>
(S) o-Terphenyl	97.0		18.0-148		05/01/2017 11:50	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.7		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.000588		0.000563	1	05/03/2017 05:50	<a href="#">WG975980</a>
Toluene	0.00605		0.00563	1	05/03/2017 05:50	<a href="#">WG975980</a>
Ethylbenzene	0.00778		0.000563	1	05/03/2017 05:50	<a href="#">WG975980</a>
Total Xylene	0.150		0.00169	1	05/03/2017 05:50	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	5.52		0.113	1	05/03/2017 05:50	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	95.5		77.0-120		05/03/2017 05:50	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	90.8		75.0-128		05/03/2017 05:50	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	5.26		4.51	1	05/01/2017 12:45	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.51	1	05/01/2017 12:45	<a href="#">WG975038</a>
(S) o-Terphenyl	72.5		18.0-148		05/01/2017 12:45	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	93.9		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	ND		0.000522	.98	05/04/2017 03:17	<a href="#">WG975980</a>
Toluene	ND		0.00522	.98	05/04/2017 03:17	<a href="#">WG975980</a>
Ethylbenzene	ND		0.000522	.98	05/04/2017 03:17	<a href="#">WG975980</a>
Total Xylene	0.00646		0.00157	.98	05/04/2017 03:17	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	ND		0.104	.98	05/04/2017 03:17	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	101		77.0-120		05/04/2017 03:17	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	91.7		75.0-128		05/04/2017 03:17	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.26	1	05/01/2017 12:18	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.26	1	05/01/2017 12:18	<a href="#">WG975038</a>
(S) o-Terphenyl	90.4		18.0-148		05/01/2017 12:18	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	93.1		1	04/27/2017 15:05	<a href="#">WG974591</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.000866		0.000521	.97	05/04/2017 03:40	<a href="#">WG975980</a>
Toluene	ND		0.00521	.97	05/04/2017 03:40	<a href="#">WG975980</a>
Ethylbenzene	ND		0.000521	.97	05/04/2017 03:40	<a href="#">WG975980</a>
Total Xylene	0.00464		0.00156	.97	05/04/2017 03:40	<a href="#">WG975980</a>
TPH (GC/FID) Low Fraction	ND		0.104	.97	05/04/2017 03:40	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(FID)	101		77.0-120		05/04/2017 03:40	<a href="#">WG975980</a>
(S) a,a,a-Trifluorotoluene(PID)	92.0		75.0-128		05/04/2017 03:40	<a href="#">WG975980</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.30	1	05/01/2017 12:04	<a href="#">WG975038</a>
C28-C40 Oil Range	ND		4.30	1	05/01/2017 12:04	<a href="#">WG975038</a>
(S) o-Terphenyl	98.4		18.0-148		05/01/2017 12:04	<a href="#">WG975038</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R3214456-1 04/28/17 09:54

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.000			

L905176-01 Original Sample (OS) • Duplicate (DUP)

(OS) L905176-01 04/28/17 09:54 • (DUP) R3214456-3 04/28/17 09:54

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	80.9	80.5	1	0.435		5

Laboratory Control Sample (LCS)

(LCS) R3214456-2 04/28/17 09:54

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	%	%	%	%	
Total Solids	50.0	50.0	99.9	85.0-115	

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R3214213-1 04/27/17 15:28

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.00140			

L905176-11 Original Sample (OS) • Duplicate (DUP)

(OS) L905176-11 04/27/17 15:28 • (DUP) R3214213-3 04/27/17 15:28

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	88.1	88.1	1	0.0446		5

Laboratory Control Sample (LCS)

(LCS) R3214213-2 04/27/17 15:28

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	%	%	%	%	
Total Solids	50.0	50.0	99.9	85.0-115	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

[L905176-21,22,23,24,25,26,27,28,29,30](#)

Method Blank (MB)

(MB) R3214212-1 04/27/17 15:05

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	%		%	%
Total Solids	0.000			

L905176-21 Original Sample (OS) • Duplicate (DUP)

(OS) L905176-21 04/27/17 15:05 • (DUP) R3214212-3 04/27/17 15:05

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	%	%		%		%
Total Solids	88.8	90.0	1	1.30		5

Laboratory Control Sample (LCS)

(LCS) R3214212-2 04/27/17 15:05

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc





Method Blank (MB)

(MB) R3215427-5 05/03/17 12:29

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000402	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 102			77.0-120	
(S) a,a,a-Trifluorotoluene(PID) 93.8			75.0-128	

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3215427-1 05/03/17 10:40 • (LCSD) R3215427-2 05/03/17 11:01

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0535	0.0504	107	101	71.0-121			6.04	20
Toluene	0.0500	0.0540	0.0500	108	99.9	72.0-120			7.69	20
Ethylbenzene	0.0500	0.0555	0.0522	111	104	76.0-121			6.08	20
Total Xylene	0.150	0.176	0.163	117	109	75.0-124			7.44	20
(S) a,a,a-Trifluorotoluene(FID)				101	102	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				99.4	101	75.0-128				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3215427-3 05/03/17 11:23 • (LCSD) R3215427-4 05/03/17 11:45

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.23	6.22	113	113	70.0-136			0.150	20
(S) a,a,a-Trifluorotoluene(FID)				104	102	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				111	110	75.0-128				

L905176-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905176-03 05/03/17 13:29 • (MS) R3215427-6 05/03/17 13:51 • (MSD) R3215427-7 05/03/17 15:23

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0549	ND	10.7	11.4	97.0	104	200	10.0-146			7.19	29
Toluene	0.0549	ND	10.6	11.4	95.4	103	200	10.0-143			7.45	30
Ethylbenzene	0.0549	0.403	11.3	12.1	98.8	106	200	10.0-147			7.07	31
Total Xylene	0.165	2.11	37.1	40.4	106	116	200	10.0-149			8.50	30

L905176-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905176-03 05/03/17 13:29 • (MS) R3215427-6 05/03/17 13:51 • (MSD) R3215427-7 05/03/17 15:23

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(FID)					103	102		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					99.8	98.6		75.0-128				

L905176-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905176-03 05/03/17 13:29 • (MS) R3215427-8 05/03/17 15:44 • (MSD) R3215427-9 05/03/17 16:06

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	6.04	401	1620	1600	101	99.4	200	10.0-147			1.03	30
(S) a,a,a-Trifluorotoluene(FID)					104	104		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					111	111		75.0-128				

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3215147-5 05/02/17 22:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000254	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 102				77.0-120
(S) a,a,a-Trifluorotoluene(PID) 94.2				75.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3215147-1 05/02/17 20:38 • (LCSD) R3215147-2 05/02/17 21:00

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0470	0.0517	94.0	103	71.0-121			9.51	20
Toluene	0.0500	0.0465	0.0514	93.1	103	72.0-120			9.90	20
Ethylbenzene	0.0500	0.0483	0.0533	96.6	107	76.0-121			9.78	20
Total Xylene	0.150	0.151	0.166	101	110	75.0-124			9.29	20
(S) a,a,a-Trifluorotoluene(FID)				100	102	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				99.3	101	75.0-128				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3215147-3 05/02/17 21:22 • (LCSD) R3215147-4 05/02/17 21:44

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.35	6.28	115	114	70.0-136			1.17	20
(S) a,a,a-Trifluorotoluene(FID)				102	103	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				110	111	75.0-128				

L905176-24 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905176-24 05/03/17 01:03 • (MS) R3215147-6 05/02/17 23:12 • (MSD) R3215147-7 05/02/17 23:35

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0574	ND	11.0	11.9	95.1	103	200	10.0-146			8.28	29
Toluene	0.0574	2.37	13.0	13.9	92.8	101	200	10.0-143			6.60	30
Ethylbenzene	0.0574	1.36	12.7	13.6	98.6	107	200	10.0-147			7.18	31
Total Xylene	0.172	17.6	46.1	48.3	83.0	89.4	200	10.0-149			4.62	30



L905176-24 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905176-24 05/03/17 01:03 • (MS) R3215147-6 05/02/17 23:12 • (MSD) R3215147-7 05/02/17 23:35

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(FID)					98.9	100		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					98.5	101		75.0-128				

L905176-24 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905176-24 05/03/17 01:03 • (MS) R3215147-8 05/02/17 23:57 • (MSD) R3215147-9 05/03/17 00:19

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	6.31	399	1890	1870	118	117	200	10.0-147			0.870	30
(S) a,a,a-Trifluorotoluene(FID)					104	104		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					111	111		75.0-128				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3214911-1 05/02/17 08:44

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	70.1			18.0-148

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3214911-2 05/02/17 08:58 • (LCSD) R3214911-3 05/02/17 09:11

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	48.8	46.2	81.3	76.9	50.0-150			5.50	20
(S) o-Terphenyl				77.1	64.3	18.0-148				

L905176-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905176-01 05/02/17 09:26 • (MS) R3214911-4 05/02/17 09:39 • (MSD) R3214911-5 05/02/17 09:53

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	74.2	ND	62.8	61.8	84.6	83.3	1	50.0-150			1.54	20
(S) o-Terphenyl					70.5	71.9		18.0-148				

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc



Method Blank (MB)

(MB) R3214627-1 05/01/17 09:42

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	102			18.0-148

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3214627-2 05/01/17 09:56 • (LCSD) R3214627-3 05/01/17 10:10

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	48.2	48.2	80.3	80.4	50.0-150			0.110	20
(S) o-Terphenyl				106	98.3	18.0-148				

L905386-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L905386-01 05/01/17 17:32 • (MS) R3214627-4 05/01/17 17:45 • (MSD) R3214627-5 05/01/17 18:00

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	67.3	480	512	499	47.6	27.0	1	50.0-150	EV	EV	2.74	20
(S) o-Terphenyl					115	119		18.0-148				



## Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL (dry)	Reported Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

## Qualifier      Description

B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
V	The sample concentration is too high to evaluate accurate spike recoveries.

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

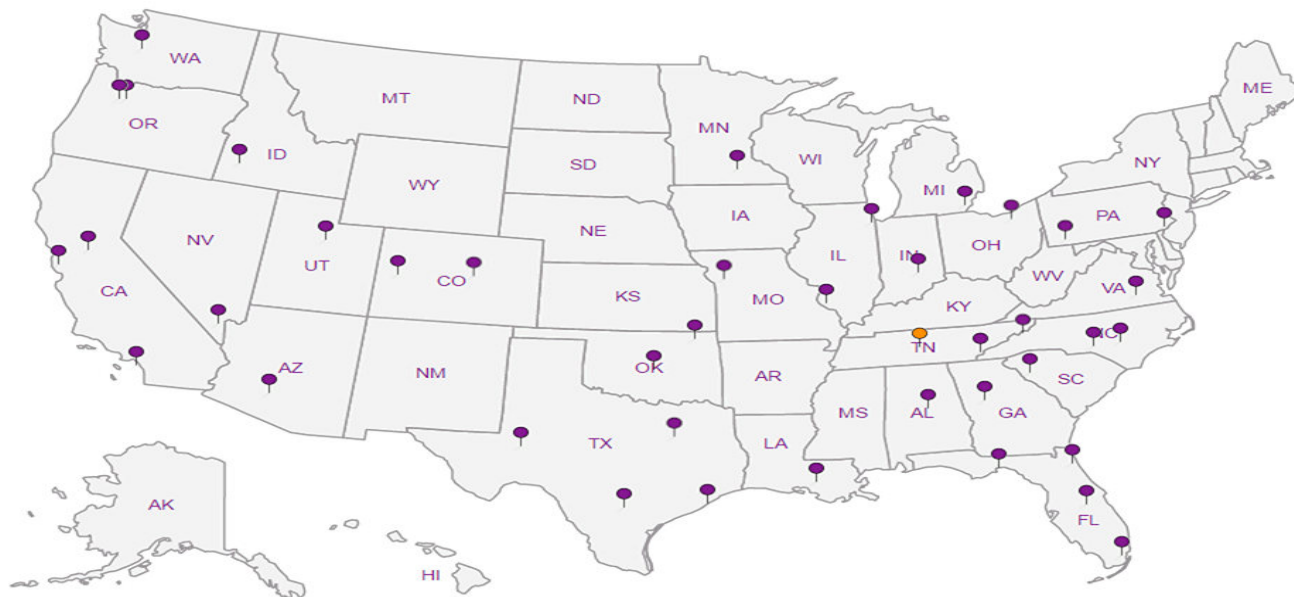


- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc




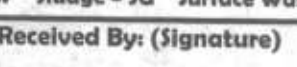
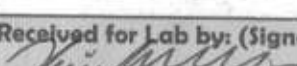
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Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina <sup>1</sup>	DW21704
Florida	E87487	North Carolina <sup>2</sup>	41
Georgia	NELAP	North Dakota	R-140
Georgia <sup>1</sup>	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky <sup>1</sup>	90010	South Dakota	n/a
Kentucky <sup>2</sup>	16	Tennessee <sup>14</sup>	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

A2LA – ISO 17025	1461.01	AIHA-LAP, LLC	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA-Crypto	IN00003		

## Our Locations





		Quote Number		Page <u>1</u> of <u>3</u>		Analysis						Lab Information	
		XTO Contact <u>James McDaniel</u>		XTO Contact Phone # <u>(505) 419-0915</u>									
		Well Site/Location <u>OH Ranch #5 OH Parcel #5</u>		Email Results to: <u>james.mcdaniel@xtoenergy.com</u> <u>dhenemann@henv.com</u> <u>logan-hixon@xtoenergy.com</u> <u>dburns@henv.com</u>		BTEX-8021 TPH (GRO, DRO, HRO)-8015						<b>Office Abbreviations</b> Farmington = FAR Durango = DUR Bakken = BAK Raton = RAT Piceance = PC Roosevelt = RSV La Barge = LB Orangeville = OV	
		Collected By <u>D. Burns</u>		API Number									
Company <u>LT Environmental</u>		Samples on Ice <u>(N)</u>		Turnaround <u>X</u> Standard Next Day Two Day Three Day Std. 5 Bus. Days (by contract)									
Signature 		QA/QC Requested		Date Needed									
Gray Areas for Lab Use Only!													
Sample ID	Sample Name	Media	Date	Time	Preservative	No. of Conts.							Sample Number
BH-11 @ 20'-25'		Soil	4/19/17	1215	Cool	2	X	X					L905176-01
BH-12 @ 0'-10'			4/19/17	1300		2							02
BH-12 @ 10'-15'			4/19/17	1315		2							03
BH-12 @ 15'-20'			4/19/17	1325		2							04
BH-12 @ 20'-25'			4/19/17	1340		2							05
BH-12 @ 25'-30'			4/19/17	1400		2							06
BH-12 @ 30'-35'			4/19/17	1435		2							07
BH-13 @ 0'-10'			4/19/17	1540		2							08
BH-13 @ 10'-15'			4/19/17	1550		2							09
BH-13 @ 15'-20'			4/19/17	1600		2							10
BH-13 @ 20'-25'			4/19/17	1610		2							11
BH-13 @ 25'-30'			4/19/17	1620		2							12
BH-13 @ 30'-35'		↓	4/19/17	1635	↓	2	↓	↓					13
Media: Filter = F Soil = S Wastewater = WW Groundwater = GW Drinking Water = DW Sludge = SG Surface Water = SW Air = A Drill Mud = DM Other = OT													
Relinquished By: (Signature) 		Date: 4-25-17		Time: 14:00		Received By: (Signature) 		Number of Bottles		Sample Condition			
Relinquished By: (Signature)		Date:		Time:		Received By: (Signature)		Temperature: 24°C		Other Information			
Relinquished By: (Signature)		Date:		Time:		Received for Lab by: (Signature) 		Date: 4-26-17		Time: 8:45			
Comments													

\* Sample ID will be the office and sampler-date-military time FARJM-MMDDYY-1200

Count: 60 = 402

COSEF JON

0189



Quote Number

Page 2 of 3

XTO Contact

James McDaniel

XTO Contact Phone #

(505) 419-0915

Email Results to:

james.mcdaniel@xtoenergy.com | dhencmann@ltenv.com  
logan.hixon@xtoenergy.com | dburns@ltenv.com

Analysis

Lab Information

Office Abbreviations

Farmington = FAR  
Durango = DUR  
Bakken = BAK  
Raton = RAT  
Piceance = PC  
Roosevelt = RSV  
La Barge = LB  
Orangeville = OVWell Site/Location  
OH Bundle #5 OH Bundle #5

Collected By

D. Burns

Company

LT Environmental

Signature

API Number

Samples on Ice

(D/N)

QA/QC Requested

Gray Areas for Lab Use Only!

Test Reason  
Confirmation Soil Sample  
Turnaround☒ Standard  
☐ Next Day  
☐ Two Day  
☐ Three Day  
☐ Std. 5 Bus. Days (by contract)  
Date NeededBTEX-8021  
TPH (GRO, DRO, HRO) - 8015

Sample ID	Sample Name	Media	Date	Time	Preservative	No. of Conts.							Sample Number
BH-14 @ 15'-20'		Soil	4/20/17	0930	Cool	2	X	X					L905176-14
BH-14 @ 20'-25'			4/20/17	0945									15
BH-15 @ 0'-10'			4/20/17	1130									16
BH-15 @ 10'-15'			4/20/17	1140									17
BH-15 @ 15'-20'			4/20/17	1145									18
BH-15 @ 20'-25'			4/20/17	1200									19
BH-15 @ 30'-32'			4/20/17	1320									20
BH-16 @ 0'-10'			4/20/17	1420									21
BH-16 @ 10'-15'			4/20/17	1430									22
BH-16 @ 15'-20'			4/20/17	1440									23
BH-16 @ 23'-25'			4/20/17	1515									24
BH-16 @ 25'-27'			4/20/17	1530									25
BH-16 @ 27'-29'			4/20/17	1540									26

Media: Filter = F Soil = S Wastewater = WW Groundwater = GW Drinking Water = DW Sludge = SG Surface Water = SW Air = A Drill Mud = DM Other = OT

Relinquished By: (Signature)	Date: 4-25-17	Time: 14:00	Received By: (Signature)	Number of Bottles	Sample Condition
Relinquished By: (Signature)	Date:	Time:	Received By: (Signature)	Temperature: 21°C	
Relinquished By: (Signature)	Date:	Time:	Received for Lab by: (Signature)	Date: 4-26-17	Time: 845

Comments

CocSE

Toll

\* Sample ID will be the office and sampler-date-military time FARJM-MMDDYY-1200

count: 60 = 482

0190



Quote Number

Page 3 of 3

Analysis

Lab Information

XTO Contact

James McDaniel

XTO Contact Phone #

(505) 419-0915

Email Results to:

james.mcdaniel@xtoenergy.com | dhencmann@tenv.com  
loganhixon@xtoenergy.com | dburns@tenv.com

API Number

Test Reason

Confirmation Soil Sample

Collected By

Samples on Ice

(Y/N)

Turnaround

Company

QA/QC Requested

☒ Standard☐ Next Day☐ Two Day☐ Three Day☐ Std. 5 Bus. Days (by contract)

Gray Areas for Lab Use Only!

Date Needed

Sample ID

Sample Name

Media

Date

Time

Preservative

No. of  
Conts.

Sample Number

BH-16 @ 33'-35'

Soil

4/20/17

1405

Cool

2

L905176-27

BH-17 @ 20'-25'

↓

4/21/17

1030

↓

↓

28

BH-18 @ 30'-32'

↓

4/21/17

0900

↓

↓

29

BH-19 @ 30'-35'

↓

4/24/17

1025

↓

↓

30

Media: Filter = F Soil = S Wastewater = WW Groundwater = GW Drinking Water = DW Sludge = SG Surface Water = SW Air = A Drill Mud = DM Other = OT

Relinquished By: (Signature)

Date:

4-25-17

Time:

14:00

Received By: (Signature)

Number of Bottles

Sample Condition

Relinquished By: (Signature)

Date:

Time:

Received By: (Signature)

Temperature:

21.2

Other Information

Relinquished By: (Signature)

Date:

Time:

Received for Lab by: (Signature)

Date:

4-26-17

Time:

8:15

Comments

COC SE


7011

\* Sample ID will be the office and sampler-date-military time FARJM-MMDDYY-1200

0191

Count: 60 = 102

## ESC LAB SCIENCES Cooler Receipt Form

Client:	XTORN	SDG#	L905176	
Cooler Received/Opened On:	4/26/17	Temperature:	26	
Received By: Rickey Mosley				
Signature: 				
<b>Receipt Check List</b>	<b>NP</b>	<b>Yes</b>	<b>No</b>	
COC Seal Present / Intact?		/		
COC Signed / Accurate?		/		
Bottles arrive intact?		/		
Correct bottles used?		/		
Sufficient volume sent?		/		
If Applicable				
VOA Zero headspace?		/		
Preservation Correct / Checked?				



## XTO Energy - San Juan Division

Sample Delivery Group: L931528  
Samples Received: 08/24/2017  
Project Number: 30-045-05964  
Description: OH Randel #5

Report To: James McDaniel  
382 County Road 3100  
Aztec, NM 87410

Entire Report Reviewed By:



Daphne Richards  
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



Cp: Cover Page	1	<sup>1</sup> Cp
Tc: Table of Contents	2	
Ss: Sample Summary	3	<sup>2</sup> Tc
Cn: Case Narrative	6	
Sr: Sample Results	7	<sup>3</sup> Ss
FARMW-82117-1010 L931528-01	7	
FARMW-82117-1125 L931528-02	8	<sup>4</sup> Cn
FARMW-82217-1100 L931528-03	9	<sup>5</sup> Sr
FARMW-82117-1300 L931528-04	10	
FARMW-82117-1310 L931528-05	11	<sup>6</sup> Qc
FARMW-82117-1325 L931528-06	12	
FARMW-82117-1335 L931528-07	13	<sup>7</sup> Gl
FARMW-82117-1010 L931528-08	14	<sup>8</sup> Al
FARMW-82117-1505 L931528-09	15	
FARMW-82117-1550 L931528-10	16	<sup>9</sup> Sc
FARMW-82217-1310 L931528-11	17	
FARMW-82217-1325 L931528-12	18	
FARMW-82217-1450 L931528-13	19	
FARMW-82217-1320 L931528-14	20	
FARMW-82217-1530 L931528-15	21	
FARMW-82217-1550 L931528-16	22	
FARMW-82217-1025 L931528-17	23	
Qc: Quality Control Summary	24	
Total Solids by Method 2540 G-2011	24	
Volatile Organic Compounds (GC) by Method 8015/8021	27	
Semi-Volatile Organic Compounds (GC) by Method 8015	28	
Gl: Glossary of Terms	29	
Al: Accreditations & Locations	30	
Sc: Chain of Custody	31	



## FARMW-82117-1010 L931528-01 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 10:10  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013214	1	08/24/17 12:32	08/24/17 12:43	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	25	08/24/17 10:52	08/25/17 13:22	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/25/17 14:20	ACM

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## FARMW-82117-1125 L931528-02 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 11:25  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013214	1	08/24/17 12:32	08/24/17 12:43	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1000	08/24/17 10:52	08/25/17 01:18	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	10	08/25/17 00:37	08/25/17 20:00	DMG

## FARMW-82217-1100 L931528-03 Solid

Collected by  
Collected date/time  
Received date/time

08/22/17 11:00  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013214	1	08/24/17 12:32	08/24/17 12:43	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1000	08/24/17 10:52	08/25/17 01:40	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/25/17 14:35	ACM
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	5	08/25/17 00:37	08/25/17 20:29	DMG

## FARMW-82117-1300 L931528-04 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 13:00  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013214	1	08/24/17 12:32	08/24/17 12:43	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1000	08/24/17 10:52	08/25/17 02:02	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/25/17 15:18	ACM
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	5	08/25/17 00:37	08/25/17 21:11	DMG

## FARMW-82117-1310 L931528-05 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 13:10  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013214	1	08/24/17 12:32	08/24/17 12:43	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1000	08/24/17 10:52	08/25/17 02:24	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/25/17 15:32	ACM

## FARMW-82117-1325 L931528-06 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 13:25  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013214	1	08/24/17 12:32	08/24/17 12:43	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	500	08/24/17 10:52	08/25/17 02:47	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	5	08/25/17 00:37	08/25/17 17:25	DMG

# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## FARMW-82117-1335 L931528-07 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 13:35  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1000	08/24/17 10:52	08/25/17 03:09	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	10	08/25/17 00:37	08/25/17 20:14	DMG

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

## FARMW-82117-1010 L931528-08 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 16:10  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1000	08/24/17 10:52	08/25/17 03:31	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	5	08/25/17 00:37	08/25/17 17:39	DMG

## FARMW-82117-1505 L931528-09 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 15:05  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	25	08/24/17 10:52	08/25/17 13:44	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	5	08/25/17 00:37	08/25/17 17:53	DMG

## FARMW-82117-1550 L931528-10 Solid

Collected by  
Collected date/time  
Received date/time

08/21/17 15:50  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	200	08/24/17 10:52	08/25/17 14:07	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	5	08/25/17 00:37	08/25/17 18:07	DMG

## FARMW-82217-1310 L931528-11 Solid

Collected by  
Collected date/time  
Received date/time

08/22/17 13:10  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1	08/24/17 10:52	08/25/17 14:29	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/26/17 06:11	DMG

## FARMW-82217-1325 L931528-12 Solid

Collected by  
Collected date/time  
Received date/time

08/22/17 13:25  
08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1	08/24/17 10:52	08/25/17 05:00	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/26/17 06:25	DMG

ACCOUNT:

XTO Energy - San Juan Division

PROJECT:

30-045-05964

SDG:

L931528

DATE/TIME:

08/29/17 14:54

PAGE:

4 of 33



# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



FARMW-82217-1450 L931528-13 Solid

Collected by

Collected date/time

Received date/time

08/22/17 14:50

08/24/17 08:45

<sup>1</sup>Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	25	08/24/17 10:52	08/25/17 14:51	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/26/17 06:38	DMG

<sup>2</sup>Tc

<sup>3</sup>Ss

FARMW-82217-1320 L931528-14 Solid

Collected by

Collected date/time

Received date/time

08/22/17 13:20

08/24/17 08:45

<sup>4</sup>Cn

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	500	08/24/17 10:52	08/25/17 05:44	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	5	08/25/17 00:37	08/25/17 19:04	DMG

<sup>5</sup>Sr

<sup>6</sup>Qc

FARMW-82217-1530 L931528-15 Solid

Collected by

Collected date/time

Received date/time

08/22/17 15:30

08/24/17 08:45

<sup>7</sup>Gl

<sup>8</sup>Al

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1	08/24/17 10:52	08/25/17 15:13	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/26/17 09:29	DMG

<sup>9</sup>Sc

FARMW-82217-1550 L931528-16 Solid

Collected by

Collected date/time

Received date/time

08/22/17 15:50

08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013216	1	08/24/17 11:59	08/24/17 12:16	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1	08/24/17 10:52	08/25/17 15:35	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/26/17 09:43	DMG

FARMW-82217-1025 L931528-17 Solid

Collected by

Collected date/time

Received date/time

08/22/17 10:25

08/24/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1013217	1	08/24/17 12:16	08/24/17 12:29	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1013435	1000	08/24/17 10:52	08/25/17 06:29	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1013319	1	08/25/17 00:37	08/26/17 14:57	DMG

ACCOUNT:

XTO Energy - San Juan Division

PROJECT:

30-045-05964

SDG:

L931528

DATE/TIME:

08/29/17 14:54

PAGE:

5 of 33



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne Richards  
Technical Service Representative

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.0		1	08/24/2017 12:43	<a href="#">WG1013214</a>

1  
Cp2  
Tc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0138		0.0125	25	08/25/2017 13:22	<a href="#">WG1013435</a>
Toluene	ND		0.125	25	08/25/2017 13:22	<a href="#">WG1013435</a>
Ethylbenzene	ND		0.0125	25	08/25/2017 13:22	<a href="#">WG1013435</a>
Total Xylene	2.34		0.0375	25	08/25/2017 13:22	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	96.9		2.50	25	08/25/2017 13:22	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	95.1		77.0-120		08/25/2017 13:22	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	106		75.0-128		08/25/2017 13:22	<a href="#">WG1013435</a>

3  
Ss4  
Cn5  
Sr6  
Qc7  
Gl

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	150		4.00	1	08/25/2017 14:20	<a href="#">WG1013319</a>
C28-C40 Oil Range	13.8		4.00	1	08/25/2017 14:20	<a href="#">WG1013319</a>
(S) o-Terphenyl	96.5		18.0-148		08/25/2017 14:20	<a href="#">WG1013319</a>

8  
Al9  
Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.6		1	08/24/2017 12:43	<a href="#">WG1013214</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	21.1		0.500	1000	08/25/2017 01:18	<a href="#">WG1013435</a>
Toluene	125		5.00	1000	08/25/2017 01:18	<a href="#">WG1013435</a>
Ethylbenzene	18.8		0.500	1000	08/25/2017 01:18	<a href="#">WG1013435</a>
Total Xylene	152		1.50	1000	08/25/2017 01:18	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	4170		100	1000	08/25/2017 01:18	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	89.8		77.0-120		08/25/2017 01:18	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	104		75.0-128		08/25/2017 01:18	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-02 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	421		40.0	10	08/25/2017 20:00	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		40.0	10	08/25/2017 20:00	<a href="#">WG1013319</a>
(S) o-Terphenyl	85.2		18.0-148		08/25/2017 20:00	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	92.8		1	08/24/2017 12:43	<a href="#">WG1013214</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	2.26		0.500	1000	08/25/2017 01:40	<a href="#">WG1013435</a>
Toluene	32.9		5.00	1000	08/25/2017 01:40	<a href="#">WG1013435</a>
Ethylbenzene	9.64		0.500	1000	08/25/2017 01:40	<a href="#">WG1013435</a>
Total Xylene	80.8		1.50	1000	08/25/2017 01:40	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	1600		100	1000	08/25/2017 01:40	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	81.2		77.0-120		08/25/2017 01:40	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	106		75.0-128		08/25/2017 01:40	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-03 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	392	<u>V</u>	20.0	5	08/25/2017 20:29	<a href="#">WG1013319</a>
C28-C40 Oil Range	9.83		4.00	1	08/25/2017 14:35	<a href="#">WG1013319</a>
(S) o-Terphenyl	106		18.0-148		08/25/2017 14:35	<a href="#">WG1013319</a>
(S) o-Terphenyl	87.5		18.0-148		08/25/2017 20:29	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.0		1	08/24/2017 12:43	<a href="#">WG1013214</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	ND		0.500	1000	08/25/2017 02:02	<a href="#">WG1013435</a>
Toluene	5.39		5.00	1000	08/25/2017 02:02	<a href="#">WG1013435</a>
Ethylbenzene	ND		0.500	1000	08/25/2017 02:02	<a href="#">WG1013435</a>
Total Xylene	81.7		1.50	1000	08/25/2017 02:02	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	1710		100	1000	08/25/2017 02:02	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	93.4		77.0-120		08/25/2017 02:02	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		08/25/2017 02:02	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-04 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	457		20.0	5	08/25/2017 21:11	<a href="#">WG1013319</a>
C28-C40 Oil Range	14.0		4.00	1	08/25/2017 15:18	<a href="#">WG1013319</a>
(S) o-Terphenyl	90.5		18.0-148		08/25/2017 21:11	<a href="#">WG1013319</a>
(S) o-Terphenyl	88.8		18.0-148		08/25/2017 15:18	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.6		1	08/24/2017 12:43	<a href="#">WG1013214</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	2.47		0.500	1000	08/25/2017 02:24	<a href="#">WG1013435</a>
Toluene	29.1		5.00	1000	08/25/2017 02:24	<a href="#">WG1013435</a>
Ethylbenzene	8.57		0.500	1000	08/25/2017 02:24	<a href="#">WG1013435</a>
Total Xylene	72.7		1.50	1000	08/25/2017 02:24	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	1880		100	1000	08/25/2017 02:24	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	89.8		77.0-120		08/25/2017 02:24	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		08/25/2017 02:24	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-05 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	325		4.00	1	08/25/2017 15:32	<a href="#">WG1013319</a>
C28-C40 Oil Range	8.88		4.00	1	08/25/2017 15:32	<a href="#">WG1013319</a>
(S) o-Terphenyl	95.3		18.0-148		08/25/2017 15:32	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	79.3		1	08/24/2017 12:43	<a href="#">WG1013214</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	28.1		0.250	500	08/25/2017 02:47	<a href="#">WG1013435</a>
Toluene	123		2.50	500	08/25/2017 02:47	<a href="#">WG1013435</a>
Ethylbenzene	13.9		0.250	500	08/25/2017 02:47	<a href="#">WG1013435</a>
Total Xylene	114		0.750	500	08/25/2017 02:47	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	3620		50.0	500	08/25/2017 02:47	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	85.8		77.0-120		08/25/2017 02:47	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	102		75.0-128		08/25/2017 02:47	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-06 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	95.8		20.0	5	08/25/2017 17:25	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		20.0	5	08/25/2017 17:25	<a href="#">WG1013319</a>
(S) o-Terphenyl	80.0		18.0-148		08/25/2017 17:25	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	91.7		1	08/24/2017 12:16	<a href="#">WG1013216</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	10.3		0.500	1000	08/25/2017 03:09	<a href="#">WG1013435</a>
Toluene	131		5.00	1000	08/25/2017 03:09	<a href="#">WG1013435</a>
Ethylbenzene	26.8		0.500	1000	08/25/2017 03:09	<a href="#">WG1013435</a>
Total Xylene	219		1.50	1000	08/25/2017 03:09	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	4810		100	1000	08/25/2017 03:09	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	90.4		77.0-120		08/25/2017 03:09	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		08/25/2017 03:09	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-07 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	842		40.0	10	08/25/2017 20:14	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		40.0	10	08/25/2017 20:14	<a href="#">WG1013319</a>
(S) o-Terphenyl	88.1		18.0-148		08/25/2017 20:14	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	81.6		1	08/24/2017 12:16	<a href="#">WG1013216</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	3.50		0.500	1000	08/25/2017 03:31	<a href="#">WG1013435</a>
Toluene	25.6		5.00	1000	08/25/2017 03:31	<a href="#">WG1013435</a>
Ethylbenzene	4.42		0.500	1000	08/25/2017 03:31	<a href="#">WG1013435</a>
Total Xylene	39.3		1.50	1000	08/25/2017 03:31	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	1250		100	1000	08/25/2017 03:31	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	90.6		77.0-120		08/25/2017 03:31	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		08/25/2017 03:31	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-08 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	92.7		20.0	5	08/25/2017 17:39	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		20.0	5	08/25/2017 17:39	<a href="#">WG1013319</a>
(S) o-Terphenyl	70.5		18.0-148		08/25/2017 17:39	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.9		1	08/24/2017 12:16	<a href="#">WG1013216</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0142		0.0125	25	08/25/2017 13:44	<a href="#">WG1013435</a>
Toluene	ND		0.125	25	08/25/2017 13:44	<a href="#">WG1013435</a>
Ethylbenzene	ND		0.0125	25	08/25/2017 13:44	<a href="#">WG1013435</a>
Total Xylene	0.859		0.0375	25	08/25/2017 13:44	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	82.5		2.50	25	08/25/2017 13:44	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	92.8		77.0-120		08/25/2017 13:44	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	106		75.0-128		08/25/2017 13:44	<a href="#">WG1013435</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	64.1		20.0	5	08/25/2017 17:53	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		20.0	5	08/25/2017 17:53	<a href="#">WG1013319</a>
(S) o-Terphenyl	88.0		18.0-148		08/25/2017 17:53	<a href="#">WG1013319</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	90.9		1	08/24/2017 12:16	<a href="#">WG1013216</a>

1  
Cp2  
Tc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.841		0.100	200	08/25/2017 14:07	<a href="#">WG1013435</a>
Toluene	22.7		1.00	200	08/25/2017 14:07	<a href="#">WG1013435</a>
Ethylbenzene	7.02		0.100	200	08/25/2017 14:07	<a href="#">WG1013435</a>
Total Xylene	58.4		0.300	200	08/25/2017 14:07	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	1430		20.0	200	08/25/2017 14:07	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	88.9		77.0-120		08/25/2017 14:07	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	104		75.0-128		08/25/2017 14:07	<a href="#">WG1013435</a>

3  
Ss4  
Cn5  
Sr6  
Qc7  
Gl

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	360		20.0	5	08/25/2017 18:07	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		20.0	5	08/25/2017 18:07	<a href="#">WG1013319</a>
(S) o-Terphenyl	92.0		18.0-148		08/25/2017 18:07	<a href="#">WG1013319</a>

8  
Al9  
Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.8		1	08/24/2017 12:16	<a href="#">WG1013216</a>

1 Cp

2 Tc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.0192		0.000500	1	08/25/2017 14:29	<a href="#">WG1013435</a>
Toluene	0.0386		0.00500	1	08/25/2017 14:29	<a href="#">WG1013435</a>
Ethylbenzene	0.00242		0.000500	1	08/25/2017 14:29	<a href="#">WG1013435</a>
Total Xylene	0.0229		0.00150	1	08/25/2017 14:29	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	0.470		0.100	1	08/25/2017 14:29	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	93.5		77.0-120		08/25/2017 14:29	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	102		75.0-128		08/25/2017 14:29	<a href="#">WG1013435</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	08/26/2017 06:11	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		4.00	1	08/26/2017 06:11	<a href="#">WG1013319</a>
(S) o-Terphenyl	94.6		18.0-148		08/26/2017 06:11	<a href="#">WG1013319</a>

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.6		1	08/24/2017 12:16	<a href="#">WG1013216</a>

1 Cp

2 Tc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00512		0.000500	1	08/25/2017 05:00	<a href="#">WG1013435</a>
Toluene	0.0102		0.00500	1	08/25/2017 05:00	<a href="#">WG1013435</a>
Ethylbenzene	0.00133	B	0.000500	1	08/25/2017 05:00	<a href="#">WG1013435</a>
Total Xylene	0.00697	B	0.00150	1	08/25/2017 05:00	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	0.195		0.100	1	08/25/2017 05:00	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	94.7		77.0-120		08/25/2017 05:00	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	103		75.0-128		08/25/2017 05:00	<a href="#">WG1013435</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	08/26/2017 06:25	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		4.00	1	08/26/2017 06:25	<a href="#">WG1013319</a>
(S) o-Terphenyl	106		18.0-148		08/26/2017 06:25	<a href="#">WG1013319</a>

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.5		1	08/24/2017 12:16	<a href="#">WG1013216</a>

1 Cp

2 Tc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.276		0.0125	25	08/25/2017 14:51	<a href="#">WG1013435</a>
Toluene	0.517		0.125	25	08/25/2017 14:51	<a href="#">WG1013435</a>
Ethylbenzene	0.517		0.0125	25	08/25/2017 14:51	<a href="#">WG1013435</a>
Total Xylene	3.80		0.0375	25	08/25/2017 14:51	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	180		2.50	25	08/25/2017 14:51	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	89.6		77.0-120		08/25/2017 14:51	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	103		75.0-128		08/25/2017 14:51	<a href="#">WG1013435</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	40.8		4.00	1	08/26/2017 06:38	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		4.00	1	08/26/2017 06:38	<a href="#">WG1013319</a>
(S) o-Terphenyl	92.9		18.0-148		08/26/2017 06:38	<a href="#">WG1013319</a>

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.7		1	08/24/2017 12:16	<a href="#">WG1013216</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.462		0.250	500	08/25/2017 05:44	<a href="#">WG1013435</a>
Toluene	4.82		2.50	500	08/25/2017 05:44	<a href="#">WG1013435</a>
Ethylbenzene	3.17		0.250	500	08/25/2017 05:44	<a href="#">WG1013435</a>
Total Xylene	37.4		0.750	500	08/25/2017 05:44	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	1000		50.0	500	08/25/2017 05:44	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	88.3		77.0-120		08/25/2017 05:44	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		08/25/2017 05:44	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-14 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	483		20.0	5	08/25/2017 19:04	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		20.0	5	08/25/2017 19:04	<a href="#">WG1013319</a>
(S) o-Terphenyl	88.5		18.0-148		08/25/2017 19:04	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.0		1	08/24/2017 12:16	<a href="#">WG1013216</a>

1  
Cp2  
Tc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00431		0.000500	1	08/25/2017 15:13	<a href="#">WG1013435</a>
Toluene	0.00854		0.00500	1	08/25/2017 15:13	<a href="#">WG1013435</a>
Ethylbenzene	ND		0.000500	1	08/25/2017 15:13	<a href="#">WG1013435</a>
Total Xylene	0.00915		0.00150	1	08/25/2017 15:13	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	0.532		0.100	1	08/25/2017 15:13	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	92.3		77.0-120		08/25/2017 15:13	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	101		75.0-128		08/25/2017 15:13	<a href="#">WG1013435</a>

3  
Ss4  
Cn5  
Sr6  
Qc7  
Gl

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	08/26/2017 09:29	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		4.00	1	08/26/2017 09:29	<a href="#">WG1013319</a>
(S) o-Terphenyl	89.7		18.0-148		08/26/2017 09:29	<a href="#">WG1013319</a>

8  
Al9  
Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	88.2		1	08/24/2017 12:16	<a href="#">WG1013216</a>

1 Cp

2 Tc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	0.00369		0.000500	1	08/25/2017 15:35	<a href="#">WG1013435</a>
Toluene	0.00711		0.00500	1	08/25/2017 15:35	<a href="#">WG1013435</a>
Ethylbenzene	0.000684	B	0.000500	1	08/25/2017 15:35	<a href="#">WG1013435</a>
Total Xylene	0.00471		0.00150	1	08/25/2017 15:35	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	0.161		0.100	1	08/25/2017 15:35	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	92.3		77.0-120		08/25/2017 15:35	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	101		75.0-128		08/25/2017 15:35	<a href="#">WG1013435</a>

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	08/26/2017 09:43	<a href="#">WG1013319</a>
C28-C40 Oil Range	ND		4.00	1	08/26/2017 09:43	<a href="#">WG1013319</a>
(S) o-Terphenyl	90.8		18.0-148		08/26/2017 09:43	<a href="#">WG1013319</a>

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.7		1	08/24/2017 12:29	<a href="#">WG1013217</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Benzene	12.7		0.500	1000	08/25/2017 06:29	<a href="#">WG1013435</a>
Toluene	90.9		5.00	1000	08/25/2017 06:29	<a href="#">WG1013435</a>
Ethylbenzene	15.7		0.500	1000	08/25/2017 06:29	<a href="#">WG1013435</a>
Total Xylene	128		1.50	1000	08/25/2017 06:29	<a href="#">WG1013435</a>
TPH (GC/FID) Low Fraction	3310		100	1000	08/25/2017 06:29	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(FID)	90.9		77.0-120		08/25/2017 06:29	<a href="#">WG1013435</a>
(S) a,a,a-Trifluorotoluene(PID)	104		75.0-128		08/25/2017 06:29	<a href="#">WG1013435</a>

## Sample Narrative:

L931528-17 WG1013435: Target and Non-target compounds too high to run at a lower dilution.

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	336		4.00	1	08/26/2017 14:57	<a href="#">WG1013319</a>
C28-C40 Oil Range	5.44		4.00	1	08/26/2017 14:57	<a href="#">WG1013319</a>
(S) o-Terphenyl	94.6		18.0-148		08/26/2017 14:57	<a href="#">WG1013319</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Total Solids by Method 2540 G-2011

L931528-01,02,03,04,05,06

### Method Blank (MB)

(MB) R3244383-1 08/24/17 12:43

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.000			

Cp

 $\frac{2}{T_C}$ 

Ss

$$C_n$$
<sup>5</sup>Sr

Qc

L931528-03 Original Sample (OS) • Duplicate (DUP)

(OS) L931528-03 08/24/17 12:43 • (DUP) R3244383-3 08/24/17 12:43

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	92.8	92.5	1	0.281		5

GI

 ${}^3\text{Al}$ 

Sc

## Laboratory Control Sample (LCS)

(LCS) R3244383-2 08/24/17 12:43

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85.0-115	



Method Blank (MB)

(MB) R3244382-1 08/24/17 12:16

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.000500			

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

L931528-11 Original Sample (OS) • Duplicate (DUP)

(OS) L931528-11 08/24/17 12:16 • (DUP) R3244382-3 08/24/17 12:16

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	85.8	85.7	1	0.0906		5

<sup>7</sup>Gl

<sup>8</sup>Al

Laboratory Control Sample (LCS)

(LCS) R3244382-2 08/24/17 12:16

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3244380-1 08/24/17 12:29

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.000100			

L931563-01 Original Sample (OS) • Duplicate (DUP)

(OS) L931563-01 08/24/17 12:29 • (DUP) R3244380-3 08/24/17 12:29

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	95.3	93.1	1	2.38		5

Laboratory Control Sample (LCS)

(LCS) R3244380-2 08/24/17 12:29

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3244430-5 08/24/17 23:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000534	U	0.000150	0.00500
Ethylbenzene	0.000239	U	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	95.9			77.0-120
(S) a,a,a-Trifluorotoluene(PID)	105			75.0-128

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3244430-1 08/24/17 21:59 • (LCSD) R3244430-2 08/24/17 22:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0457	0.0492	91.5	98.3	71.0-121			7.23	20
Toluene	0.0500	0.0472	0.0498	94.3	99.5	72.0-120			5.34	20
Ethylbenzene	0.0500	0.0459	0.0490	91.8	97.9	76.0-121			6.51	20
Total Xylene	0.150	0.135	0.142	89.7	94.7	75.0-124			5.50	20
(S) a,a,a-Trifluorotoluene(FID)				95.7	95.9	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				104	104	75.0-128				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3244430-3 08/24/17 22:43 • (LCSD) R3244430-4 08/24/17 23:05

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.58	5.67	102	103	70.0-136			1.47	20
(S) a,a,a-Trifluorotoluene(FID)				107	109	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				119	120	75.0-128				



Method Blank (MB)

(MB) R3244529-1 08/25/17 10:20

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	100			18.0-148

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3244529-2 08/25/17 10:34 • (LCSD) R3244529-3 08/25/17 10:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	46.5	44.2	77.5	73.7	50.0-150			5.03	20
(S) o-Terphenyl				94.8	101	18.0-148				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc





## Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
-----------	-------------

B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
V	The sample concentration is too high to evaluate accurate spike recoveries.

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

## State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina <sup>1</sup>	DW21704
Florida	E87487	North Carolina <sup>2</sup>	41
Georgia	NELAP	North Dakota	R-140
Georgia <sup>1</sup>	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky <sup>1</sup>	90010	South Dakota	n/a
Kentucky <sup>2</sup>	16	Tennessee <sup>14</sup>	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

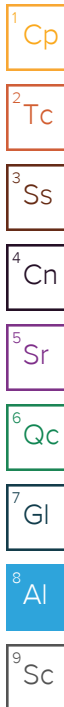
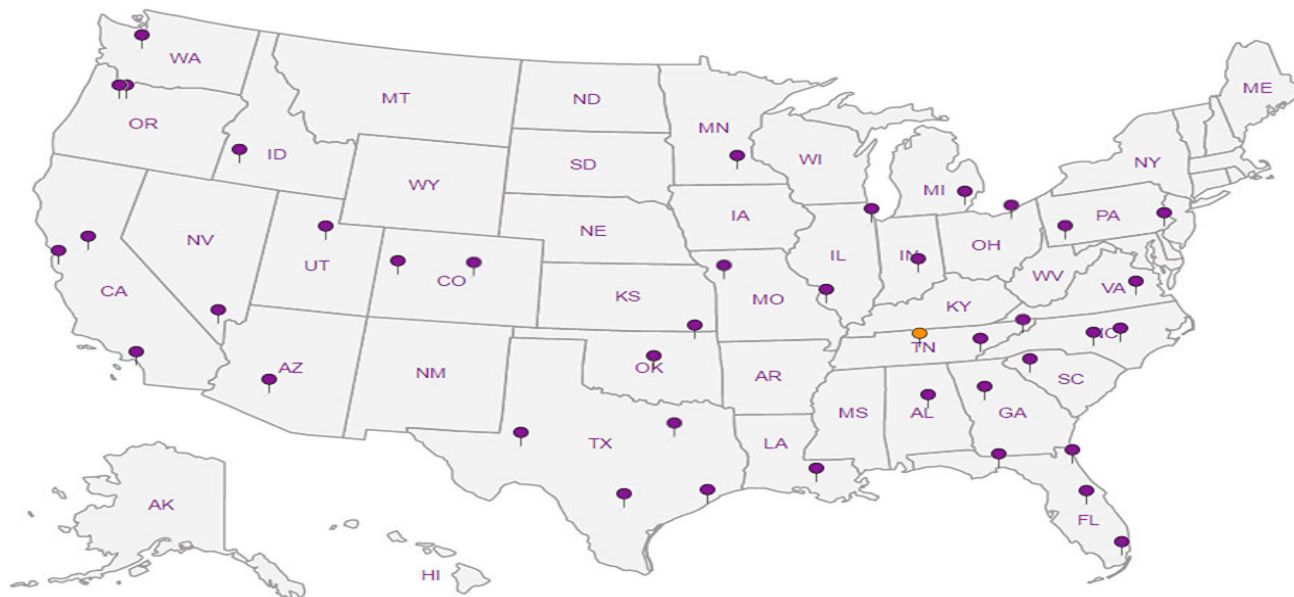
## Third Party & Federal Accreditations

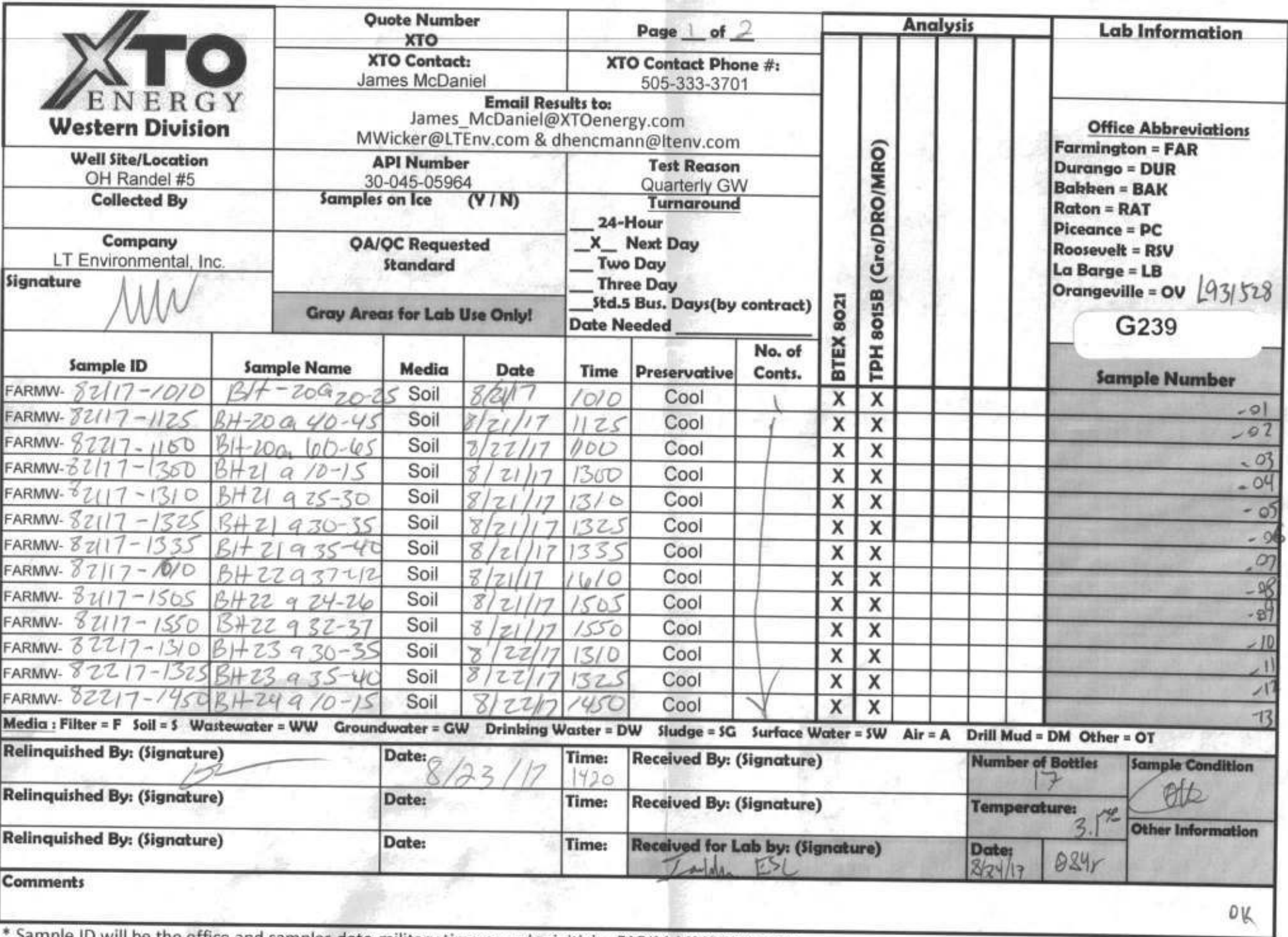
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>n/a</sup> Accreditation not applicable

## Our Locations

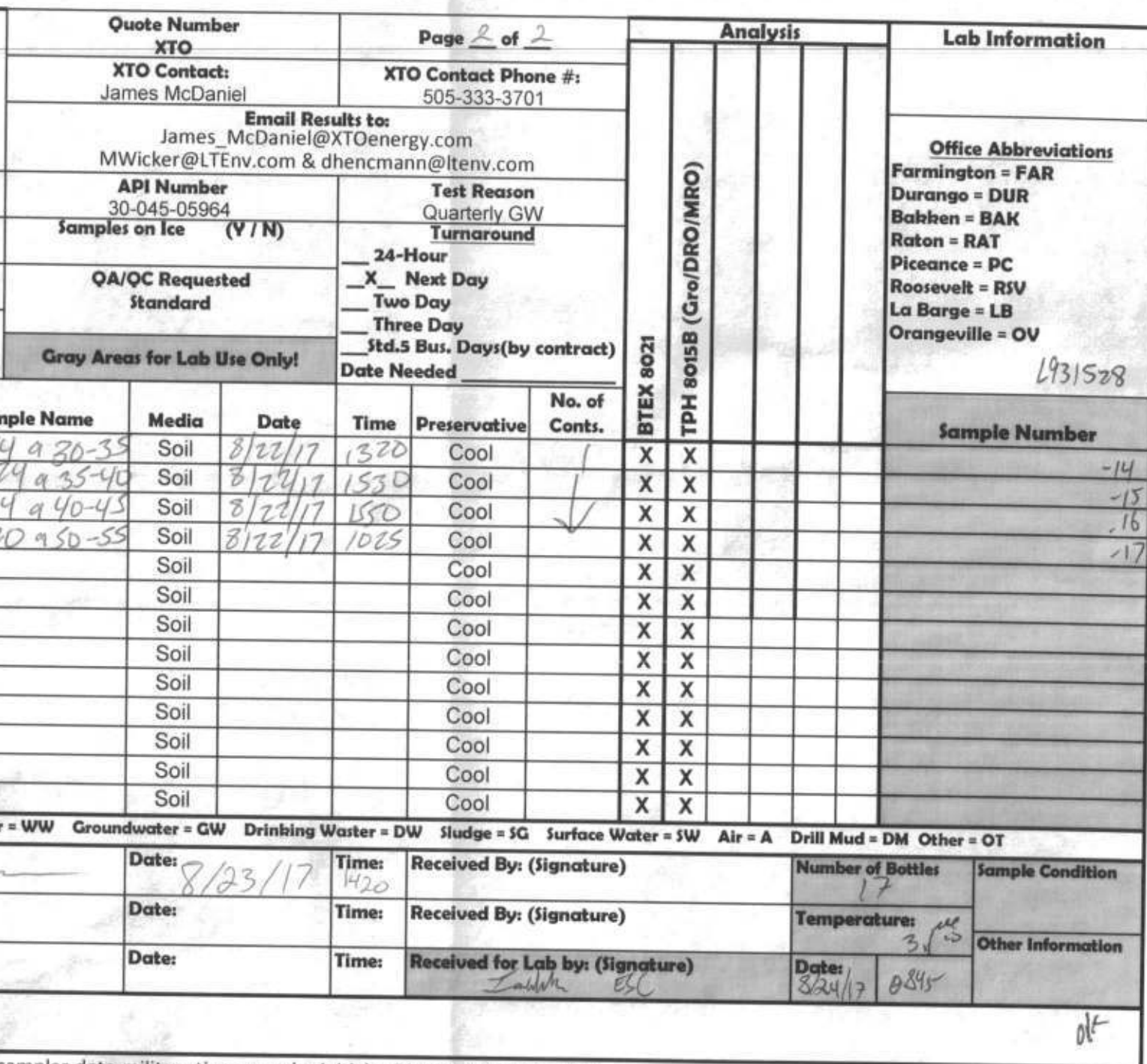
ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**





OK

\* Sample ID will be the office and sampler-date-military time-sampler initials FARJM-MMDDYY-1200



\* Sample ID will be the office and sampler-date-military time-sampler initials FARJM-MMDDYY-1200

## ESC LAB SCIENCES Cooler Receipt Form

Client: <u>XTORNM</u>	SDG#	<u>6931528</u>	
Cooler Received/Opened On: <u>8/24/17</u>	Temperature:	<u>3.12</u>	
Received by : Ian White			
Signature: <u>I. White</u>			
<b>Receipt Check List</b>	<b>NP</b>	<b>Yes</b>	<b>No</b>
COC Seal Present / Intact?	/		
COC Signed / Accurate?		/	
Bottles arrive intact?		/	
Correct bottles used?		/	
Sufficient volume sent?		/	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			



October 10, 2017

## XTO Energy - San Juan Division

Sample Delivery Group: L940569  
Samples Received: 10/03/2017  
Project Number:  
Description: OH Randal #5

Report To: James McDaniel  
382 County Road 3100  
Aztec, NM 87410

Entire Report Reviewed By:



Daphne Richards  
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	5
Sr: Sample Results	6
BH20 75-80 L940569-01	6
BH20 80-82 L940569-02	7
BH13 38-40 L940569-03	8
BH13 50-54 L940569-04	9
BH25 30-35 L940569-05	10
BH25 45-50 L940569-06	11
BH26 20-25 L940569-07	12
Qc: Quality Control Summary	13
Total Solids by Method 2540 G-2011	13
Volatile Organic Compounds (GC) by Method 8015/8021	17
Semi-Volatile Organic Compounds (GC) by Method 8015	19
Gl: Glossary of Terms	20
Al: Accreditations & Locations	21
Sc: Sample Chain of Custody	22





## BH20 75-80 L940569-01 Solid

Collected by  
D. Burns

Collected date/time  
09/28/17 09:20

Received date/time  
10/03/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1028636	1	10/06/17 13:50	10/06/17 14:02	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1029054	500	10/03/17 15:38	10/09/17 13:37	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 12:43	TH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	5	10/06/17 09:11	10/08/17 19:53	TH

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## BH20 80-82 L940569-02 Solid

Collected by  
D. Burns

Collected date/time  
09/28/17 09:40

Received date/time  
10/03/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1028558	1	10/06/17 10:46	10/06/17 10:55	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1029054	500	10/03/17 15:38	10/09/17 14:00	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 12:57	TH

## BH13 38-40 L940569-03 Solid

Collected by  
D. Burns

Collected date/time  
09/28/17 12:10

Received date/time  
10/03/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1028636	1	10/06/17 13:50	10/06/17 14:02	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1029054	5000	10/03/17 15:38	10/10/17 14:32	LRL
Volatile Organic Compounds (GC) by Method 8021	WG1029054	500	10/03/17 15:38	10/09/17 14:23	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 13:11	TH

## BH13 50-54 L940569-04 Solid

Collected by  
D. Burns

Collected date/time  
09/28/17 13:45

Received date/time  
10/03/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1028642	1	10/06/17 14:59	10/06/17 15:11	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1029054	100	10/03/17 15:38	10/09/17 14:45	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 13:25	TH

## BH25 30-35 L940569-05 Solid

Collected by  
D. Burns

Collected date/time  
09/28/17 15:30

Received date/time  
10/03/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1028558	1	10/06/17 10:46	10/06/17 10:55	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1029054	1	10/03/17 15:38	10/09/17 12:30	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 13:39	TH

## BH25 45-50 L940569-06 Solid

Collected by  
D. Burns

Collected date/time  
09/29/17 11:00

Received date/time  
10/03/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1028558	1	10/06/17 10:46	10/06/17 10:55	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1029054	1	10/03/17 15:38	10/09/17 12:52	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 13:53	TH



# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



BH26 20-25 L940569-07 Solid

Collected by  
D. Burns

Collected date/time  
09/29/17 12:00

Received date/time  
10/03/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1028647	1	10/06/17 14:19	10/06/17 14:36	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1029054	1	10/03/17 15:38	10/09/17 13:15	JAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 14:07	TH

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

ACCOUNT:

XTO Energy - San Juan Division

PROJECT:

SDG:

L940569

DATE/TIME:

10/10/17 16:26

PAGE:

4 of 23



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne Richards  
Technical Service Representative

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	91.7		1	10/06/2017 14:02	<a href="#">WG1028636</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	12.0		0.273	500	10/09/2017 13:37	<a href="#">WG1029054</a>
Toluene	114		2.73	500	10/09/2017 13:37	<a href="#">WG1029054</a>
Ethylbenzene	21.6		0.273	500	10/09/2017 13:37	<a href="#">WG1029054</a>
Total Xylene	171		0.818	500	10/09/2017 13:37	<a href="#">WG1029054</a>
TPH (GC/FID) Low Fraction	4900		54.5	500	10/09/2017 13:37	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	85.9		77.0-120		10/09/2017 13:37	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	90.3		75.0-128		10/09/2017 13:37	<a href="#">WG1029054</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	435		21.8	5	10/08/2017 19:53	<a href="#">WG1028273</a>
C28-C40 Oil Range	21.5		4.36	1	10/07/2017 12:43	<a href="#">WG1028273</a>
(S) o-Terphenyl	107		18.0-148		10/08/2017 19:53	<a href="#">WG1028273</a>
(S) o-Terphenyl	69.4		18.0-148		10/07/2017 12:43	<a href="#">WG1028273</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	90.9		1	10/06/2017 10:55	<a href="#">WG1028558</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	2.11		0.275	500	10/09/2017 14:00	<a href="#">WG1029054</a>
Toluene	63.8		2.75	500	10/09/2017 14:00	<a href="#">WG1029054</a>
Ethylbenzene	13.4		0.275	500	10/09/2017 14:00	<a href="#">WG1029054</a>
Total Xylene	121		0.825	500	10/09/2017 14:00	<a href="#">WG1029054</a>
TPH (GC/FID) Low Fraction	2710		55.0	500	10/09/2017 14:00	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	85.9		77.0-120		10/09/2017 14:00	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	87.2		75.0-128		10/09/2017 14:00	<a href="#">WG1029054</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	340		4.40	1	10/07/2017 12:57	<a href="#">WG1028273</a>
C28-C40 Oil Range	24.2		4.40	1	10/07/2017 12:57	<a href="#">WG1028273</a>
(S) o-Terphenyl	65.4		18.0-148		10/07/2017 12:57	<a href="#">WG1028273</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	92.7		1	10/06/2017 14:02	<a href="#">WG1028636</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	73.4		0.270	500	10/09/2017 14:23	<a href="#">WG1029054</a>
Toluene	378		27.0	5000	10/10/2017 14:32	<a href="#">WG1029054</a>
Ethylbenzene	43.7		0.270	500	10/09/2017 14:23	<a href="#">WG1029054</a>
Total Xylene	321		0.809	500	10/09/2017 14:23	<a href="#">WG1029054</a>
TPH (GC/FID) Low Fraction	8090		539	5000	10/10/2017 14:32	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	81.3		77.0-120		10/10/2017 14:32	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	89.6		77.0-120		10/09/2017 14:23	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	105		75.0-128		10/09/2017 14:23	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	103		75.0-128		10/10/2017 14:32	<a href="#">WG1029054</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	295		4.31	1	10/07/2017 13:11	<a href="#">WG1028273</a>
C28-C40 Oil Range	14.4		4.31	1	10/07/2017 13:11	<a href="#">WG1028273</a>
(S) o-Terphenyl	71.5		18.0-148		10/07/2017 13:11	<a href="#">WG1028273</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	81.1		1	10/06/2017 15:11	<a href="#">WG1028642</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	0.592		0.0616	100	10/09/2017 14:45	<a href="#">WG1029054</a>
Toluene	14.8		0.616	100	10/09/2017 14:45	<a href="#">WG1029054</a>
Ethylbenzene	4.07		0.0616	100	10/09/2017 14:45	<a href="#">WG1029054</a>
Total Xylene	38.3	<a href="#">J6</a>	0.185	100	10/09/2017 14:45	<a href="#">WG1029054</a>
TPH (GC/FID) Low Fraction	908		12.3	100	10/09/2017 14:45	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	86.8		77.0-120		10/09/2017 14:45	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	87.0		75.0-128		10/09/2017 14:45	<a href="#">WG1029054</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	257		4.93	1	10/07/2017 13:25	<a href="#">WG1028273</a>
C28-C40 Oil Range	18.8		4.93	1	10/07/2017 13:25	<a href="#">WG1028273</a>
(S) o-Terphenyl	63.8		18.0-148		10/07/2017 13:25	<a href="#">WG1028273</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.5		1	10/06/2017 10:55	<a href="#">WG1028558</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	0.00956		0.000621	1	10/09/2017 12:30	<a href="#">WG1029054</a>
Toluene	0.0413		0.00621	1	10/09/2017 12:30	<a href="#">WG1029054</a>
Ethylbenzene	0.00304		0.000621	1	10/09/2017 12:30	<a href="#">WG1029054</a>
Total Xylene	0.0534		0.00186	1	10/09/2017 12:30	<a href="#">WG1029054</a>
TPH (GC/FID) Low Fraction	0.399		0.124	1	10/09/2017 12:30	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	97.0		77.0-120		10/09/2017 12:30	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	88.6		75.0-128		10/09/2017 12:30	<a href="#">WG1029054</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	5.00		4.97	1	10/07/2017 13:39	<a href="#">WG1028273</a>
C28-C40 Oil Range	ND		4.97	1	10/07/2017 13:39	<a href="#">WG1028273</a>
(S) o-Terphenyl	95.5		18.0-148		10/07/2017 13:39	<a href="#">WG1028273</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.7		1	10/06/2017 10:55	<a href="#">WG1028558</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	0.000770		0.000528	1	10/09/2017 12:52	<a href="#">WG1029054</a>
Toluene	ND		0.00528	1	10/09/2017 12:52	<a href="#">WG1029054</a>
Ethylbenzene	ND		0.000528	1	10/09/2017 12:52	<a href="#">WG1029054</a>
Total Xylene	0.00202	<u>B</u>	0.00158	1	10/09/2017 12:52	<a href="#">WG1029054</a>
TPH (GC/FID) Low Fraction	ND		0.106	1	10/09/2017 12:52	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	97.1		77.0-120		10/09/2017 12:52	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	87.8		75.0-128		10/09/2017 12:52	<a href="#">WG1029054</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.22	1	10/07/2017 13:53	<a href="#">WG1028273</a>
C28-C40 Oil Range	ND		4.22	1	10/07/2017 13:53	<a href="#">WG1028273</a>
(S) o-Terphenyl	98.6		18.0-148		10/07/2017 13:53	<a href="#">WG1028273</a>





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.4		1	10/06/2017 14:36	<a href="#">WG1028647</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	0.0103		0.000622	1	10/09/2017 13:15	<a href="#">WG1029054</a>
Toluene	0.0146		0.00622	1	10/09/2017 13:15	<a href="#">WG1029054</a>
Ethylbenzene	ND		0.000622	1	10/09/2017 13:15	<a href="#">WG1029054</a>
Total Xylene	0.00390	<u>B</u>	0.00187	1	10/09/2017 13:15	<a href="#">WG1029054</a>
TPH (GC/FID) Low Fraction	ND		0.124	1	10/09/2017 13:15	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(FID)	96.7		77.0-120		10/09/2017 13:15	<a href="#">WG1029054</a>
(S) a,a,a-Trifluorotoluene(PID)	88.0		75.0-128		10/09/2017 13:15	<a href="#">WG1029054</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.98	1	10/07/2017 14:07	<a href="#">WG1028273</a>
C28-C40 Oil Range	ND		4.98	1	10/07/2017 14:07	<a href="#">WG1028273</a>
(S) o-Terphenyl	87.8		18.0-148		10/07/2017 14:07	<a href="#">WG1028273</a>



Total Solids by Method 2540 G-2011

L940569-02,05,06

### Method Blank (MB)

(MB) R3255530-1 10/06/17 10:55

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.0005			

Cp

 $^{235}\text{Tc}$ 

Ss

$$C_n$$
 $^{87}\text{Sr}$ 

Qc

L940569-02 Original Sample (OS) • Duplicate (DUP)

(OS) L940569-02 10/06/17 10:55 • (DUP) R3255530-3 10/06/17 10:55

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	90.9	91.3	1	0		5

GI

 ${}^3\text{Al}$ 

Sc

## Laboratory Control Sample (LCS)

(LCS) R3255530-2 10/06/17 10:55

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85-115	

Method Blank (MB)

(MB) R3255781-1 10/06/17 14:02

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.0002			

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

L940775-01 Original Sample (OS) • Duplicate (DUP)

(OS) L940775-01 10/06/17 14:02 • (DUP) R3255781-3 10/06/17 14:02

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	84.6	84.7	1	0		5

<sup>7</sup>Gl

<sup>8</sup>Al

Laboratory Control Sample (LCS)

(LCS) R3255781-2 10/06/17 14:02

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85-115	

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3255797-1 10/06/17 15:11

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0			

L940814-02 Original Sample (OS) • Duplicate (DUP)

(OS) L940814-02 10/06/17 15:11 • (DUP) R3255797-3 10/06/17 15:11

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	83.2	82.8	1	0		5

Laboratory Control Sample (LCS)

(LCS) R3255797-2 10/06/17 15:11

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85-115	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Total Solids by Method 2540 G-2011

L940569-07

### Method Blank (MB)

(MB) R3255784-1 10/06/17 14:36

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.0006			

Cp

 ${}^2\text{Tc}$ 

Ss

Cn

<sup>87</sup>Sr

Qc

L940569-07 Original Sample (OS) • Duplicate (DUP)

(OS) L940569-07 10/06/17 14:36 • (DUP) R3255784-3 10/06/17 14:36

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	80.4	79.8	1	1		5

G|

Al

Sc

## Laboratory Control Sample (LCS)

(LCS) R3255784-2 10/06/17 14:36

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85-115	



Method Blank (MB)

(MB) R3256047-5 10/09/17 11:45

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000419	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	99.0			77.0-120
(S) a,a,a-Trifluorotoluene(PID)	91.3			75.0-128

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3256047-1 10/09/17 09:53 • (LCSD) R3256047-2 10/09/17 10:16

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0546	0.0569	109	114	71.0-121			4.00	20
Toluene	0.0500	0.0535	0.0554	107	111	72.0-120			3.45	20
Ethylbenzene	0.0500	0.0546	0.0569	109	114	76.0-121			4.22	20
Total Xylene	0.150	0.168	0.175	112	117	75.0-124			4.20	20
(S) a,a,a-Trifluorotoluene(FID)				101	98.0	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				102	98.3	75.0-128				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3256047-3 10/09/17 10:38 • (LCSD) R3256047-4 10/09/17 11:00

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.51	5.52	100	100	70.0-136			0.250	20
(S) a,a,a-Trifluorotoluene(FID)				101	102	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				99.4	98.9	75.0-128				



L940569-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L940569-04 10/09/17 14:45 • (MS) R3256047-6 10/09/17 19:56 • (MSD) R3256047-7 10/09/17 20:18

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0616	0.592	8.96	9.10	136	138	100	10.0-146			1.49	29
Toluene	0.0616	14.8	18.8	18.8	66.1	65.1	100	10.0-143			0.320	30
Ethylbenzene	0.0616	4.07	9.90	9.74	94.5	92.0	100	10.0-147			1.59	31
Total Xylene	0.185	38.3	48.8	49.4	57.0	60.3	100	10.0-149	J6	J6	1.25	30
(S) a,a,a-Trifluorotoluene(FID)					87.8	88.1		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					97.6	99.4		75.0-128				

L940569-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L940569-04 10/09/17 14:45 • (MS) R3256047-8 10/09/17 20:40 • (MSD) R3256047-9 10/09/17 21:02

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	6.78	908	1530	1470	91.4	83.0	100	10.0-147	E	E	3.76	30
(S) a,a,a-Trifluorotoluene(FID)					96.9	97.3		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					107	108		75.0-128				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3255555-1 10/06/17 22:27

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	88.9			18.0-148

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3255555-2 10/06/17 22:41 • (LCSD) R3255555-3 10/06/17 22:55

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	35.3	32.7	58.9	54.6	50.0-150			7.61	20
(S) o-Terphenyl				76.5	71.1	18.0-148				

L940399-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L940399-01 10/07/17 06:32 • (MS) R3255555-4 10/07/17 06:47 • (MSD) R3255555-5 10/07/17 07:00

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	12.0	ND	48.9	55.9	48.7	60.4	5	50.0-150	J6		13.5	20
(S) o-Terphenyl					8.00	79.5		18.0-148				





## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

### Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

<sup>1</sup> Cp
<sup>2</sup> Tc
<sup>3</sup> Ss
<sup>4</sup> Cn
<sup>5</sup> Sr
<sup>6</sup> Qc
<sup>7</sup> Gi
<sup>8</sup> Al
<sup>9</sup> Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

## State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina <sup>1</sup>	DW21704
Florida	E87487	North Carolina <sup>2</sup>	41
Georgia	NELAP	North Dakota	R-140
Georgia <sup>1</sup>	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky <sup>1</sup>	90010	South Dakota	n/a
Kentucky <sup>2</sup>	16	Tennessee <sup>14</sup>	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

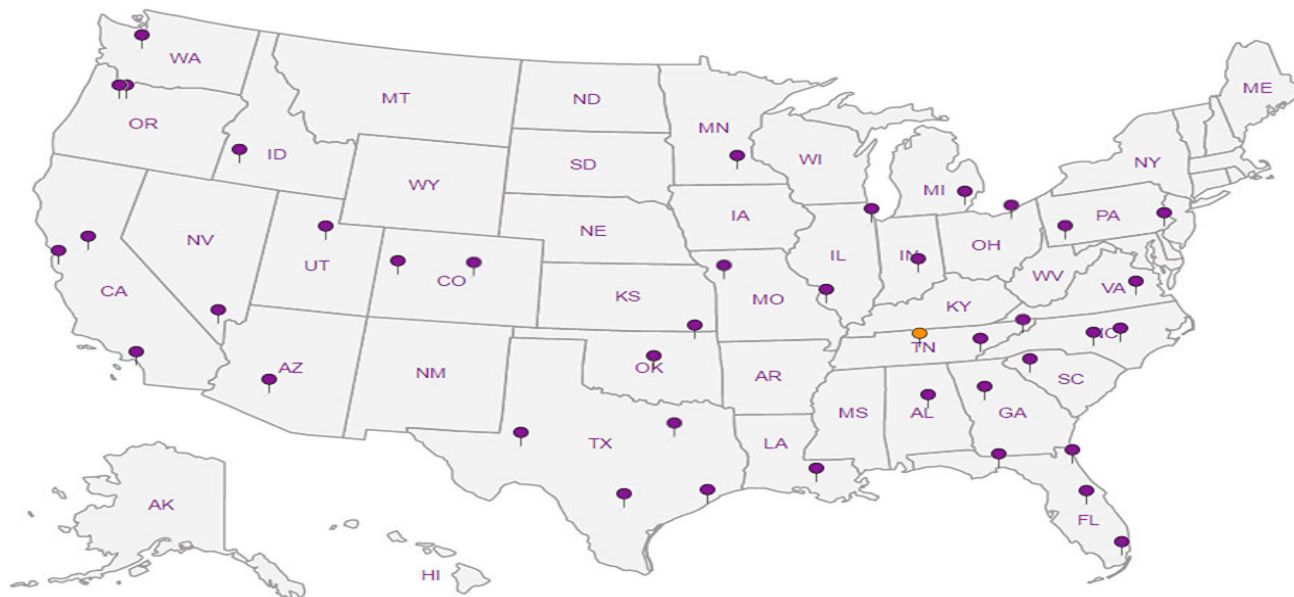
## Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>n/a</sup> Accreditation not applicable

## Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



**Collected By**  
D. Burns

**Company**  
LT Environmental, Inc.

Signature \_\_\_\_\_

**Gray Areas for Lab Use Only!**

**Orangeville = OV**

940569-01

2

07

04

05

07

61

Media : Filter = F Soil = S Wastewater = WW Groundwater = GW Drinking Waster = DW Sludge = SG Surface Water = SW Air = A Drill Mud = DM Other = OT

Date: 10-2-17

Time: 0800

Received By: (Signature)

Number of Bottles

14

Sample Condition	Sample	Temperature (°C)	Time (min)	Concentration (g/L)	Viscosity (Pa·s)	Modulus (Pa)	Loss Modulus (Pa)	Phase Angle (°)
Control	Control	25	10	0.5	0.015	1.5	0.5	90
		35	10	0.5	0.012	1.2	0.4	90
		45	10	0.5	0.010	1.0	0.3	90
10% PEG	10% PEG	25	10	0.5	0.018	1.8	0.6	90
		35	10	0.5	0.015	1.5	0.5	90
		45	10	0.5	0.012	1.2	0.4	90
20% PEG	20% PEG	25	10	0.5	0.020	2.0	0.7	90
		35	10	0.5	0.017	1.7	0.6	90
		45	10	0.5	0.014	1.4	0.5	90
30% PEG	30% PEG	25	10	0.5	0.022	2.2	0.8	90
		35	10	0.5	0.019	1.9	0.7	90
		45	10	0.5	0.016	1.6	0.6	90
40% PEG	40% PEG	25	10	0.5	0.024	2.4	0.9	90
		35	10	0.5	0.021	2.1	0.8	90
		45	10	0.5	0.018	1.8	0.7	90
50% PEG	50% PEG	25	10	0.5	0.026	2.6	1.0	90
		35	10	0.5	0.023	2.3	0.9	90
		45	10	0.5	0.020	2.0	0.8	90

Date: 10-2-17

Time: 1600

Received By: (Signature)

Temperature:

1.3

<b>Other Information</b>
--------------------------

Date:

Time:

Received for Lab by: (Signature)

Date:

2000

LAST

430-32

### Comments

FedEx: 6777 0002 1380

\* Sample ID will be the office and sampler-date-military time-sampler initials FARJUM-MMDDYY-1200

## ESC LAB SCIENCES Cooler Receipt Form

Client: <i>Xtolum</i>	SDG#	94085	
Cooler Received/Opened On: 10/3/17	Temperature:	1.3	
Received by : Jennifer Royal			
Signature: <i>Jennifer Royal</i>			
<b>Receipt Check List</b>	<b>NP</b>	<b>Yes</b>	<b>No</b>
COC Seal Present / Intact?		/	
COC Signed / Accurate?		/	
Bottles arrive intact?		/	
Correct bottles used?		/	
Sufficient volume sent?		/	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			



October 10, 2017

## XTO Energy - San Juan Division

Sample Delivery Group: L940568  
Samples Received: 10/03/2017  
Project Number:  
Description: OH Randal #5

Report To: James McDaniel  
382 County Road 3100  
Aztec, NM 87410

Entire Report Reviewed By:



Daphne Richards  
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	4
Sr: Sample Results	5
BH27 35-40 L940568-01	5
BH 27 40-45 L940568-02	6
BH27 45-50 L940568-03	7
BH27 35-40 L940568-04	8
BH 27 40-45 L940568-05	9
BH27 45-50 L940568-06	10
Qc: Quality Control Summary	11
Total Solids by Method 2540 G-2011	11
Volatile Organic Compounds (GC) by Method 8015/8021	12
Semi-Volatile Organic Compounds (GC) by Method 8015	14
Gl: Glossary of Terms	15
Al: Accreditations & Locations	16
Sc: Sample Chain of Custody	17



# SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## BH27 35-40 L940568-01 Solid

			Collected by D. Burns	Collected date/time 09/30/17 11:00	Received date/time 10/03/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1027125	1	10/03/17 11:00	10/03/17 11:36	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1027344	25	10/03/17 10:22	10/03/17 17:26	BMB

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

## BH 27 40-45 L940568-02 Solid

			Collected by D. Burns	Collected date/time 09/30/17 11:30	Received date/time 10/03/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1027125	1	10/03/17 11:00	10/03/17 11:36	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1027344	500	10/03/17 10:22	10/03/17 17:04	BMB

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

## BH27 45-50 L940568-03 Solid

			Collected by D. Burns	Collected date/time 09/30/17 12:00	Received date/time 10/03/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1027125	1	10/03/17 11:00	10/03/17 11:36	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1027344	1000	10/03/17 10:22	10/03/17 17:49	BMB

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

## BH27 35-40 L940568-04 Solid

			Collected by D. Burns	Collected date/time 09/30/17 11:00	Received date/time 10/03/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1027125	1	10/03/17 11:00	10/03/17 11:36	KDW
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 11:18	TH

## BH 27 40-45 L940568-05 Solid

			Collected by D. Burns	Collected date/time 09/30/17 11:30	Received date/time 10/03/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1027125	1	10/03/17 11:00	10/03/17 11:36	KDW
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 12:14	TH

## BH27 45-50 L940568-06 Solid

			Collected by D. Burns	Collected date/time 09/30/17 12:00	Received date/time 10/03/17 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1027125	1	10/03/17 11:00	10/03/17 11:36	KDW
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	1	10/06/17 09:11	10/07/17 12:29	TH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1028273	5	10/06/17 09:11	10/08/17 19:39	TH

ACCOUNT:

XTO Energy - San Juan Division

PROJECT:

SDG:

L940568

DATE/TIME:

10/10/17 17:49

PAGE:

3 of 18



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne Richards  
Technical Service Representative

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc





## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	75.7		1	10/03/2017 11:36	<a href="#">WG1027125</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
Benzene	0.0442	<u>B</u>	0.0165	25	10/03/2017 17:26	<a href="#">WG1027344</a>
Toluene	0.863		0.165	25	10/03/2017 17:26	<a href="#">WG1027344</a>
Ethylbenzene	1.19		0.0165	25	10/03/2017 17:26	<a href="#">WG1027344</a>
Total Xylene	9.66		0.0496	25	10/03/2017 17:26	<a href="#">WG1027344</a>
TPH (GC/FID) Low Fraction	207		3.30	25	10/03/2017 17:26	<a href="#">WG1027344</a>
(S) a,a,a-Trifluorotoluene(FID)	83.5		77.0-120		10/03/2017 17:26	<a href="#">WG1027344</a>
(S) a,a,a-Trifluorotoluene(PID)	94.6		75.0-128		10/03/2017 17:26	<a href="#">WG1027344</a>



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.9		1	10/03/2017 11:36	<a href="#">WG1027125</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.263	500	10/03/2017 17:04	<a href="#">WG1027344</a>
Toluene	5.91		2.63	500	10/03/2017 17:04	<a href="#">WG1027344</a>
Ethylbenzene	3.98		0.263	500	10/03/2017 17:04	<a href="#">WG1027344</a>
Total Xylene	35.4		0.790	500	10/03/2017 17:04	<a href="#">WG1027344</a>
TPH (GC/FID) Low Fraction	621		52.7	500	10/03/2017 17:04	<a href="#">WG1027344</a>
(S) a,a,a-Trifluorotoluene(FID)	86.1		77.0-120		10/03/2017 17:04	<a href="#">WG1027344</a>
(S) a,a,a-Trifluorotoluene(PID)	98.3		75.0-128		10/03/2017 17:04	<a href="#">WG1027344</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.8		1	10/03/2017 11:36	<a href="#">WG1027125</a>

## Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg			
Benzene	ND		0.533	1000	10/03/2017 17:49	<a href="#">WG1027344</a>
Toluene	18.9		5.33	1000	10/03/2017 17:49	<a href="#">WG1027344</a>
Ethylbenzene	7.51		0.533	1000	10/03/2017 17:49	<a href="#">WG1027344</a>
Total Xylene	68.1		1.60	1000	10/03/2017 17:49	<a href="#">WG1027344</a>
TPH (GC/FID) Low Fraction	1540		107	1000	10/03/2017 17:49	<a href="#">WG1027344</a>
(S) a,a,a-Trifluorotoluene(FID)	85.5		77.0-120		10/03/2017 17:49	<a href="#">WG1027344</a>
(S) a,a,a-Trifluorotoluene(PID)	98.8		75.0-128		10/03/2017 17:49	<a href="#">WG1027344</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	75.6		1	10/03/2017 11:36	<a href="#">WG1027125</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		5.29	1	10/07/2017 11:18	<a href="#">WG1028273</a>
C28-C40 Oil Range	ND		5.29	1	10/07/2017 11:18	<a href="#">WG1028273</a>
(S) o-Terphenyl	87.9		18.0-148		10/07/2017 11:18	<a href="#">WG1028273</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.6		1	10/03/2017 11:36	<a href="#">WG1027125</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	303		4.23	1	10/07/2017 12:14	<a href="#">WG1028273</a>
C28-C40 Oil Range	26.7		4.23	1	10/07/2017 12:14	<a href="#">WG1028273</a>
(S) o-Terphenyl	71.5		18.0-148		10/07/2017 12:14	<a href="#">WG1028273</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



## Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.8		1	10/03/2017 11:36	<a href="#">WG1027125</a>

## Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	510		21.3	5	10/08/2017 19:39	<a href="#">WG1028273</a>
C28-C40 Oil Range	33.2		4.26	1	10/07/2017 12:29	<a href="#">WG1028273</a>
(S) o-Terphenyl	65.2		18.0-148		10/07/2017 12:29	<a href="#">WG1028273</a>
(S) o-Terphenyl	90.5		18.0-148		10/08/2017 19:39	<a href="#">WG1028273</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Total Solids by Method 2540 G-2011

L940568-01,02,03,04,05,06

### Method Blank (MB)

(MB) R3254523-1 10/03/17 11:36

	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.0012			

L940568-01 Original Sample (OS) • Duplicate (DUP)

(OS) L940568-01 10/03/17 11:36 • (DUP) R3254523-3 10/03/17 11:36

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	75.7	75.0	1	1		5

## Laboratory Control Sample (LCS)

(LCS) R3254523-2 10/03/17 11:36

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85-115	

 ${}^1\text{Cp}$  ${}^2\text{Tc}$  ${}^3S_s$  ${}^4\text{Cn}$  $^5\text{Sr}$ <sup>6</sup>Qc

GI

 ${}^8\text{Al}$ <sup>9</sup>Sc



Method Blank (MB)

(MB) R3254454-3 10/03/17 15:35

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	0.000213	⌋	0.000120	0.000500
Toluene	0.000340	⌋	0.000150	0.00500
Ethylbenzene	0.000124	⌋	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	0.0282	⌋	0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	89.5			77.0-120
(S) a,a,a-Trifluorotoluene(PID)	97.8			75.0-128

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3254454-1 10/03/17 14:28 • (LCSD) R3254454-2 10/03/17 14:50

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	4.92	4.84	89.5	87.9	70.0-136			1.80	20
(S) a,a,a-Trifluorotoluene(FID)				106	105	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				113	112	75.0-128				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3254454-4 10/03/17 16:19 • (LCSD) R3254454-5 10/03/17 16:42

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0434	0.0438	86.9	87.6	71.0-121			0.830	20
Toluene	0.0500	0.0469	0.0471	93.8	94.2	72.0-120			0.440	20
Ethylbenzene	0.0500	0.0471	0.0480	94.3	96.0	76.0-121			1.78	20
Total Xylene	0.150	0.141	0.140	93.9	93.0	75.0-124			1.00	20
(S) a,a,a-Trifluorotoluene(FID)				86.4	89.3	77.0-120				
(S) a,a,a-Trifluorotoluene(PID)				92.1	96.2	75.0-128				





L940163-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L940163-01 10/03/17 18:19 • (MS) R3254454-6 10/03/17 22:49 • (MSD) R3254454-7 10/03/17 23:12

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	ND	22.4	22.3	89.4	89.0	500	10.0-146			0.460	29
Toluene	0.0500	ND	23.9	24.0	94.2	94.3	500	10.0-143			0.140	30
Ethylbenzene	0.0500	ND	27.2	27.0	109	108	500	10.0-147			0.650	31
Total Xylene	0.150	15.0	82.5	81.5	90.0	88.7	500	10.0-149			1.22	30
(S) a,a,a-Trifluorotoluene(FID)					90.2	90.4		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					96.6	96.9		75.0-128				

L940163-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L940163-01 10/03/17 18:19 • (MS) R3254454-8 10/03/17 23:34 • (MSD) R3254454-9 10/03/17 23:56

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	958	3300	3300	85.3	85.3	500	10.0-147			0.0200	30
(S) a,a,a-Trifluorotoluene(FID)					101	101		77.0-120				
(S) a,a,a-Trifluorotoluene(PID)					108	108		75.0-128				

1  
Cp

2  
Tc

3  
Ss

4  
Cn

5  
Sr

6  
Qc

7  
Gl

8  
Al

9  
Sc



Method Blank (MB)

(MB) R3255555-1 10/06/17 22:27

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	88.9			18.0-148

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3255555-2 10/06/17 22:41 • (LCSD) R3255555-3 10/06/17 22:55

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	35.3	32.7	58.9	54.6	50.0-150			7.61	20
(S) o-Terphenyl				76.5	71.1	18.0-148				

L940399-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L940399-01 10/07/17 06:32 • (MS) R3255555-4 10/07/17 06:47 • (MSD) R3255555-5 10/07/17 07:00

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	12.0	ND	48.9	55.9	48.7	60.4	5	50.0-150	J6		13.5	20
(S) o-Terphenyl					8.00	79.5		18.0-148				



## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

### Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

### Qualifier Description

B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 G

8 Al

9 Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

## State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina <sup>1</sup>	DW21704
Florida	E87487	North Carolina <sup>2</sup>	41
Georgia	NELAP	North Dakota	R-140
Georgia <sup>1</sup>	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky <sup>1</sup>	90010	South Dakota	n/a
Kentucky <sup>2</sup>	16	Tennessee <sup>14</sup>	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

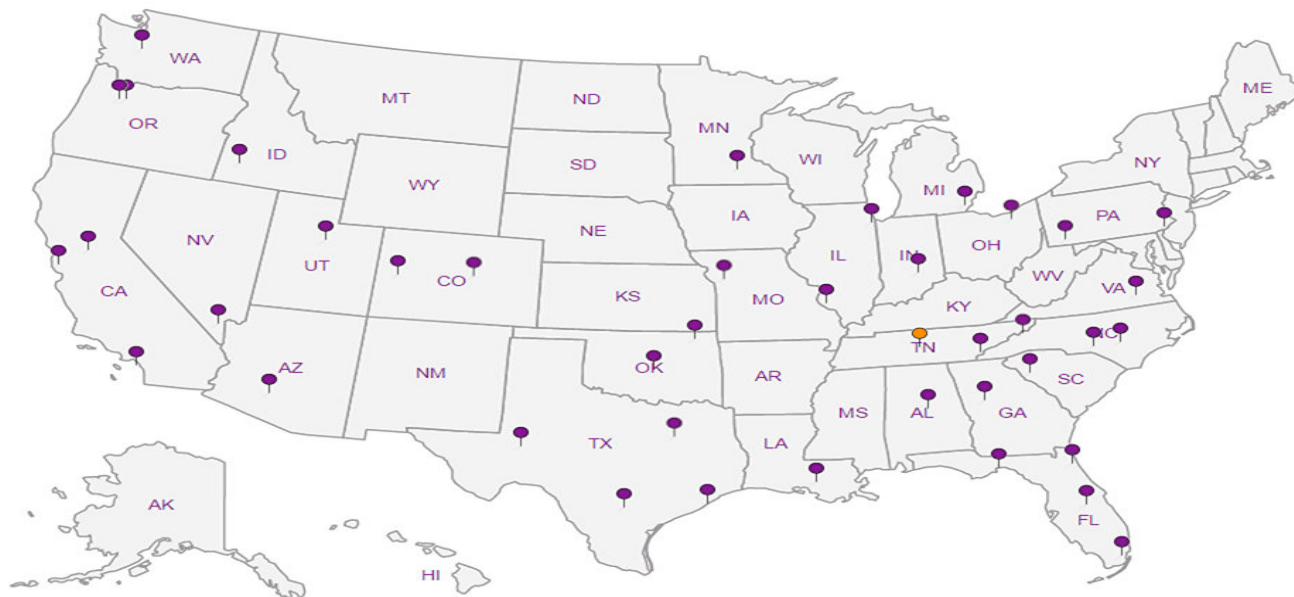
## Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>n/a</sup> Accreditation not applicable

## Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**





## ESC LAB SCIENCES Cooler Receipt Form

Client: <i>X-TOWN</i>	SDG#	940568	
Cooler Received/Opened On: 10/ 3 /17	Temperature:	1.3	
Received by : Jennifer Royal			
Signature: <i>Jennifer Royal</i>			
<b>Receipt Check List</b>	<b>NP</b>	<b>Yes</b>	<b>No</b>
COC Seal Present / Intact?		✓	
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			



*Hall Environmental Analysis Laboratory*  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

January 03, 2019

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

RE: OH Randel 5

OrderNo.: 1812913

Dear Carla Cordova:

Hall Environmental Analysis Laboratory received 4 sample(s) on 12/15/2018 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued December 20, 2018.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. 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. All samples are reported as received unless otherwise indicated.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812913**Date Reported: **1/3/2019****CLIENT:** HILCORP ENERGY**Client Sample ID:** BH-33 30-35'**Project:** OH Randel 5**Collection Date:** 12/13/2018 1:30:00 PM**Lab ID:** 1812913-001**Matrix:** SOIL**Received Date:** 12/15/2018 4:00:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	140	9.2		mg/Kg	1	12/20/2018 6:47:50 AM
Motor Oil Range Organics (MRO)	ND	46		mg/Kg	1	12/20/2018 6:47:50 AM
Surr: DNOP	98.1	50.6-138		%Rec	1	12/20/2018 6:47:50 AM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	1100	240		mg/Kg	50	12/18/2018 9:42:34 AM
Surr: BFB	170	73.8-119	S	%Rec	50	12/18/2018 9:42:34 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	1.2		mg/Kg	50	12/18/2018 9:42:34 AM
Toluene	31	2.4		mg/Kg	50	12/18/2018 9:42:34 AM
Ethylbenzene	6.5	2.4		mg/Kg	50	12/18/2018 9:42:34 AM
Xylenes, Total	71	4.7		mg/Kg	50	12/18/2018 9:42:34 AM
Surr: 4-Bromofluorobenzene	128	80-120	S	%Rec	50	12/18/2018 9:42:34 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812913

Date Reported: 1/3/2019

CLIENT: HILCORP ENERGY

Client Sample ID: BH-33 75-80'

Project: OH Randel 5

Collection Date: 12/14/2018 9:30:00 AM

Lab ID: 1812913-002

Matrix: MEOH (SOIL)

Received Date: 12/15/2018 4:00:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	180	10		mg/Kg	1	12/17/2018 10:37:36 AM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	12/17/2018 10:37:36 AM
Surr: DNOP	100	50.6-138		%Rec	1	12/17/2018 10:37:36 AM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	6900	270		mg/Kg	50	12/17/2018 9:49:36 AM
Surr: BFB	239	73.8-119	S	%Rec	50	12/17/2018 9:49:36 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	26	1.4		mg/Kg	50	12/17/2018 9:49:36 AM
Toluene	250	2.7		mg/Kg	50	12/17/2018 9:49:36 AM
Ethylbenzene	26	2.7		mg/Kg	50	12/17/2018 9:49:36 AM
Xylenes, Total	280	5.4		mg/Kg	50	12/17/2018 9:49:36 AM
Surr: 4-Bromofluorobenzene	113	80-120		%Rec	50	12/17/2018 9:49:36 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812913**

Date Reported: **1/3/2019**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-32 40-45'

**Project:** OH Randel 5

**Collection Date:** 12/14/2018 11:00:00 AM

**Lab ID:** 1812913-003

**Matrix:** SOIL

**Received Date:** 12/15/2018 4:00:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	12/20/2018 7:53:59 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/20/2018 7:53:59 AM
Surr: DNOP	96.8	50.6-138		%Rec	1	12/20/2018 7:53:59 AM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	12/19/2018 10:29:50 AM
Surr: BFB	96.8	73.8-119		%Rec	1	12/19/2018 10:29:50 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	12/19/2018 10:29:50 AM
Toluene	0.053	0.047		mg/Kg	1	12/19/2018 10:29:50 AM
Ethylbenzene	ND	0.047		mg/Kg	1	12/19/2018 10:29:50 AM
Xylenes, Total	ND	0.093		mg/Kg	1	12/19/2018 10:29:50 AM
Surr: 4-Bromofluorobenzene	100	80-120		%Rec	1	12/19/2018 10:29:50 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812913

Date Reported: 1/3/2019

CLIENT: HILCORP ENERGY

Client Sample ID: BH-32 50-57'

Project: OH Randel 5

Collection Date: 12/14/2018 2:00:00 PM

Lab ID: 1812913-004

Matrix: SOIL

Received Date: 12/15/2018 4:00:00 PM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	12/20/2018 8:16:00 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/20/2018 8:16:00 AM
Surr: DNOP	90.6	50.6-138		%Rec	1	12/20/2018 8:16:00 AM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	12/18/2018 8:43:18 PM
Surr: BFB	96.4	73.8-119		%Rec	1	12/18/2018 8:43:18 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	12/18/2018 8:43:18 PM
Toluene	ND	0.047		mg/Kg	1	12/18/2018 8:43:18 PM
Ethylbenzene	ND	0.047		mg/Kg	1	12/18/2018 8:43:18 PM
Xylenes, Total	ND	0.093		mg/Kg	1	12/18/2018 8:43:18 PM
Surr: 4-Bromofluorobenzene	97.6	80-120		%Rec	1	12/18/2018 8:43:18 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	Page 4 of 8
	D	Sample Diluted Due to Matrix	E	Value above quantitation range	
	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 Quantitative Limit	RL	Reporting Detection Limit	
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified	

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812913

03-Jan-19

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	LCS-42138		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 42138		RunNo: 56379					
Prep Date:	12/17/2018		Analysis Date: 12/17/2018		SeqNo: 1885000		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	56	10	50.00	0	112	70	130			
Surr: DNOP	4.5		5.000		90.6	50.6	138			

Sample ID	MB-42138		SampType:	MBLK		TestCode:	EPA Method 8015M/D: Diesel Range Organics				
Client ID:	PBS		Batch ID:	42138		RunNo:	56379				
Prep Date:	12/17/2018		Analysis Date:	12/17/2018		SeqNo:	1885001		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	10		10.00		103	50.6	138				

Sample ID	1812913-002AMS		SampType: MS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	BH-33 75-80'		Batch ID: 42138		RunNo: 56379					
Prep Date:	12/17/2018		Analysis Date: 12/17/2018		SeqNo: 1885959		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	270	9.9	49.31	178.0	196	53.5	126			S
Surr: DNOP	5.1		4.931		104	50.6	138			

Sample ID	1812913-002AMSD		SampType: MSD		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	BH-33 75-80'		Batch ID: 42138		RunNo: 56379					
Prep Date:	12/17/2018		Analysis Date: 12/17/2018		SeqNo: 1885960		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	300	9.8	49.07	178.0	247	53.5	126	8.69	21.7	S
Surr: DNOP	5.2		4.907		106	50.6	138	0	0	

Sample ID	1812913-001AMS		SampType: MS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	BH-33 30-35'		Batch ID: 42177		RunNo: 56431					
Prep Date:	12/18/2018		Analysis Date: 12/20/2018		SeqNo: 1889462		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	230	9.7	48.45	140.5	190	53.5	126			S
Surr: DNOP	4.5		4.845		93.1	50.6	138			

### 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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812913

03-Jan-19

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	1812913-001AMSD	SampType:	MSD	TestCode:	EPA Method 8015M/D: Diesel Range Organics					
Client ID:	BH-33 30-35'	Batch ID:	42177	RunNo:	56431					
Prep Date:	12/18/2018	Analysis Date:	12/20/2018	SeqNo:	1889463	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	140	9.3	46.34	140.5	-10.1	53.5	126	52.5	21.7	RS
Surr: DNOP	4.3		4.634		92.1	50.6	138	0	0	

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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 Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812913

03-Jan-19

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42127		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 42127		RunNo: 56380					
Prep Date:	12/14/2018		Analysis Date: 12/17/2018		SeqNo: 1885502		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	990		1000		98.9	73.8	119			

Sample ID	LCS-42127		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 42127		RunNo: 56380					
Prep Date:	12/14/2018		Analysis Date: 12/17/2018		SeqNo: 1885503		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	1100		1000		113	73.8	119			

Sample ID	B9		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: G56380		RunNo: 56380					
Prep Date:			Analysis Date: 12/17/2018		SeqNo: 1885527		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	970		1000		97.5	73.8	119			

Sample ID	2.5UG GRO LCS		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: G56380		RunNo: 56380					
Prep Date:			Analysis Date: 12/17/2018		SeqNo: 1885528		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	5.0	25.00	0	97.3	80.1	123			
Surr: BFB	1100		1000		115	73.8	119			

Sample ID	MB-42158		SampType:	MBLK		TestCode:	EPA Method 8015D: Gasoline Range				
Client ID:	PBS		Batch ID:	42158		RunNo:	56429				
Prep Date:	12/17/2018		Analysis Date:	12/18/2018		SeqNo:	1886718		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	1000		1000		101	73.8	119				

Sample ID	LCS-42158		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 42158		RunNo: 56429					
Prep Date:	12/17/2018		Analysis Date: 12/18/2018		SeqNo: 1886719		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	27	5.0	25.00	0	108	80.1	123			
Surr: BFB	1200		1000		119	73.8	119			S

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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 Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812913

03-Jan-19

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	<b>MB-42127</b>		SampType:	<b>MBLK</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>PBS</b>		Batch ID:	<b>42127</b>		RunNo:	<b>56380</b>			
Prep Date:	<b>12/14/2018</b>		Analysis Date:	<b>12/17/2018</b>		SeqNo:	<b>1885539</b>	Units:	<b>mg/Kg</b>	
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	1.0		1.000		103	80	120			

Sample ID	<b>LCS-42127</b>		SampType:	<b>LCS</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>LCSS</b>		Batch ID:	<b>42127</b>		RunNo:	<b>56380</b>			
Prep Date:	<b>12/14/2018</b>		Analysis Date:	<b>12/17/2018</b>		SeqNo:	<b>1885540</b>	Units:	<b>mg/Kg</b>	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.95	0.025	1.000	0	94.6	80	120			
Toluene	1.0	0.050	1.000	0	99.6	80	120			
Ethylbenzene	1.0	0.050	1.000	0	100	80	120			
Xylenes, Total	3.1	0.10	3.000	0	102	80	120			
Surr: 4-Bromofluorobenzene	1.1		1.000		107	80	120			

Sample ID	<b>MB-42158</b>		SampType:	<b>MBLK</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>PBS</b>		Batch ID:	<b>42158</b>		RunNo:	<b>56429</b>			
Prep Date:	<b>12/17/2018</b>		Analysis Date:	<b>12/18/2018</b>		SeqNo:	<b>1886748</b>	Units:	<b>mg/Kg</b>	
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	1.0		1.000		105	80	120			

Sample ID	<b>LCS-42158</b>		SampType:	<b>LCS</b>		TestCode:	<b>EPA Method 8021B: Volatiles</b>			
Client ID:	<b>LCSS</b>		Batch ID:	<b>42158</b>		RunNo:	<b>56429</b>			
Prep Date:	<b>12/17/2018</b>		Analysis Date:	<b>12/18/2018</b>		SeqNo:	<b>1886749</b>	Units:	<b>mg/Kg</b>	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.95	0.025	1.000	0	95.3	80	120			
Toluene	1.0	0.050	1.000	0	100	80	120			
Ethylbenzene	1.0	0.050	1.000	0	101	80	120			
Xylenes, Total	3.1	0.10	3.000	0	103	80	120			
Surr: 4-Bromofluorobenzene	1.1		1.000		105	80	120			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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 Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

## Sample Log-In Check List

Client Name: **HILCORP ENERGY FAR**

Work Order Number: **1812913**

RcptNo: 1

Received By: **Andy Freeman** 12/15/2018 4:00:00 PM

Completed By: **Erin Melendrez** 12/17/2018 8:15:11 AM

Reviewed By: **DAD 12-17-18**

**LB: JU 12-17-18**

### 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  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? 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. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
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 ☐

# of preserved  
bottles checked  
for pH:

( $\leq 2$  or  $> 12$  unless noted)

Adjusted? 50

Checked by: 12-17-18

### 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 $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.7	Good	Yes			







*Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)*

December 21, 2018

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

RE: OH Randel 5

OrderNo.: 1812985

Dear Clara Cardoza:

Hall Environmental Analysis Laboratory received 12 sample(s) on 12/18/2018 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](http://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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-34 55-60'

**Project:** OH Randel 5

**Collection Date:** 12/15/2018 11:30:00 AM

**Lab ID:** 1812985-001

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	350	8.9		mg/Kg	1	12/19/2018 4:22:58 PM
Motor Oil Range Organics (MRO)	ND	44		mg/Kg	1	12/19/2018 4:22:58 PM
Surr: DNOP	90.9	50.6-138		%Rec	1	12/19/2018 4:22:58 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	5300	480		mg/Kg	100	12/20/2018 11:06:56 AM
Surr: BFB	183	73.8-119	S	%Rec	100	12/20/2018 11:06:56 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	15	0.24		mg/Kg	10	12/19/2018 3:18:10 PM
Toluene	180	4.8		mg/Kg	100	12/20/2018 11:06:56 AM
Ethylbenzene	22	0.48		mg/Kg	10	12/19/2018 3:18:10 PM
Xylenes, Total	220	9.6		mg/Kg	100	12/20/2018 11:06:56 AM
Surr: 4-Bromofluorobenzene	112	80-120		%Rec	100	12/20/2018 11:06:56 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812985

Date Reported: 12/21/2018

CLIENT: HILCORP ENERGY

Client Sample ID: BH-34 75-77'

Project: OH Randel 5

Collection Date: 12/15/2018 12:40:00 PM

Lab ID: 1812985-002

Matrix: SOIL

Received Date: 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: Irm
Diesel Range Organics (DRO)	170	8.6		mg/Kg	1	12/19/2018 4:47:23 PM
Motor Oil Range Organics (MRO)	ND	43		mg/Kg	1	12/19/2018 4:47:23 PM
Surr: DNOP	92.1	50.6-138		%Rec	1	12/19/2018 4:47:23 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: NSB
Gasoline Range Organics (GRO)	1700	25		mg/Kg	5	12/19/2018 3:40:50 PM
Surr: BFB	773	73.8-119	S	%Rec	5	12/19/2018 3:40:50 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: NSB
Benzene	1.9	0.12		mg/Kg	5	12/19/2018 3:40:50 PM
Toluene	49	2.5		mg/Kg	50	12/20/2018 11:29:38 AM
Ethylbenzene	9.0	0.25		mg/Kg	5	12/19/2018 3:40:50 PM
Xylenes, Total	86	5.0		mg/Kg	50	12/20/2018 11:29:38 AM
Surr: 4-Bromofluorobenzene	112	80-120		%Rec	50	12/20/2018 11:29:38 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-35 55-60'

**Project:** OH Randel 5

**Collection Date:** 12/15/2018 5:00:00 PM

**Lab ID:** 1812985-003

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	12/19/2018 5:11:55 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/19/2018 5:11:55 PM
Surr: DNOP	91.9	50.6-138		%Rec	1	12/19/2018 5:11:55 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	12/19/2018 5:34:14 PM
Surr: BFB	88.1	73.8-119		%Rec	1	12/19/2018 5:34:14 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	12/19/2018 5:34:14 PM
Toluene	ND	0.048		mg/Kg	1	12/19/2018 5:34:14 PM
Ethylbenzene	ND	0.048		mg/Kg	1	12/19/2018 5:34:14 PM
Xylenes, Total	ND	0.096		mg/Kg	1	12/19/2018 5:34:14 PM
Surr: 4-Bromofluorobenzene	102	80-120		%Rec	1	12/19/2018 5:34:14 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-35 45-50'

**Project:** OH Randel 5

**Collection Date:** 12/15/2018 3:40:00 PM

**Lab ID:** 1812985-004

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.0		mg/Kg	1	12/19/2018 5:36:14 PM
Motor Oil Range Organics (MRO)	ND	45		mg/Kg	1	12/19/2018 5:36:14 PM
Surr: DNOP	91.5	50.6-138		%Rec	1	12/19/2018 5:36:14 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	12/19/2018 5:57:00 PM
Surr: BFB	87.9	73.8-119		%Rec	1	12/19/2018 5:57:00 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	12/19/2018 5:57:00 PM
Toluene	ND	0.049		mg/Kg	1	12/19/2018 5:57:00 PM
Ethylbenzene	ND	0.049		mg/Kg	1	12/19/2018 5:57:00 PM
Xylenes, Total	ND	0.097		mg/Kg	1	12/19/2018 5:57:00 PM
Surr: 4-Bromofluorobenzene	101	80-120		%Rec	1	12/19/2018 5:57:00 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-36 50-55'

**Project:** OH Randel 5

**Collection Date:** 12/16/2018 1:00:00 PM

**Lab ID:** 1812985-005

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	12/19/2018 6:00:38 PM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	12/19/2018 6:00:38 PM
Surr: DNOP	92.6	50.6-138		%Rec	1	12/19/2018 6:00:38 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	12/19/2018 6:19:43 PM
Surr: BFB	88.1	73.8-119		%Rec	1	12/19/2018 6:19:43 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	12/19/2018 6:19:43 PM
Toluene	0.049	0.047		mg/Kg	1	12/19/2018 6:19:43 PM
Ethylbenzene	ND	0.047		mg/Kg	1	12/19/2018 6:19:43 PM
Xylenes, Total	ND	0.095		mg/Kg	1	12/19/2018 6:19:43 PM
Surr: 4-Bromofluorobenzene	101	80-120		%Rec	1	12/19/2018 6:19:43 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-36 55-60'

**Project:** OH Randel 5

**Collection Date:** 12/16/2018 1:40:00 PM

**Lab ID:** 1812985-006

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	12/19/2018 6:24:52 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	12/19/2018 6:24:52 PM
Surr: DNOP	93.6	50.6-138		%Rec	1	12/19/2018 6:24:52 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	12/19/2018 7:05:16 PM
Surr: BFB	85.1	73.8-119		%Rec	1	12/19/2018 7:05:16 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	12/19/2018 7:05:16 PM
Toluene	0.049	0.049		mg/Kg	1	12/19/2018 7:05:16 PM
Ethylbenzene	ND	0.049		mg/Kg	1	12/19/2018 7:05:16 PM
Xylenes, Total	ND	0.098		mg/Kg	1	12/19/2018 7:05:16 PM
Surr: 4-Bromofluorobenzene	97.2	80-120		%Rec	1	12/19/2018 7:05:16 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-31 20-25'

**Project:** OH Randel 5

**Collection Date:** 12/16/2018 4:00:00 PM

**Lab ID:** 1812985-007

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	280	9.7		mg/Kg	1	12/19/2018 6:49:07 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/19/2018 6:49:07 PM
Surr: DNOP	87.4	50.6-138		%Rec	1	12/19/2018 6:49:07 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	3400	240		mg/Kg	50	12/20/2018 11:52:27 AM
Surr: BFB	249	73.8-119	S	%Rec	50	12/20/2018 11:52:27 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	1.3	0.024		mg/Kg	1	12/19/2018 7:50:45 PM
Toluene	100	2.4		mg/Kg	50	12/20/2018 11:52:27 AM
Ethylbenzene	13	2.4		mg/Kg	50	12/20/2018 11:52:27 AM
Xylenes, Total	180	4.7		mg/Kg	50	12/20/2018 11:52:27 AM
Surr: 4-Bromofluorobenzene	116	80-120		%Rec	50	12/20/2018 11:52:27 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-31 30-33'

**Project:** OH Randel 5

**Collection Date:** 12/16/2018 4:20:00 PM

**Lab ID:** 1812985-008

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>JME</b>
Diesel Range Organics (DRO)	440	9.7		mg/Kg	1	12/18/2018 9:24:07 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/18/2018 9:24:07 AM
Surr: DNOP	100	50.6-138		%Rec	1	12/18/2018 9:24:07 AM
<b>EPA METHOD 8260B: VOLATILES SHORT LIST</b>						Analyst: <b>AG</b>
Benzene	30	4.4		mg/Kg	200	12/18/2018 8:21:37 PM
Toluene	360	8.9		mg/Kg	200	12/18/2018 8:21:37 PM
Ethylbenzene	36	8.9		mg/Kg	200	12/18/2018 8:21:37 PM
Xylenes, Total	360	18		mg/Kg	200	12/18/2018 8:21:37 PM
Surr: 4-Bromofluorobenzene	104	70-130		%Rec	200	12/18/2018 8:21:37 PM
Surr: Toluene-d8	99.8	70-130		%Rec	200	12/18/2018 8:21:37 PM
<b>EPA METHOD 8015D MOD: GASOLINE RANGE</b>						Analyst: <b>AG</b>
Gasoline Range Organics (GRO)	9600	890		mg/Kg	200	12/18/2018 8:21:37 PM
Surr: BFB	95.0	70-130		%Rec	200	12/18/2018 8:21:37 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-28 0-10'

**Project:** OH Randel 5

**Collection Date:** 12/17/2018 9:00:00 AM

**Lab ID:** 1812985-009

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	12/19/2018 7:13:22 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/19/2018 7:13:22 PM
Surr: DNOP	86.5	50.6-138		%Rec	1	12/19/2018 7:13:22 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	7.0	4.9		mg/Kg	1	12/20/2018 12:15:12 PM
Surr: BFB	104	73.8-119		%Rec	1	12/20/2018 12:15:12 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.025		mg/Kg	1	12/20/2018 12:15:12 PM
Toluene	0.21	0.049		mg/Kg	1	12/20/2018 12:15:12 PM
Ethylbenzene	ND	0.049		mg/Kg	1	12/20/2018 12:15:12 PM
Xylenes, Total	0.38	0.099		mg/Kg	1	12/20/2018 12:15:12 PM
Surr: 4-Bromofluorobenzene	103	80-120		%Rec	1	12/20/2018 12:15:12 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-28 30-35'

**Project:** OH Randel 5

**Collection Date:** 12/17/2018 10:00:00 AM

**Lab ID:** 1812985-010

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.3		mg/Kg	1	12/19/2018 7:37:41 PM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	12/19/2018 7:37:41 PM
Surr: DNOP	87.8	50.6-138		%Rec	1	12/19/2018 7:37:41 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	12/19/2018 8:36:07 PM
Surr: BFB	90.2	73.8-119		%Rec	1	12/19/2018 8:36:07 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	12/19/2018 8:36:07 PM
Toluene	ND	0.046		mg/Kg	1	12/19/2018 8:36:07 PM
Ethylbenzene	ND	0.046		mg/Kg	1	12/19/2018 8:36:07 PM
Xylenes, Total	ND	0.092		mg/Kg	1	12/19/2018 8:36:07 PM
Surr: 4-Bromofluorobenzene	88.6	80-120		%Rec	1	12/19/2018 8:36:07 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-29 10'-15'

**Project:** OH Randel 5

**Collection Date:** 12/17/2018 12:00:00 PM

**Lab ID:** 1812985-011

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.5		mg/Kg	1	12/19/2018 8:01:51 PM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	12/19/2018 8:01:51 PM
Surr: DNOP	87.6	50.6-138		%Rec	1	12/19/2018 8:01:51 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	12/19/2018 8:58:50 PM
Surr: BFB	89.8	73.8-119		%Rec	1	12/19/2018 8:58:50 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.024		mg/Kg	1	12/19/2018 8:58:50 PM
Toluene	ND	0.047		mg/Kg	1	12/19/2018 8:58:50 PM
Ethylbenzene	ND	0.047		mg/Kg	1	12/19/2018 8:58:50 PM
Xylenes, Total	ND	0.095		mg/Kg	1	12/19/2018 8:58:50 PM
Surr: 4-Bromofluorobenzene	92.4	80-120		%Rec	1	12/19/2018 8:58:50 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812985**

Date Reported: **12/21/2018**

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-29 27'-32'

**Project:** OH Randel 5

**Collection Date:** 12/17/2018 12:40:00 PM

**Lab ID:** 1812985-012

**Matrix:** SOIL

**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.5		mg/Kg	1	12/19/2018 8:26:10 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	12/19/2018 8:26:10 PM
Surr: DNOP	88.8	50.6-138		%Rec	1	12/19/2018 8:26:10 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	12/19/2018 9:21:34 PM
Surr: BFB	87.8	73.8-119		%Rec	1	12/19/2018 9:21:34 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	12/19/2018 9:21:34 PM
Toluene	ND	0.047		mg/Kg	1	12/19/2018 9:21:34 PM
Ethylbenzene	ND	0.047		mg/Kg	1	12/19/2018 9:21:34 PM
Xylenes, Total	ND	0.094		mg/Kg	1	12/19/2018 9:21:34 PM
Surr: 4-Bromofluorobenzene	93.1	80-120		%Rec	1	12/19/2018 9:21:34 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812985

21-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42163	SampType: MBLK			TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS	Batch ID: 42163			RunNo: 56397					
Prep Date:	12/18/2018	Analysis Date: 12/18/2018			SeqNo: 1885920		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	9.6		10.00		95.6	50.6	138			

Sample ID	LCS-42163		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 42163		RunNo: 56397					
Prep Date:	12/18/2018		Analysis Date: 12/18/2018		SeqNo: 1885921		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	52	10	50.00	0	104	70	130			
Surr: DNOP	4.4		5.000		88.9	50.6	138			

Sample ID	MB-42144		SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS		Batch ID: 42144		RunNo: 56397					
Prep Date:	12/17/2018		Analysis Date: 12/18/2018		SeqNo: 1886799		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	9.4		10.00		94.1	50.6	138			

Sample ID	LCS-42144		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 42144		RunNo: 56397					
Prep Date:	12/17/2018		Analysis Date: 12/18/2018		SeqNo: 1886800		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.9		5.000		97.7	50.6	138			

Sample ID	LCS-42188		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 42188		RunNo: 56437					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1887450		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	41	10	50.00	0	81.7	70	130			
Surr: DNOP	4.0		5.000		80.3	50.6	138			

Sample ID	MB-42188		SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS		Batch ID: 42188		RunNo: 56437					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1887451		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								

### 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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812985

21-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42188		SampType:	MBLK		TestCode:	EPA Method 8015M/D: Diesel Range Organics			
Client ID:	PBS		Batch ID:	42188		RunNo:	56437			
Prep Date:	12/18/2018		Analysis Date:	12/19/2018		SeqNo:	1887451		Units: mg/Kg	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	8.6		10.00		85.5	50.6	138			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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 Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812985

21-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42176		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 42176		RunNo: 56474					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888431		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		90.4	73.8	119			

Sample ID	LCS-42176		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 42176		RunNo: 56474					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888432		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	5.0	25.00	0	96.5	80.1	123			
Surr: BFB	1100		1000		110	73.8	119			

### Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
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 Quantitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812985

21-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42176		SampType: MBLK		TestCode: EPA Method 8021B: Volatiles					
Client ID:	PBS		Batch ID: 42176		RunNo: 56474					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888469		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	1.0		1.000		100	80	120			

Sample ID	LCS-42176		SampType: LCS		TestCode: EPA Method 8021B: Volatiles					
Client ID:	LCSS		Batch ID: 42176		RunNo: 56474					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888470		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.81	0.025	1.000	0	80.9	80	120			
Toluene	0.90	0.050	1.000	0	90.2	80	120			
Ethylbenzene	0.95	0.050	1.000	0	95.0	80	120			
Xylenes, Total	3.0	0.10	3.000	0	101	80	120			
Surr: 4-Bromofluorobenzene	1.1		1.000		106	80	120			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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 Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812985

21-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	100ng lcs	SampType:	LCS	TestCode:	EPA Method 8260B: Volatiles Short List					
Client ID:	LCSS	Batch ID:	A56420	RunNo:	56420					
Prep Date:		Analysis Date:	12/18/2018	SeqNo:	1886354	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.99	0.025	1.000	0	99.1	70	130			
Toluene	0.96	0.050	1.000	0	95.9	70	130			
Surr: 1,2-Dichloroethane-d4	0.51		0.5000		101	70	130			
Surr: 4-Bromofluorobenzene	0.50		0.5000		99.7	70	130			
Surr: Dibromofluoromethane	0.49		0.5000		98.6	70	130			
Surr: Toluene-d8	0.48		0.5000		96.3	70	130			

Sample ID	rb	SampType:	MBLK	TestCode:	EPA Method 8260B: Volatiles Short List					
Client ID:	PBS	Batch ID:	A56420	RunNo:	56420					
Prep Date:		Analysis Date:	12/18/2018	SeqNo:	1886362	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: 1,2-Dichloroethane-d4	0.51		0.5000		102	70	130			
Surr: 4-Bromofluorobenzene	0.51		0.5000		103	70	130			
Surr: Dibromofluoromethane	0.50		0.5000		99.7	70	130			
Surr: Toluene-d8	0.50		0.5000		99.6	70	130			

### Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
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 Quantitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812985

21-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	2.5ug gro lcs	SampType:	LCS	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	LCSS	Batch ID:	B56420	RunNo:	56420					
Prep Date:		Analysis Date:	12/18/2018	SeqNo:	1886341	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	5.0	25.00	0	92.0	70	130			
Surr: BFB	460		500.0		92.7	70	130			

Sample ID	rb	SampType:	MBLK	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	PBS	Batch ID:	B56420	RunNo:	56420					
Prep Date:		Analysis Date:	12/18/2018	SeqNo:	1886342	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	470		500.0		94.0	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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



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 FAR

Work Order Number: 1812985

RcptNo: 1

Received By: Isaiah Ortiz 12/18/2018 8:05:00 AM

Completed By: Anne Thorne 12/18/2018 8:33:31 AM

Reviewed By: JAB 12/18/18

IOX

Anne Thorne

Labeled by: DAD 12/18/18

### 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  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? 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. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒  
10. Were any sample containers received broken? Yes ☐ No ☒  
11. Does paperwork match bottle labels? Yes ☒ No ☐  
(Note discrepancies on chain of custody)  
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? Yes ☒ No ☐  
(If no, notify customer for authorization.)

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

Adjusted? \_\_\_\_\_

Checked by: DAD 12/18/18

### 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 $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.1	Good	Yes			
2	2.4	Good	Yes			





*Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)*

December 26, 2018

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

RE: OH Randel 5

OrderNo.: 1812988

Dear Clara Cardoza:

Hall Environmental Analysis Laboratory received 1 sample(s) on 12/18/2018 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](http://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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a light blue horizontal line.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order **1812988**Date Reported: **12/26/2018****CLIENT:** HILCORP ENERGY**Client Sample ID:** BH-33 100-105'**Project:** OH Randel 5**Collection Date:** 12/17/2018 3:40:00 PM**Lab ID:** 1812988-001**Matrix:** SOIL**Received Date:** 12/18/2018 8:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: <b>Irm</b>
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	12/21/2018 7:02:13 AM	42209
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/21/2018 7:02:13 AM	42209
Surr: DNOP	112	50.6-138		%Rec	1	12/21/2018 7:02:13 AM	42209
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	12/19/2018 1:15:08 PM	42178
Surr: BFB	94.0	73.8-119		%Rec	1	12/19/2018 1:15:08 PM	42178
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	12/19/2018 1:15:08 PM	42178
Toluene	0.093	0.046		mg/Kg	1	12/19/2018 1:15:08 PM	42178
Ethylbenzene	ND	0.046		mg/Kg	1	12/19/2018 1:15:08 PM	42178
Xylenes, Total	ND	0.093		mg/Kg	1	12/19/2018 1:15:08 PM	42178
Surr: 4-Bromofluorobenzene	96.6	80-120		%Rec	1	12/19/2018 1:15:08 PM	42178

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812988

26-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42209		SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS		Batch ID: 42209		RunNo: 56431					
Prep Date:	12/19/2018		Analysis Date: 12/20/2018		SeqNo: 1890230		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	50.6	138			

Sample ID	LCS-42209		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 42209		RunNo: 56431					
Prep Date:	12/19/2018		Analysis Date: 12/20/2018		SeqNo: 1890231		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	60	10	50.00	0	119	70	130			
Surr: DNOP	5.4		5.000		109	50.6	138			

Sample ID	LCS-42209		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 42209		RunNo: 56431					
Prep Date:	12/19/2018		Analysis Date: 12/21/2018		SeqNo: 1890696		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	58	10	50.00	0	116	70	130			
Surr: DNOP	5.9		5.000		118	50.6	138			

### 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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812988

26-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42178		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 42178		RunNo: 56473					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888352		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	950		1000		94.7	73.8	119			

Sample ID	LCS-42178		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 42178		RunNo: 56473					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888353		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	5.0	25.00	0	97.8	80.1	123			
Surr: BFB	1000		1000		101	73.8	119			

Sample ID	MB-42210		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 42210		RunNo: 56489					
Prep Date:	12/19/2018		Analysis Date: 12/20/2018		SeqNo: 1889749		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	880		1000		87.8	73.8	119			

Sample ID	LCS-42210		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 42210		RunNo: 56489					
Prep Date:	12/19/2018		Analysis Date: 12/20/2018		SeqNo: 1889750		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	1000		1000		104	73.8	119			

### 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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812988

26-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42178		SampType: MBLK		TestCode: EPA Method 8021B: Volatiles					
Client ID:	PBS		Batch ID: 42178		RunNo: 56473					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888393		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	0.98		1.000		98.1	80	120			

Sample ID	LCS-42178		SampType: LCS		TestCode: EPA Method 8021B: Volatiles					
Client ID:	LCSS		Batch ID: 42178		RunNo: 56473					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888394		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.93	0.025	1.000	0	93.1	80	120			
Toluene	0.98	0.050	1.000	0	98.1	80	120			
Ethylbenzene	1.0	0.050	1.000	0	99.7	80	120			
Xylenes, Total	3.0	0.10	3.000	0	100	80	120			
Surr: 4-Bromofluorobenzene	0.99		1.000		99.2	80	120			

Sample ID	1812988-001AMS		SampType: MS		TestCode: EPA Method 8021B: Volatiles					
Client ID:	BH-33 100-105'		Batch ID: 42178		RunNo: 56473					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888396		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.0	0.024	0.9425	0.02231	109	63.9	127			
Toluene	1.2	0.047	0.9425	0.09306	116	69.9	131			
Ethylbenzene	1.1	0.047	0.9425	0.01120	121	71	132			
Xylenes, Total	3.5	0.094	2.828	0.04935	122	71.8	131			
Surr: 4-Bromofluorobenzene	0.88		0.9425		93.2	80	120			

Sample ID	1812988-001AMSD		SampType: MSD		TestCode: EPA Method 8021B: Volatiles					
Client ID:	BH-33 100-105'		Batch ID: 42178		RunNo: 56473					
Prep Date:	12/18/2018		Analysis Date: 12/19/2018		SeqNo: 1888397		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.98	0.023	0.9363	0.02231	102	63.9	127	6.49	20	
Toluene	1.1	0.047	0.9363	0.09306	111	69.9	131	4.60	20	
Ethylbenzene	1.1	0.047	0.9363	0.01120	115	71	132	5.06	20	
Xylenes, Total	3.3	0.094	2.809	0.04935	116	71.8	131	5.22	20	
Surr: 4-Bromofluorobenzene	0.89		0.9363		95.2	80	120	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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812988

26-Dec-18

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42210		SampType: MBLK		TestCode: EPA Method 8021B: Volatiles					
Client ID:	PBS		Batch ID: 42210		RunNo: 56489					
Prep Date:	12/19/2018		Analysis Date: 12/20/2018		SeqNo: 1889786		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	0.92		1.000		91.6	80	120			

Sample ID	LCS-42210		SampType: LCS		TestCode: EPA Method 8021B: Volatiles					
Client ID:	LCSS		Batch ID: 42210		RunNo: 56489					
Prep Date:	12/19/2018		Analysis Date: 12/20/2018		SeqNo: 1889787		Units: %Rec			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	1.0		1.000		102	80	120			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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 Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# Sample Log-In Check List

Client Name: HILCORP ENERGY FAR

Work Order Number: 1812988

RcptNo: 1

Received By: **Isaiah Ortiz** 12/18/2018 8:05:00 AM

Completed By: **Michelle Garcia** 12/18/2018 9:10:18 AM

Reviewed By: *SV 12-18-18*

*LB : DAD 12/18/18*

*I-OK*

*Michelle Garcia*

## 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. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒

10. Were any sample containers received broken? Yes ☐ No ☒

11. Does paperwork match bottle labels? Yes ☒ No ☐

(Note discrepancies on chain of custody)

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? Yes ☒ No ☐

(If no, notify customer for authorization.)

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

Adjusted? \_\_\_\_\_

Checked by: *DAD 12/18/18*

## 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	2.4	Good	Yes			
2	2.1	Good	Yes			

# Chain-of-Custody Record

Client: Hilcorp Four Corners  
Clara Cardona  
 Mailing Address:

Phone #: 970-385-1096  
 email or Fax#: ccardona@hilcorp.com  
 QA/QC Package:  
☒ Standard ☐ Level 4 (Full Validation)

Accreditation  
☐ NELAP ☐ Other

☒ EDD (Type) PDF

Date	Time	Matrix	Sample Request ID
12/17	1540	Soil	BH-33 100-105

Turn-Around Time:

☒ Standard ☐ Rush

Project Name:

OH Randel #5

Project #:

Project Manager:

Clara Cardona - Hilcorp  
Devin Henemann - LTF

Sampler: Eric Carroll

On Ice: ☒ Yes ☐ No

Sample Temperature: 2.4°C 2.1°C

Container Type and #	Preservative Type	HEAL No.
1.402	cool	1812988 -001

Relinquished by:

Time:

Received by:

Date:

Time:

Relinquished by:

Time:

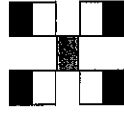
Received by:

Date:

Time:

Remarks:

Please CC: dhennemann@itenv.com  
ecarroll@itenv.com



## HALL ENVIRONMENTAL ANALYSIS LABORATORY

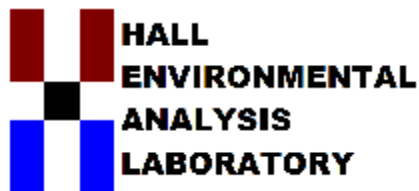
www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

### Analysis Request

BTX + MTBE + TMBs (8021)	X	BTX + MTBE + TPH (Gas only)	X	TPH 8015B (GRO / DRO / MRO)		TPH (Method 418.1)		EDB (Method 504.1)		PAH's (8310 or 8270 SIMS)		RCRA 8 Metals		Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )		8081 Pesticides / 8082 PCB's		8260B (VOA)		8270 (Semi-VOA)		Air Bubbles (Y or N)	
--------------------------	---	-----------------------------	---	-----------------------------	--	--------------------	--	--------------------	--	---------------------------	--	---------------	--	--	--	------------------------------	--	-------------	--	-----------------	--	----------------------	--



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

January 03, 2019

Clara Cardoza

HILCORP ENERGY

PO Box 4700

Farmington, NM 87499

TEL: (505) 564-0733

FAX

RE: OH Randel 5

OrderNo.: 1812C56

Dear Clara Cardoza:

Hall Environmental Analysis Laboratory received 6 sample(s) on 12/20/2018 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued December 28, 2018.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. 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. All samples are reported as received unless otherwise indicated.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", with a stylized flourish at the end.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812C56

Date Reported: 1/3/2019

CLIENT: HILCORP ENERGY

Client Sample ID: BH-32 75-80'

Project: OH Randel 5

Collection Date: 12/18/2018 10:50:00 AM

Lab ID: 1812C56-001

Matrix: SOIL

Received Date: 12/20/2018 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	12/27/2018 7:41:34 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	12/27/2018 7:41:34 PM
Surr: DNOP	95.1	50.6-138		%Rec	1	12/27/2018 7:41:34 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	28	4.9		mg/Kg	1	12/26/2018 10:10:19 PM
Surr: BFB	169	73.8-119	S	%Rec	1	12/26/2018 10:10:19 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	0.069	0.025		mg/Kg	1	12/26/2018 10:10:19 PM
Toluene	0.66	0.049		mg/Kg	1	12/26/2018 10:10:19 PM
Ethylbenzene	0.14	0.049		mg/Kg	1	12/26/2018 10:10:19 PM
Xylenes, Total	1.7	0.099		mg/Kg	1	12/26/2018 10:10:19 PM
Surr: 4-Bromofluorobenzene	103	80-120		%Rec	1	12/26/2018 10:10:19 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified



# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812C56

Date Reported: 1/3/2019

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-32 95-100'

**Project:** OH Randel 5

**Collection Date:** 12/18/2018 11:40:00 AM

**Lab ID:** 1812C56-002

**Matrix:** SOIL

**Received Date:** 12/20/2018 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	12/27/2018 8:03:33 PM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	12/27/2018 8:03:33 PM
Surr: DNOP	96.2	50.6-138		%Rec	1	12/27/2018 8:03:33 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	31	4.7		mg/Kg	1	12/26/2018 11:11:34 AM
Surr: BFB	193	73.8-119	S	%Rec	1	12/26/2018 11:11:34 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	0.024	0.024		mg/Kg	1	12/26/2018 11:11:34 AM
Toluene	0.048	0.047		mg/Kg	1	12/26/2018 11:11:34 AM
Ethylbenzene	ND	0.047		mg/Kg	1	12/26/2018 11:11:34 AM
Xylenes, Total	0.30	0.094		mg/Kg	1	12/26/2018 11:11:34 AM
Surr: 4-Bromofluorobenzene	103	80-120		%Rec	1	12/26/2018 11:11:34 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812C56

Date Reported: 1/3/2019

CLIENT: HILCORP ENERGY

Client Sample ID: BH-31 94-96'

Project: OH Randel 5

Collection Date: 12/19/2018 11:20:00 AM

Lab ID: 1812C56-003

Matrix: SOIL

Received Date: 12/20/2018 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: Irm
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	12/27/2018 8:25:26 PM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	12/27/2018 8:25:26 PM
Surr: DNOP	96.1	50.6-138		%Rec	1	12/27/2018 8:25:26 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	12/26/2018 11:34:13 AM
Surr: BFB	92.4	73.8-119		%Rec	1	12/26/2018 11:34:13 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: NSB
Benzene	ND	0.023		mg/Kg	1	12/26/2018 11:34:13 AM
Toluene	ND	0.047		mg/Kg	1	12/26/2018 11:34:13 AM
Ethylbenzene	ND	0.047		mg/Kg	1	12/26/2018 11:34:13 AM
Xylenes, Total	ND	0.094		mg/Kg	1	12/26/2018 11:34:13 AM
Surr: 4-Bromofluorobenzene	96.2	80-120		%Rec	1	12/26/2018 11:34:13 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812C56

Date Reported: 1/3/2019

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-31 61-63'

**Project:** OH Randel 5

**Collection Date:** 12/19/2018 11:00:00 AM

**Lab ID:** 1812C56-004

**Matrix:** SOIL

**Received Date:** 12/20/2018 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	330	10		mg/Kg	1	12/27/2018 8:47:13 PM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	12/27/2018 8:47:13 PM
Surr: DNOP	106	50.6-138		%Rec	1	12/27/2018 8:47:13 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	7200	470		mg/Kg	100	12/26/2018 11:56:55 AM
Surr: BFB	199	73.8-119	S	%Rec	100	12/26/2018 11:56:55 AM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	28	2.3		mg/Kg	100	12/26/2018 11:56:55 AM
Toluene	270	4.7		mg/Kg	100	12/26/2018 11:56:55 AM
Ethylbenzene	28	4.7		mg/Kg	100	12/26/2018 11:56:55 AM
Xylenes, Total	270	9.4		mg/Kg	100	12/26/2018 11:56:55 AM
Surr: 4-Bromofluorobenzene	107	80-120		%Rec	100	12/26/2018 11:56:55 AM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812C56

Date Reported: 1/3/2019

CLIENT: HILCORP ENERGY

Client Sample ID: BH-28 45-50'

Project: OH Randel 5

Collection Date: 12/19/2018 12:55:00 PM

Lab ID: 1812C56-005

Matrix: SOIL

Received Date: 12/20/2018 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: Irm
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	12/27/2018 9:09:02 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	12/27/2018 9:09:02 PM
Surr: DNOP	99.6	50.6-138		%Rec	1	12/27/2018 9:09:02 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	12/26/2018 12:19:50 PM
Surr: BFB	90.7	73.8-119		%Rec	1	12/26/2018 12:19:50 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: NSB
Benzene	ND	0.024		mg/Kg	1	12/26/2018 12:19:50 PM
Toluene	ND	0.048		mg/Kg	1	12/26/2018 12:19:50 PM
Ethylbenzene	ND	0.048		mg/Kg	1	12/26/2018 12:19:50 PM
Xylenes, Total	ND	0.095		mg/Kg	1	12/26/2018 12:19:50 PM
Surr: 4-Bromofluorobenzene	95.6	80-120		%Rec	1	12/26/2018 12:19:50 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# Hall Environmental Analysis Laboratory, Inc.

## Analytical Report

Lab Order 1812C56

Date Reported: 1/3/2019

**CLIENT:** HILCORP ENERGY

**Client Sample ID:** BH-28 85-87'

**Project:** OH Randel 5

**Collection Date:** 12/19/2018 2:25:00 PM

**Lab ID:** 1812C56-006

**Matrix:** SOIL

**Received Date:** 12/20/2018 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>						Analyst: <b>irm</b>
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	12/27/2018 9:30:46 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	12/27/2018 9:30:46 PM
Surr: DNOP	109	50.6-138		%Rec	1	12/27/2018 9:30:46 PM
<b>EPA METHOD 8015D: GASOLINE RANGE</b>						Analyst: <b>NSB</b>
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	12/26/2018 4:30:08 PM
Surr: BFB	89.7	73.8-119		%Rec	1	12/26/2018 4:30:08 PM
<b>EPA METHOD 8021B: VOLATILES</b>						Analyst: <b>NSB</b>
Benzene	ND	0.023		mg/Kg	1	12/26/2018 4:30:08 PM
Toluene	ND	0.047		mg/Kg	1	12/26/2018 4:30:08 PM
Ethylbenzene	ND	0.047		mg/Kg	1	12/26/2018 4:30:08 PM
Xylenes, Total	ND	0.093		mg/Kg	1	12/26/2018 4:30:08 PM
Surr: 4-Bromofluorobenzene	95.4	80-120		%Rec	1	12/26/2018 4:30:08 PM

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

<b>Qualifiers:</b>	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	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 Quantitative Limit	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812C56

03-Jan-19

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	LCS-42306		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 42306		RunNo: 56614					
Prep Date:	12/26/2018		Analysis Date: 12/27/2018		SeqNo: 1894477		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	51	10	50.00	0	102	70	130			
Surr: DNOP	4.1		5.000		81.6	50.6	138			

Sample ID	MB-42306	SampType: MBLK			TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS	Batch ID: 42306			RunNo: 56614					
Prep Date:	12/26/2018	Analysis Date: 12/27/2018			SeqNo: 1894478		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	9.3		10.00		93.4	50.6	138			

Sample ID	1812C56-006AMS		SampType: MS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	BH-28 85-87'		Batch ID: 42306		RunNo: 56614					
Prep Date:	12/26/2018		Analysis Date: 12/27/2018		SeqNo: 1895081		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	51	9.6	48.12	0	106	53.5	126			
Surr: DNOP	5.2		4.812		108	50.6	138			

Sample ID	1812C56-006AMSD		SampType:	MSD		TestCode:	EPA Method 8015M/D: Diesel Range Organics				
Client ID:	BH-28 85-87'		Batch ID:	42306		RunNo:	56614				
Prep Date:	12/26/2018		Analysis Date:	12/27/2018		SeqNo:	1895082		Units: mg/Kg		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Diesel Range Organics (DRO)	50	9.8	48.92	0	102	53.5	126	2.34	21.7		
Surr: DNOP	5.0		4.892		101	50.6	138	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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812C56

03-Jan-19

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42264		SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	PBS		Batch ID: 42264		RunNo: 56602					
Prep Date:	12/21/2018		Analysis Date: 12/26/2018		SeqNo: 1893678		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	950		1000		95.2	73.8	119			

Sample ID	LCS-42264		SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range					
Client ID:	LCSS		Batch ID: 42264		RunNo: 56602					
Prep Date:	12/21/2018		Analysis Date: 12/26/2018		SeqNo: 1893679		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	24	5.0	25.00	0	96.2	80.1	123			
Surr: BFB	1100		1000		111	73.8	119			

### Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range
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 Quantitative Limit	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1812C56

03-Jan-19

Client: HILCORP ENERGY

Project: OH Randel 5

Sample ID	MB-42264	SampType:	MBLK		TestCode:	EPA Method 8021B: Volatiles				
Client ID:	PBS	Batch ID:	42264		RunNo:	56602				
Prep Date:	12/21/2018	Analysis Date:	12/26/2018		SeqNo:	1893709	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	1.0		1.000		102	80	120			

Sample ID	LCS-42264		SampType: LCS		TestCode: EPA Method 8021B: Volatiles					
Client ID:	LCSS		Batch ID: 42264		RunNo: 56602					
Prep Date:	12/21/2018		Analysis Date: 12/26/2018		SeqNo: 1893710		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.84	0.025	1.000	0	84.0	80	120			
Toluene	0.90	0.050	1.000	0	90.2	80	120			
Ethylbenzene	0.94	0.050	1.000	0	93.7	80	120			
Xylenes, Total	2.9	0.10	3.000	0	95.7	80	120			
Surr: 4-Bromofluorobenzene	1.1		1.000		109	80	120			

### 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 Quantitative Limit  
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank  
E Value above quantitation range  
J Analyte detected below quantitation limits  
P Sample pH Not In Range  
RL Reporting Detection Limit  
W Sample container temperature is out of limit as specified



# Sample Log-In Check List

Client Name: **HILCORP ENERGY FAR**

Work Order Number: **1812C56**

RcptNo: 1

Received By: **Anne Thorne** 12/20/2018 8:00:00 AM

Completed By: **Erin Melendrez** 12/21/2018 8:51:10 AM

Reviewed By: *AC 12/21/18*

LB: SAB 12/21/18

## 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  $>0^{\circ}\text{C}$  to  $6.0^{\circ}\text{C}$ ? 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. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
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 ☐

# of preserved  
bottles checked  
for pH:

(&lt;2 or &gt;12 unless noted)

Adjusted?

Checked by: SAB 12/21/18

## 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	1.0	Good	Yes			
2	1.0	Good	Yes			
3	1.0	Good	Yes			
4	1.0	Good	Yes			



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## Sample Log-In Check List

Client Name: HILCORP ENERGY FAR

Work Order Number: 1812C56

RcptNo: 1

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
5	1.0	Good	Yes			
6	1.4	Good	Yes			

