LT Environmental, Inc.
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Durango, Colorado 81301
970.385.1096

May 13, 2019

NMOCD
MAY 17 2019
DISTRICT III

Mr. Cory Smith
New Mexico Oil Conservation Division
1000 Rio Brazos Road
Aztec, New Mexico 87410

RE: Stage 1 Abatement Plan (AP-126-0) – April 2019 Update and Supplemental Report
Hilcorp Energy Company
Standard #1
API # 30-045-08718
NCS1735235018
San Juan County, New Mexico

Accepted For Record
PJEG1821432884

Dear Mr. Smith:

LT Environmental, Inc. (LTE), on behalf of Hilcorp Energy Company (Hilcorp), presents the following update and supplemental report to the Stage 1 Abatement Plan (AP-126-0; Abatement Plan) associated with subsurface hydrocarbon impacts encountered at the Standard #1 natural gas production well (Site) (Figure 1). This report details the activities conducted since approval of the Abatement Plan which received status as "administratively complete" by the New Mexico Oil Conservation Division (NMOCD) on January 22, 2019. This report proposes the necessary additional delineation activities with continued monitoring and provides a proposed schedule for subsequent submittal of the Stage 2 Abatement Plan per New Mexico Administrative Code (NMAC) 19.15.30.

STAGE 1 ABATEMENT PLAN

On November 30, 2018, LTE, on behalf of Hilcorp, submitted the Abatement Plan to the NMOCD and was approved on January 22, 2019. Public notice was served followed by a 30-day public comment period according to 19.15.30.15 NMAC. The Abatement Plan proposed additional soil boring investigation and quarterly groundwater monitoring.

Additional Investigation

From March 19, 2019, to March 21, 2019, LTE conducted additional soil and groundwater assessment activities at the Site. A total of eight boreholes were advanced at the Site ranging from 20 feet to 35 feet below ground surface (bgs). Soil borings were advanced north, east, and south of the known impacted area to define the lateral extent of previously identified impacted soil and groundwater. The soil borings were logged by an LTE geologist who inspected the soil for the presence or absence of petroleum hydrocarbon odor and/or staining. The soil was

characterized by visually inspecting the soil samples and field screening the soil headspace using a photo-ionization detector (PID) to monitor for the presence of volatile organic vapors (VOCs). Groundwater monitoring wells were constructed in each borehole by installing screened casing across the groundwater interface and solid casing to surface. Monitoring wells were constructed out of 2-inch diameter Schedule 40 polyvinyl chloride (PVC) casing and 2-inch Schedule 40 PVC 0.010-inch slotted screen. Wells were completed with 10-20 silica sand pack to two feet above the screened interval, then two feet of hydrated bentonite seal, and then bentonite-cement slurry grout to ground surface. The wells were completed aboveground with a locking, steel protective casing cemented into the ground.

After construction, LTE surveyed the new groundwater monitoring wells with a Trimble® GeoExplorer® 3000 series Global Positioning System (GPS) to determine the latitude and longitude. Top-of-casing elevations were surveyed using a Dewalt® DW074 Rotary Laser Level to an accuracy of no less than plus or minus (±) 0.01 feet so that groundwater flow direction and gradient could be determined relative to mean seal level. Once the top of well casing was surveyed, the depth to groundwater or phase separated hydrocarbon (PSH) below top of casing was measured with an oil/water interface probe. The wells were developed by purging a minimum of ten casing volumes, or until the well was purged dry. Eight additional monitoring wells were installed in an effort to delineate impacted soil and groundwater. Newly installed monitoring well locations are depicted on Figure 2. Soil boring logs and monitoring well construction diagrams are included as Attachment 1.

Soil Sampling

Two soil samples from each soil boring were submitted for laboratory analysis: the most impacted sample based on field screening techniques and the terminus of the boring above the field identified groundwater table. Each sample was analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using United States Environmental Protection Agency (US EPA) Method 8021 and total petroleum hydrocarbons (TPH) – gasoline range organics (GRO), diesel range organics (DRO), and motor-oil range organics (MRO) via US EPA Method 8015.

Concentrations of benzene, BTEX, and TPH were similar to previously reported results. No samples exceeded the NMOCD remediation action level for benzene of five milligrams per kilogram (mg/kg). Laboratory analytical results indicated two soil samples exceeded the NMOCD remediation action level for total BTEX concentration of 50 mg/kg: MW15 @ 18'-20' and MW18 @ 25'-27', with concentrations of 104.53 mg/kg and 152.30 mg/kg, respectively. Concentrations of TPH exceeded the NMOCD remediation action level of 100 mg/kg in borings MW15, MW18, and MW19, with TPH concentrations ranging from 119 mg/kg in MW18 @18'-20' to 1,590 mg/kg in MW18 @ 25'-27'. The soil analytical results from existing and newly advanced soil borings are summarized and compared to the NMOCD remediation action levels in Figure 3 and Table 1. The laboratory analytical reports for the newly collected soil samples are included as Attachment 2.

Groundwater Monitoring

As required in the Abatement Plan, LTE conducted quarterly groundwater monitoring on all monitoring wells (newly installed and existing) on March 26, 2019. Static groundwater level monitoring included measuring depth to groundwater and/or depth to PSH in 22 monitoring wells with an oil/water interface probe. The interface probe was decontaminated with Alconox™ soap and rinsed with deionized water prior to each measurement.

Monitoring wells MW01, MW02, MW06, MW10, and MW14 contained measurable PSH. When PSH was measured in a monitoring well, a correction factor of 0.8 was applied to the elevation to account for the depression of the water column caused by the weight of the overlying PSH. Groundwater elevations and PSH thickness are summarized in Table 2 and depicted on Figure 4.

PSH removal was completed using a dedicated bailer and total volume removed was recorded. All PSH was disposed of in the onsite pit tank. A total of 2.4 gallons of PSH was removed from seven different monitoring wells. MW01 and MW06 generally have the greatest PSH thickness and, therefore, PSH recovery, which is nearly double the volume recovered from the other wells. The occurrence of PSH is greatest near the original release location but extends as far northeast as MW14. PSH thickness measurements are summarized in Table 2 and displayed on Figure 4.

Presence of groundwater is variable. Nine monitoring wells are dry and have never contained groundwater. No saturated sediments were observed during soil boring advancement. Groundwater elevation data indicate that when groundwater is present, flow direction trends to the northwest at the Site. There is evidence of a distinct groundwater high along MW01, MW02, MW06, and MW11 with a groundwater depression at MW03. This discrepancy in groundwater elevations suggest that MW03 may be hydraulically separate from the surrounding wells, similar to the dry wells, or may be influenced by the presence of the open excavation. Lithologic controls are not evident in the existing borehole/lithologic data. It appears groundwater is discontinuous, with isolated pockets or channels forming preferential pathways for any liquid migration that are difficult to identify or predict.

On March 29, 2019, groundwater samples were collected and submitted for analysis of BTEX from eight monitoring wells (MW03, MW05, MW11, MW12, MW16, MW19, MW20, and MW22) that had adequate volume of groundwater for sampling and did not contain PSH. Groundwater samples were submitted under strict chain-of-custody protocol to Hall Environmental Analysis Laboratory (Hall) in Albuquerque, New Mexico, for analysis of BTEX by US EPA Method 8021B. LTE used low-flow sampling methods and a submersible pump to collect groundwater samples in monitoring wells that had a suitable water column. LTE used a YSI 556 hand-held multi-probe water quality field meter to record pH, electric conductivity (EC), and temperature of the groundwater. During low-flow sampling monitoring wells were purged until these properties stabilized, or until the well was purged dry, indicating that the purge water was representative

of aquifer conditions. Stabilization was defined as three consecutive stable readings for each water property (plus or minus (±) 0.4 units for pH, ±10 percent for EC, and ±2 degrees Celsius (°C) for temperature. The water column in monitoring wells MW03, MW16, MW20 and MW22 was inadequate for low-flow sampling; therefore, grab samples were collected from these monitoring wells using new disposable polyethylene bailers. The interface probe and submersible pump were decontaminated with Alconox™ soap and rinsed with de-ionized water prior to each use to prevent cross-contamination.

Laboratory analytical results of groundwater samples indicated benzene concentrations exceeded the New Mexico Water Quality Control Commission (NMWQCC) standard in MW03, MW05, MW12, MW16, MW19, and MW20 with concentrations ranging from 870 micrograms per liter (µg/L) in MW12 to 21,000 µg/L in MW03. Toluene concentrations exceeded the NMWQCC standard in MW05, MW16, MW19, and MW20 ranging from 880 µg/L in MW05 to 14,000 µg/L in MW16. Ethylbenzene concentrations exceeded the NMWQCC standard in MW12, MW16, and MW19 ranging from 930 µg/L in MW19 to 1,200 µg/L in MW12. Total xylenes concentrations exceeded the NMWQCC standard in MW03, MW05, MW12, MW16, and MW19 range from 1,500 µg/L in MW12 to 11,000 µg/L in MW03. The groundwater analytical results as compared to the NMWQCC standards are presented on Figure 5 and summarized in Table 3. The laboratory analytical reports are included in Attachment 2.

PROPOSED ADDITIONAL DELINEATION

Impact to soil and groundwater is delineated by borings from which soil and groundwater samples contain concentrations of constituents of concern below the applicable remediation action levels or by soil borings from which soil samples contain concentrations of constituents of concern below applicable remediation action levels and no groundwater. Impact to soil is not delineated to the northeast of MW18. Groundwater is not delineated west or northwest of monitoring wells MW19 and MW20, southwest of MW10, north and northeast of MW16, or southeast of MW03 and MW05 (Figures 3 and 5).

LTE proposes to install a minimum of four soil borings to fill these data gaps. The soil borings will be logged by an LTE geologist who will inspect the soil for the presence or absence of petroleum hydrocarbon odor and/or staining. The soil will be characterized by visually inspecting the soil samples and field screening the soil headspace using a PID to monitor for the presence of VOCs. Two soil samples from each soil boring will be submitted for laboratory analysis: the most impacted sample based on field screening techniques and the terminus of the borehole. Soil samples will be submitted to Hall for analysis of BTEX by USEPA 8260 and TPH-GRO, TPH-DRO, and TPH-MRO by USEPA Method 8015. If groundwater is encountered, monitoring wells will be constructed by installing screened casing across the groundwater interface and solid casing to surface. Upon completion of additional boreholes, groundwater monitoring wells will be

developed and tied into the existing survey data. To develop the wells, depth to water will be measured and ten casing volumes will be purged or until dry. At least 48 hours after development, the new groundwater monitoring wells will be sampled with a disposable bailer after three casing volumes have been purged. Groundwater samples will be submitted to Hall for analysis of BTEX by USEPA Method 8260. Proposed borehole locations are depicted on Figure 3 and Figure 5. Additional borings and monitoring wells will be installed as needed to complete delineation of any field identified impacts. Prior to drilling activities, all additional proposed borehole locations will be permitted with the New Mexico Office of the State Engineer.

PROPOSED GROUNDWATER MONITORING

LTE will continue quarterly groundwater monitoring at the Site beginning after the new monitoring wells are installed. Existing monitoring wells will be sampled concurrently with new monitoring wells. Fluid-level measurements will be monitored in all wells using an oil/water interface probe. Based on fluid-level measurements, wells containing sufficient groundwater will be purged and sampled. Each well will be purged of three well casing volumes or until the well is purged dry. Groundwater samples will be collected from each monitoring and submitted for laboratory analysis of BTEX by USEPA 8260. Wells with measurable PSH will not be sampled and PSH recovery will be conducted.

QUALITY ASSURANCE

Sampling and analytical techniques have been identified in the text above and conform with the references identified in Subsection B of 20.6.2.3107 NMAC and with 20.6.4.14 NMAC of the water quality standards for interstate and intrastate surface waters in New Mexico.

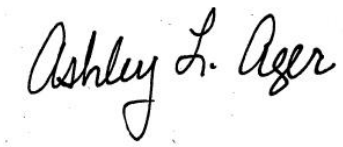
PROPOSED SCHEDULE

The additional delineation activities are proposed to be completed by July 30, 2019. Prior to any fieldwork, LTE and/or Hilcorp will provide the NMOCD with 48-hour notification. Following the proposed additional delineation activities, LTE will assess and present the results to the NMOCD in a supplemental report to the Stage 1 Abatement Plan within three weeks after receipt of the analytical reports. If the subsurface impacts are fully defined, and the geology and hydrology are fully understood, LTE will design and submit remediation options as part of the Stage 2 Abatement Plan for approval from the NMOCD within 60 days of the director's approval of the final site investigation report per NMAC 19.15.30.13.D (1).

LTE appreciates the opportunity to provide this report to the NMOCD. If you have any questions or comments regarding this update to the Stage 1 Abatement Plan, do not hesitate to contact me at (970) 385-1096 or via email at dburns@ltenv.com or Jennifer Deal at (505) 324-5128 or at jdeal@hilcorp.com.

Sincerely,

LT ENVIRONMENTAL, INC.



Danny Burns
Project Geologist

Ashley Ager, P.G.
Senior Geologist

cc: Jennifer Deal, Hilcorp Energy Company

Attachments:

Figure 1 – Site Location Map
Figure 2 – Monitoring Well Locations
Figure 3 – Soil Analytical Results
Figure 4 – March 2019 Groundwater Potentiometric and PSH Thickness Map
Figure 5 – March 2019 Groundwater Analytical Results
Table 1 – Soil Analytical Results
Table 2 – Groundwater Elevations
Table 3 – Groundwater Analytical Results
Attachment 1 – Soil Boring Logs
Attachment 2 – Laboratory Analytical Reports

FIGURES

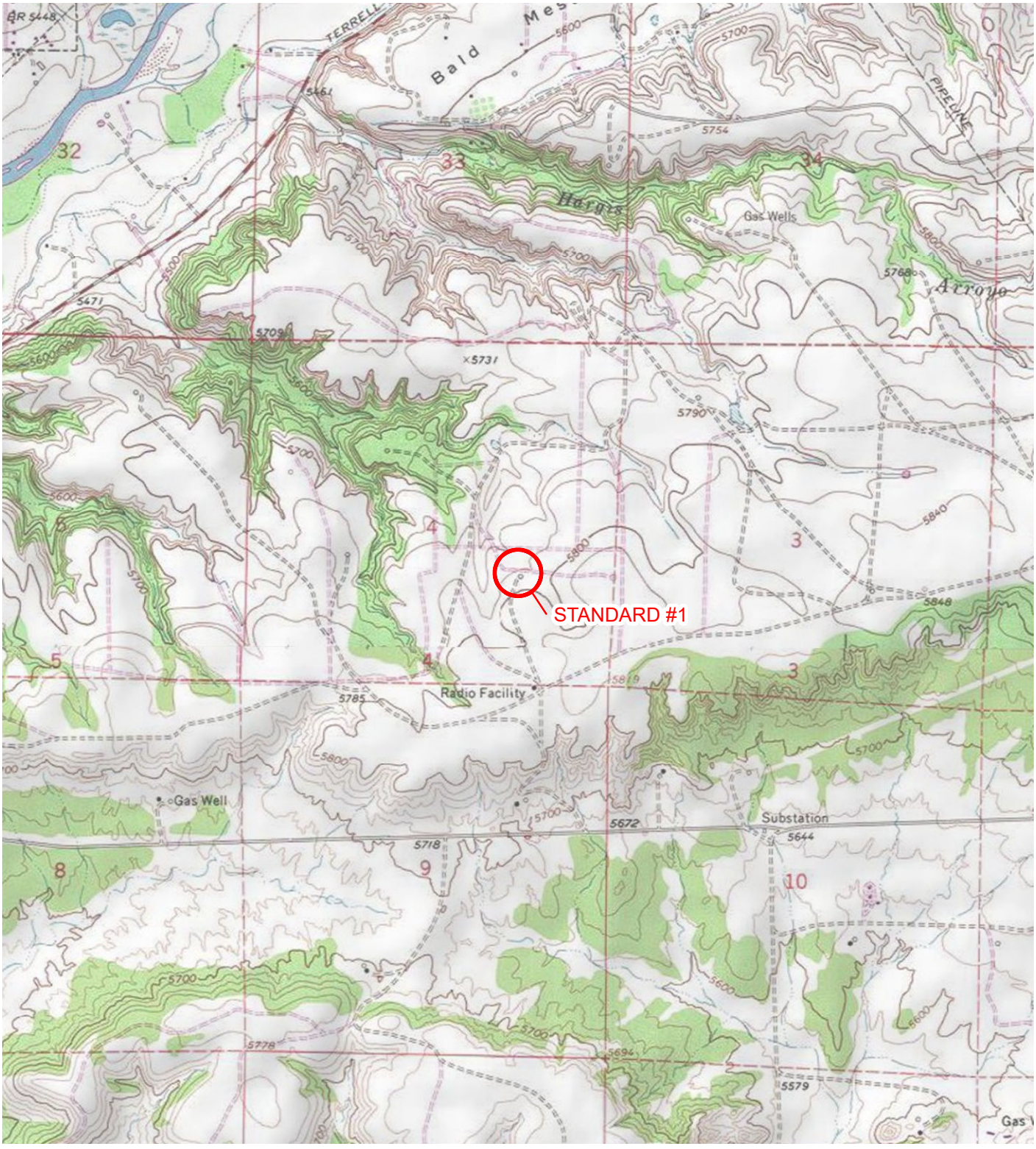


IMAGE COURTESY OF ESRI/USGS

LEGEND

SITE LOCATION

0 2,000 4,000

Feet

N

NEW MEXICO

FIGURE 1
SITE LOCATION MAP
STANDARD #1
N 1/2 SE 1/4 SEC 4 T29N R12W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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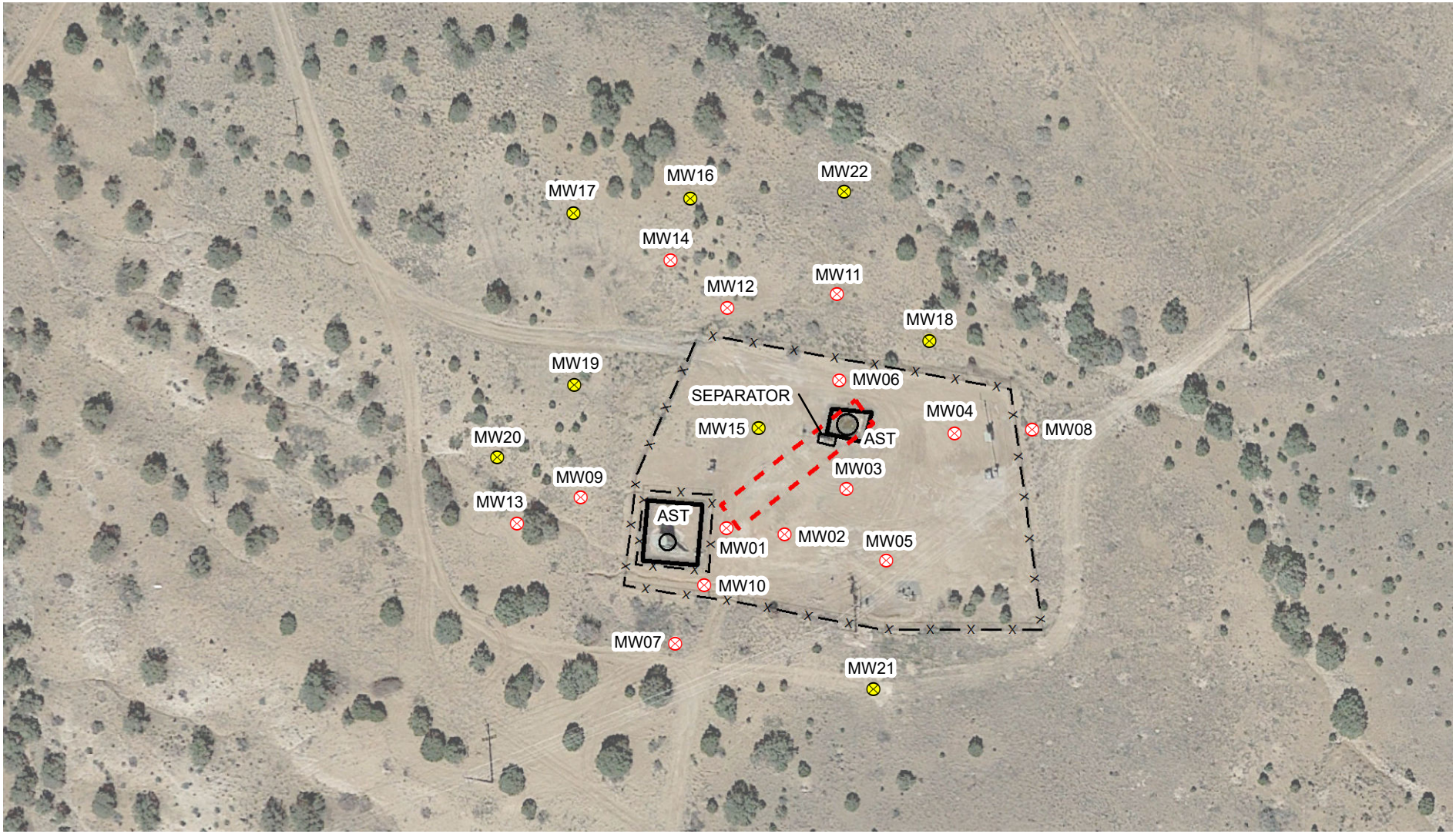

IMAGE COURTESY OF GOOGLE EARTH 2015

LEGEND

- EXISTING INSTALLED MONITORING WELL
- NEWLY INSTALLED MONITORING WELL
- AST: ABOVEGROUND STORAGE TANK
- x — x FENCE
- REMEDIATION EXCAVATION EXTENT
- BERM

0 100 200

Feet

N

FIGURE 2
MONITORING WELL LOCATIONS
STANDARD #1
N 1/2 SE 1/4 SEC 4 T29N R12W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

P:\Hilcorp\GIS\MXD\017817006_STANDARD 1\017817006_FIG02_MW LOC_2019.mxd

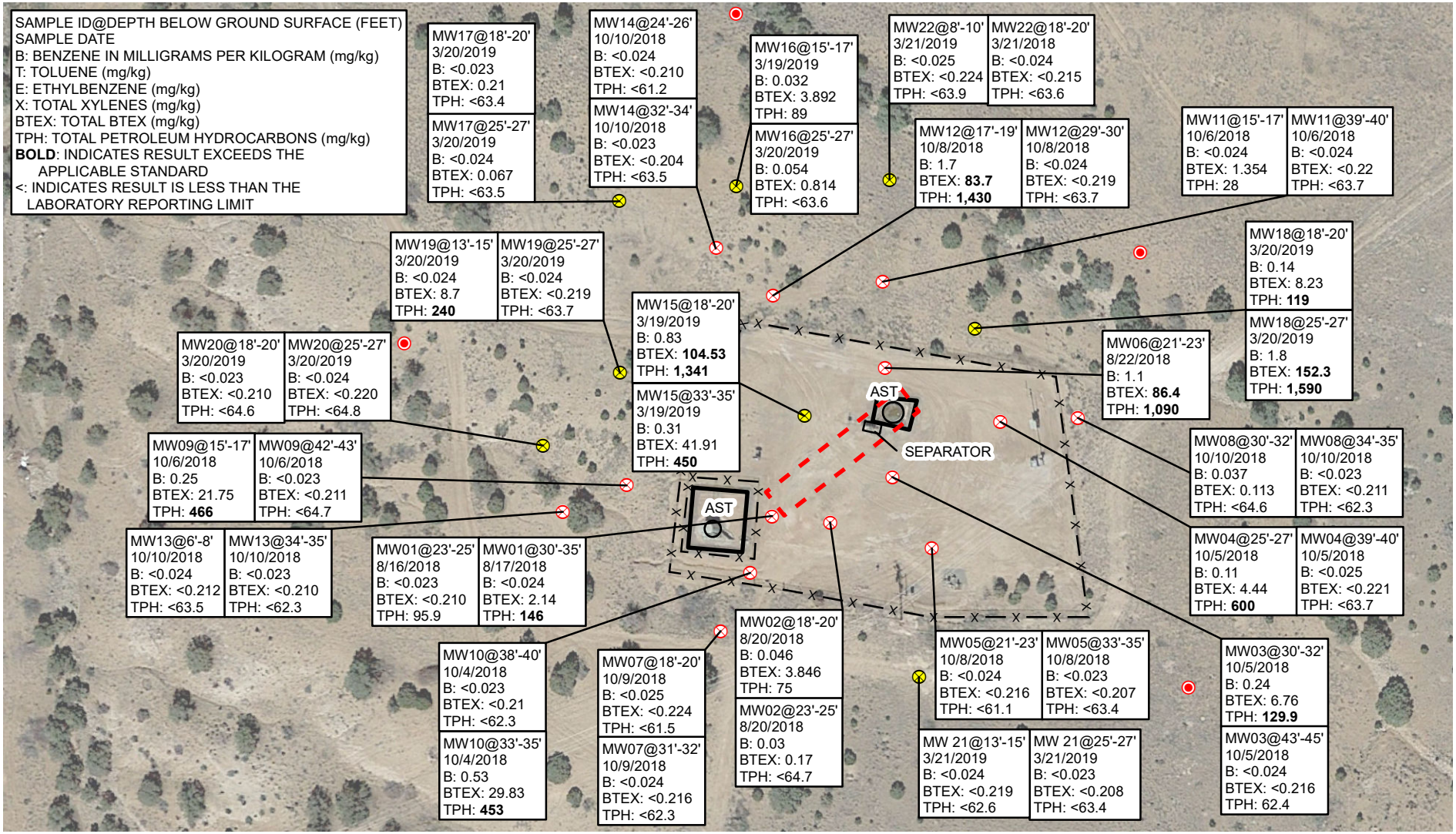

IMAGE COURTESY OF GOOGLE EARTH 2015

LEGEND

- EXISTING INSTALLED MONITORING WELL
- NEWLY INSTALLED MONITORING WELL
- PROPOSED ADDITIONAL MONITORING WELL
- x — x FENCE
- REMEDIATION EXCAVATION EXTENT
- BERM
- AST: ABOVEGROUND STORAGE TANK

0 100 200 Feet

N

FIGURE 3
SOIL ANALYTICAL RESULTS
STANDARD #1
N 1/2 SE 1/4 SEC 4 T29N R12W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

P:\Hilcorp\GIS\MXD\017817006_STANDARD 1\017817006_FIG03_SOIL_ANALY_APR_2019.mxd

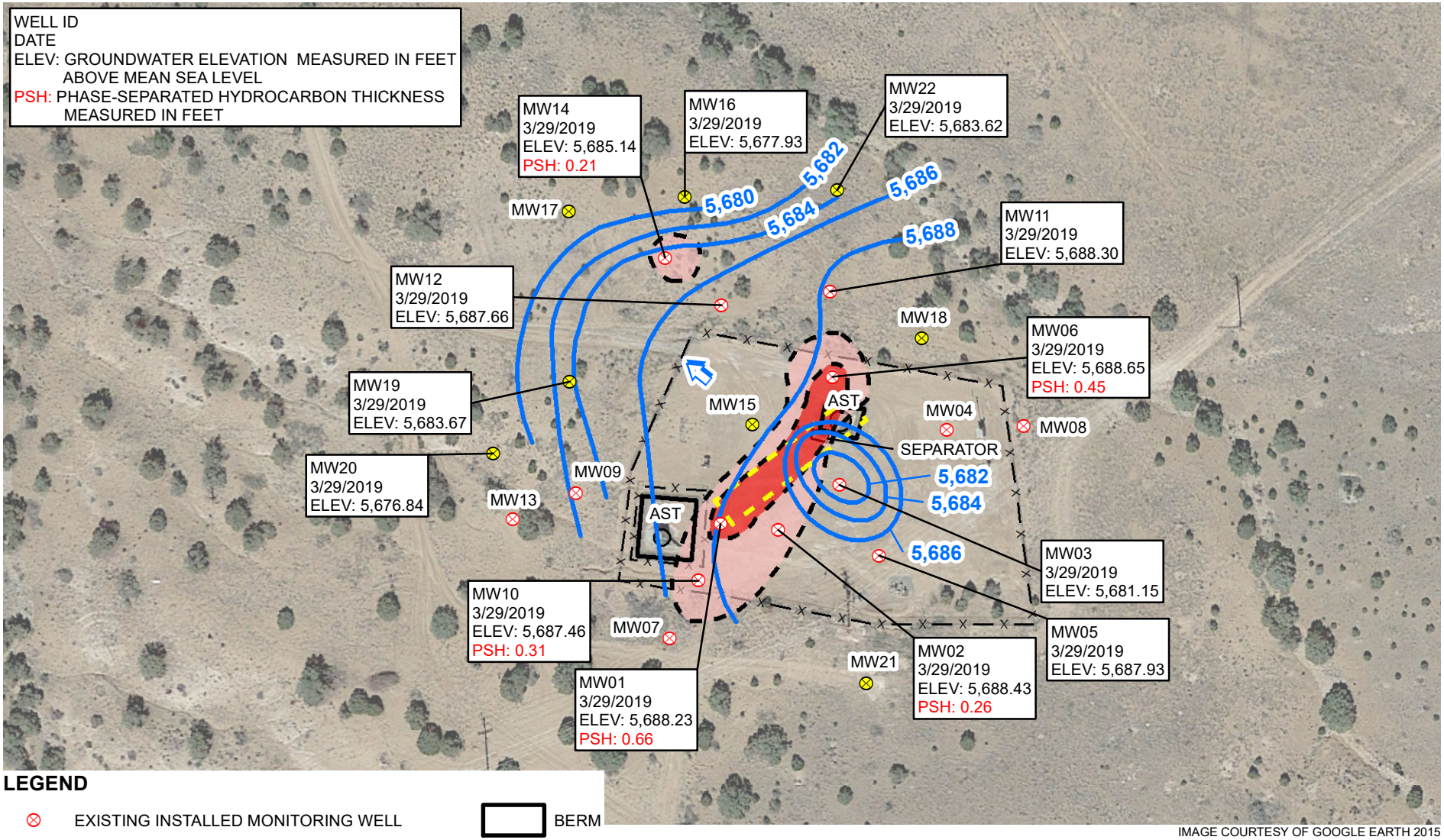

IMAGE COURTESY OF GOOGLE EARTH 2015

LEGEND

- EXISTING INSTALLED MONITORING WELL
- NEWLY INSTALLED MONITORING WELL
- SURVEYED GROUNDWATER FLOW DIRECTION
- INFERRED GROUNDWATER ELEVATION CONTOUR
- CONTOUR INTERVAL = 2.0 FEET
- x — x FENCE
- REMEDIATION EXCAVATION EXTENT
- BERM
- PRODUCT THICKNESS ISO-CONTOUR APRIL 2019

INFERRED PRODUCT THICKNESS (FEET)

- 0.2' - 0.4'
- 0.4' - 0.7'

AST: ABOVEGROUND STORAGE TANK

0 100 200
Feet

N

FIGURE 4
MARCH 2019 GROUNDWATER POTENTIOMETRIC AND PSH THICKNESS MAP
STANDARD #1
N 1/2 SE 1/4 SEC 4 T29N R12W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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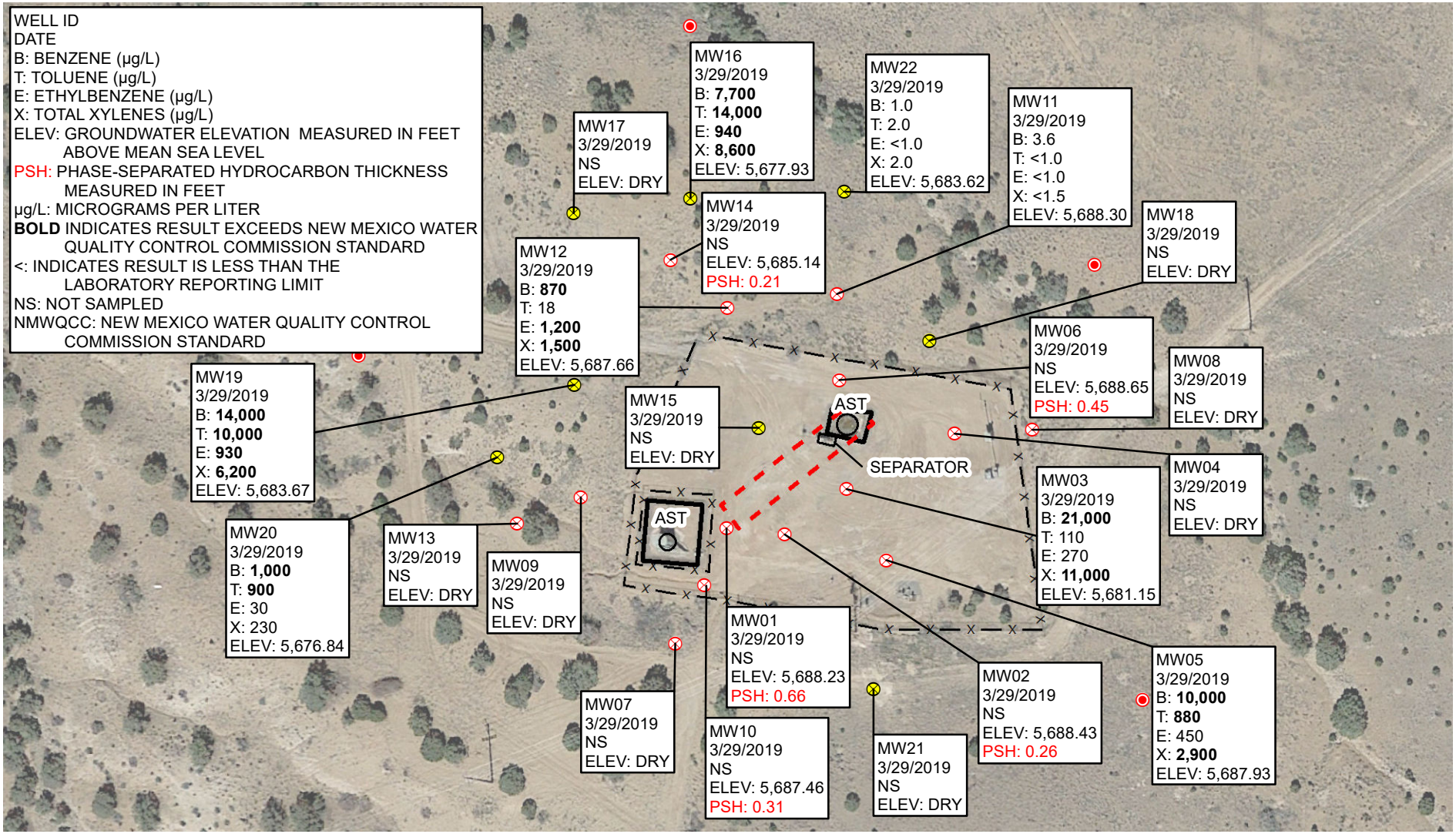

IMAGE COURTESY OF GOOGLE EARTH 2015

LEGEND

- EXISTING INSTALLED MONITORING WELL
- NEWLY INSTALLED MONITORING WELL
- PROPOSED ADDITIONAL MONITORING WELL
- FENCE
- REMEDIATION EXCAVATION EXTENT
- BERM
- AST: ABOVEGROUND STORAGE TANK

0 100 200
Feet

N

FIGURE 5
MARCH 2019 GROUNDWATER ANALYTICAL RESULTS
STANDARD #1
N 1/2 SE 1/4 SEC 4 T29N R12W
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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TABLE 1
SOIL ANALYTICAL RESULTS

STANDARD #1
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Soil Sample Identification	Sample Date	PID (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)
MW01 @ 23' - 25'	8/16/2018	111	<0.023	<0.047	<0.047	<0.093	<0.210	9.9	16	70	95.9
MW01 @ 30' - 35'	8/17/2018	67.3	<0.024	0.20	0.14	1.8	2.14	46	26	74	**146**
MW02 @ 18' - 20'	8/20/2018	1,809	0.046	0.64	0.26	2.9	3.85	38	37	<49	75
MW02 @ 23' - 25'	8/20/2018	11.0	0.030	0.14	<0.047	<0.094	0.17	<4.7	<10	<50	<64.7
MW03 @ 30' - 32'	10/5/2018	24.79	0.24	1.7	0.42	4.4	6.76	120	9.9	<49	**129.9**
MW03 @ 43' - 45'	10/5/2018	11.8	<0.024	<0.048	<0.048	<0.096	<0.216	<4.8	<9.6	<48	62.4
MW04 @ 25' - 27'	10/5/2018	2,014	0.11	0.82	0.31	3.2	4.44	150	330	120	**600**
MW04 @ 39' - 40'	10/5/2018	51.4	<0.025	<0.049	<0.049	<0.098	<0.221	<4.9	<9.8	<49	<63.7
MW05 @ 21' - 23'	10/8/2018	496.7	<0.024	<0.048	<0.048	<0.096	<0.216	<4.8	<9.3	<47	<61.1
MW05 @ 33' - 35'	10/8/2018	19.2	<0.023	<0.046	<0.046	<0.092	<0.207	<4.6	<9.8	<49	<63.4
MW06 @ 21' - 23'	8/22/2018	233	1.1	25	5.3	55	**86.4**	950	140	<49	**1,090**
MW07 @ 18' - 20'	10/9/2018	18.6	<0.025	<0.050	<0.050	<0.099	<0.224	<5.0	<9.5	<47	<61.5
MW07 @ 31' - 32'	10/9/2018	4.2	<0.024	<0.048	<0.048	<0.096	<0.216	<4.8	<9.5	<48	<62.3
MW08 @ 30' - 32'	10/10/2018	11.5	0.037	0.076	<0.047	<0.095	0.113	<4.7	<9.9	<50	<64.6
MW08 @ 34' - 35'	10/10/2018	10.6	<0.023	<0.047	<0.047	<0.094	<0.211	<4.7	<9.6	<48	<62.3
MW09 @ 15' - 17'	10/6/2018	1,821	0.25	3.0	1.5	17	21.75	430	36	<46	**466**
MW09 @ 42' - 43'	10/6/2018	5.6	<0.023	<0.047	<0.047	<0.094	<0.211	<4.7	<10	<50	<64.7
MW10 @ 33' - 35'	10/4/2018	2,615	0.53	8.2	2.1	19	29.83	360	93	<48	**453**
MW10 @ 38' - 40'	10/4/2018	6.5	<0.023	<0.047	<0.047	<0.093	<0.21	<4.7	<9.6	<48	<62.3
MW11 @ 15' - 17'	10/6/2018	32.8	<0.024	0.060	0.094	1.2	1.354	28	<9.5	<47	28
MW11 @ 39' - 40'	10/6/2018	8	<0.024	<0.049	<0.049	<0.098	<0.22	<4.9	<9.8	<49	<63.7
MW12 @ 17' - 19'	10/8/2018	28.9	1.7	19	6.0	57	**83.7**	1,300	130	<46	**1,430**
MW12 @ 29' - 30'	10/8/2018	10	<0.024	<0.049	<0.049	<0.097	<0.219	<4.9	<9.8	<49	<63.7
MW13 @ 6' - 8'	10/10/2018	10	<0.024	<0.047	<0.047	<0.094	<0.212	<4.7	<9.8	<49	<63.5
MW13 @ 34' - 35'	10/10/2018	3	<0.023	<0.047	<0.047	<0.093	<0.210	<4.7	<9.6	<48	<62.3
MW14 @ 24' - 26'	10/10/2018	18.8	<0.024	<0.047	<0.047	<0.095	<0.210	<4.7	<9.5	<47	<61.2
MW14 @ 32' - 34'	10/10/2018	2.3	<0.023	<0.046	<0.046	<0.092	<0.204	<4.6	<9.9	<49	<63.5
MW15 @ 18' - 20'	3/19/2019	1,569	0.83	23	6.7	74	**104.53**	800	231	310	**1,341**
MW15 @ 33' - 35'	3/19/2019	129.7	0.31	8.9	2.7	30	41.91	350	100	<47	**450**
MW16 @15' - 17'	3/19/2019	1,417	0.032	0.28	0.28	3.3	3.892	55	34	<50	89
MW16 @ 25' - 27'	3/20/2019	4.6	0.054	0.38	<0.048	0.38	0.814	<4.8	<9.8	<49	<63.6

TABLE 1
SOIL ANALYTICAL RESULTS

STANDARD #1
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Soil Sample Identification	Sample Date	PID (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)
MW17 @ 18' - 20'	3/20/2019	12.8	<0.023	0.11	<0.046	0.10	0.210	<4.6	<9.8	<49	<63.4
MW17 @ 25' - 27'	3/20/2019	11.5	<0.024	0.067	<0.048	<0.097	0.067	<4.8	<9.7	<49	<63.5
MW18 @ 18' - 20'	3/20/2019	2,642	0.14	1.9	0.19	6.0	8.23	48	71	<48	**119**
MW18 @ 25' - 27'	3/20/2019	2,222	1.8	41	9.5	100	152.30	1,400	190	<48	**1,590**
MW19 @ 13' - 15'	3/20/2019	2,580	<0.024	1.3	0.7	6.7	8.7	220	20	<49	**240**
MW19 @ 25' - 27'	3/20/2019	11.3	<0.024	<0.049	<0.049	<0.097	<0.219	<4.9	<9.8	<49	<63.7
MW20 @ 18' - 20'	3/20/2019	26.3	<0.023	<0.047	<0.047	<0.093	<0.210	<4.7	<9.9	<50	<64.6
MW20 @ 25' - 27'	3/20/2019	26.0	<0.024	<0.049	<0.049	<0.098	<0.220	<4.9	<9.9	<50	<64.8
MW21 @ 13' - 15'	3/21/2019	2.6	<0.024	<0.049	<0.049	<0.097	<0.219	<4.9	<9.7	<48	<62.6
MW21 @ 25' - 27'	3/21/2019	2.3	<0.023	<0.046	<0.046	<0.093	<0.208	<4.6	<9.8	<49	<63.4
MW22 @ 8' - 10'	3/21/2019	0.6	<0.025	<0.050	<0.050	<0.099	<0.224	<5.0	<9.9	<49	<63.9
MW22 @ 18' - 20'	3/21/2018	0.3	<0.024	<0.048	<0.048	<0.095	<0.215	<4.8	<9.8	<49	<63.6
NMOCD Remediation Action Level			**10**	NE	NE	NE	**50**	NE	NE	NE	**100**

NOTES:

BTEX - benzene, toluene, ethylbenzene, and total xylenes analyzed by US EPA Method 8021B
DRO - diesel range organics analyzed by US EPA Method 8015D
GRO - gasoline range organics analyzed by US EPA Method 8015D
mg/kg - milligrams per kilogram
MRO - motor oil range organics analyzed by US EPA method 8015D
NA - not applicable
NE - not established
NMOCD - New Mexico Oil Conservation Division
PID - photo-ionization detector
ppm - parts per million
Table 1 - Closure Criteria for Soils Impacted by a Release per 19.15.19 August 2018
TPH - total petroleum hydrocarbons (sum of GRO, DRO, and MRO)
< - indicates result is less than the stated laboratory reporting limit
Bold - indicates value exceeds stated NMOCD standard

TABLE 2
GROUNDWATER ELEVATION SUMMARY

STANDARD #1
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Well Name	Date	Top of Casing Elevation (feet)	Depth to Product (feet BTOC)	Depth to Groundwater (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet)
MW01	10/17/2018	5,709.05	20.85	21.00	0.15	5,688.17
	10/22/2018		20.80	20.97	0.17	5,688.22
	3/29/2019		20.69	21.35	0.66	5,688.23
MW02	10/17/2018	5,709.33	--	21.22	--	5,688.11
	10/22/2018		--	21.12	--	5,688.21
	3/29/2019		20.85	21.11	0.26	5,688.43
MW03	10/17/2018	5,712.05	--	32.52	--	5,679.53
	10/22/2018		--	DRY	--	DRY
	3/29/2019		--	30.90	--	5,681.15
MW04	10/17/2018	5,712.33	--	31.84	--	5,680.49
	10/22/2018		--	31.80	--	5,680.53
	3/29/2019		--	DRY	--	DRY
MW05	10/17/2018	5,712.58	--	28.54	--	5,684.04
	10/22/2018		--	28.39	--	5,684.19
	3/29/2019		--	24.65	--	5,687.93
MW06	10/17/2018	5,712.29	24.60	24.93	0.33	5,687.62
	10/22/2018		24.08	24.48	0.40	5,688.13
	3/29/2019		23.55	24.00	0.45	5,688.65
MW07	10/17/2018	5,711.08	--	DRY	--	DRY
	10/22/2018		--	DRY	--	DRY
	3/29/2019		--	DRY	--	DRY
MW08	10/17/2018	5,712.42	--	DRY	--	DRY
	10/22/2018		--	DRY	--	DRY
	3/29/2019		--	DRY	--	DRY
MW09	10/17/2018	5,706.12	--	DRY	--	DRY
	10/22/2018		--	DRY	--	DRY
	3/29/2019		--	DRY	--	DRY
MW10	10/17/2018	5,709.25	--	DRY	--	DRY
	10/22/2018		--	32.26	--	5,676.99
	3/29/2019		21.73	22.04	0.31	5,687.46

TABLE 2
GROUNDWATER ELEVATION SUMMARY

STANDARD #1
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Well Name	Date	Top of Casing Elevation (feet)	Depth to Product (feet BTOC)	Depth to Groundwater (feet BTOC)	Product Thickness (feet)	Groundwater Elevation (feet)
MW11	10/17/2018	5,707.93	--	20.00	--	5,687.93
	10/22/2018		--	19.89	--	5,688.04
	3/29/2019		--	19.63	--	5,688.30
MW12	10/17/2018	5,709.54	--	21.90	--	5,687.64
	10/22/2018		--	21.77	--	5,687.77
	3/29/2019		--	21.88	--	5,687.66
MW13	10/17/2018	5,705.12	--	DRY	--	DRY
	10/22/2018		--	DRY	--	DRY
	3/29/2019		--	DRY	--	DRY
MW14	10/17/2018	5,705.44	--	DRY	--	DRY
	10/22/2018		--	22.87	--	5,682.57
	3/29/2019		20.26	20.47	0.21	5,685.14
MW15	3/29/2019	5,712.21	--	DRY	--	DRY
MW16	3/29/2019	5,706.52	--	28.59	--	5,677.93
MW17	3/29/2019	5,705.22	--	DRY	--	DRY
MW18	3/29/2019	5,709.31	--	DRY	--	DRY
MW19	3/29/2019	5,703.27	--	19.60	--	5,683.67
MW20	3/29/2019	5,706.45	--	29.61	--	5,676.84
MW21	3/29/2019	NA	--	DRY	--	DRY
MW22	3/29/2019	5,706.18	--	22.56	--	5,683.62

Notes:

BTOC - below top of casing

NA- not assessed

A product density factor of 0.8 was used to account for the presence of free product.

TABLE 3
GROUNDWATER ANALYTICAL RESULTS

STANDARD #1
SAN JUAN COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Monitoring Well Identification	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
MW02	10/22/2018	**14,000**	**7,100**	**1,200**	**12,000**
MW03	3/29/2019	**21,000**	110	270	**11,000**
MW05	3/29/2019	**10,000**	**880**	450	**2,900**
MW10	10/22/2018	**22,000**	**21,000**	**1,600**	**13,000**
MW11	10/22/2018	<1.0	<1.0	<1.0	<1.5
	3/29/2019	3.6	<1.0	<1.0	<1.5
MW12	10/22/2018	**2,400**	**3,800**	**1,100**	**5,000**
	3/29/2019	**870**	18	**1,200**	**1,500**
MW14	10/22/2018	**13,000**	**26,000**	**1,100**	**10,000**
MW16	3/29/2019	**7,700**	**14,000**	**940**	**8,600**
MW19	3/29/2019	**14,000**	**10,000**	**930**	**6,200**
MW20	3/29/2019	**1,000**	**900**	30	230
MW22	3/29/2019	1.0	2.0	<1.0	2.0
NMWQCC Standard		**10**	**750**	**750**	**620**

NOTES:

µg/L - micrograms per liter

NMWQCC - New Mexico Water Quality Control Commission

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

Bold - indicates value exceeds stated NMWQCC standard

ATTACHMENT 1: SOIL BORING LOGS

Advancing Opportunity

848 E. 2nd Ave
Durango, Colorado 81301

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

oring/Well Number: MW15		Project: Standard #1	
ate: 3/19/2019		Project Number: 017817006	
ogged By: Eric Carroll		Drilled By: Cascade	
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (25' - 37')		Seal: Bentonite Chips (23' - 24')	Grout: Bentonite Slurry (0' - 23')
Casing Type: Schedule 40 PVC		Diameter: 2" Length:	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" Length:	Total Depth: 37' / Depth to Water: 28'

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	1		SW-SM	Dry, Compact, light reddish brown, poorly sorted sand, some silt <30%	Stick Up
					1					
					2					
					3					
					4					
	Moist	5.6	No		5			SW-SM	SAA no stain/odor	
					6					
					7					
					8					
					9					
	Moist	7.2	No		10			GP	Moist, loose, sandy gravel, cobbles up to 6" no stain/odor	
					11					
					12					
					13					
					14					
	Moist	30.1	No		15			GP	SAA no stain/odor	

Boring/Well #	MW15
Project:	Standard #1
Project #	017817006
Date	3/19/2019

Advancing Opportunity

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	1569	Yes	MW15 @ 18' - 20'	20			GP	Loose, dark brown coarse sand with gravel and cobbles >6" diameter, HC staining and strong odor	
					21					
					22					
					23					
					24					
	Moist	1452	No		25			SC	Compact, light yellow brown, sand some clay <50%, no staining, slight odor	
					26					
					27					
					28					
					29					
	Moist	497.50	No		30			SC	SAA no stain/odor	
					31					
					32					
					33					
					34					
	Moist	129.7	No	MW15 @ 33' - 35'	35				Compact, light yellow brown, clayey sand, mudstone/claystone, no stain, slight odor	
					36					
					37				TD at 37'	

Advancing Opportunity

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Durango, Colorado 81301

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

oring/Well Number: MW16		Project: Standard #1	
ate: 3/19/2019		Project Number: 017817006	
ogged By: Eric Carroll		Drilled By: Cascade	
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (15' - 27')		Seal: Bentonite Chips (14' - 15')	Grout: Bentonite Slurry (0' - 14')
Casing Type: Schedule 40 PVC		Diameter: 2" Length: 20'	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" Length: 10'	Total Depth: 27' / Depth to Water: 18'

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	1		SM	Dry, loose, light reddish brown, poorly sorted silty sand, trace clay to 3'	Stick Up
					1					
					2					
					3					
					4					
	Dry	0.0	No		5			SW-SM	Dry, loose sand and gravel, trace silt <10%, no stain/odor	
					6	2				
					7					
					8					
					9					
	Dry	14.5	No		10			SW-SM	SAA no stain/odor	
					11	3				
					12					
					13					
					14					
	Moist	39.6	No		15			GP	Loose, moist, dark brown, sand and gravel cobbles >6" diameter, no stain/odor	

Boring/Well #	MW16
Project:	Standard #1
Project #	017817006
Date	3/19/2019

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
	Moist	1417	Yes	MW16 @15'-17'	17	4			Loose, reddish brown, sand and gravel cobbles >6" diameter, HC staining, strong odor	
					18					
					19					
	Moist	1200	Yes		20			GP	Loose, reddish brown, sand and gravel cobbles >6" diameter, HC staining, strong odor	
					21					
					22	5				
					23					
					24					
	Moist	6.9	No		25			SC	Dense, yellow brown, sandy clay, white mottles, no stain/odor	
					26					
				MW16 @ 25'-27'	27				SAA no stain/odor	
	Moist	4.6	No		28	6				
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					

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BORING LOG/MONITORING WELL COMPLETION DIAGRAM

oring/Well Number: MW17		Project: Standard #1	
ate: 3/20/2019		Project Number: 017817006	
ogged By: Eric Carroll		Drilled By: Cascade	
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (15' - 27')		Seal: Bentonite Chips (14' - 15')	Grout: Bentonite Slurry (0' - 14')
Casing Type: Schedule 40 PVC		Diameter: 2" Length: 20'	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" Length: 10'	Total Depth: 27' / Depth to Water: 21'

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	1		SM	Dry, loose, light brown, poorly sorted silty sand with gravel, trace cobbles up to 4" diameter <10%, no staining, no odor	Stick Up
					1					
					2					
					3					
					4					
	Dry	2.7	No		5			SM	SAA, no stain/odor	
					6	2				
					7					
					8					
	Dry	2.0	No		10			SM	SAA, very light brown, cobbles up to 8" diameter, no stain/odor	
					11	3				
					12					
					13					
	Moist	5.8	No		14			SM	Moist, loose, dark reddish brown, silty sand with gravel cobbles > 8" diameter, no stain/odor	
					15					

Boring/Well #	MW17
Project:	Standard #1
Project #	017817006
Date	3/20/2019

Advancing Opportunity

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17	4				
					18					
					19					
	Moist	12.8	No	MW17 @18' - 20'	20			SC	Compact, dark yellow brown, sandy clay, no stain/odor	
					21					
					22	5				
					23					
					24					
	Moist	11.5	No	MW17 @ 25'- 27'	25			SC	SAA, light yellow brown, no stain/odor	
					26	6				
					27				SAA, no stain/odor	
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					

Advancing Opportunity

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BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: MW18		Project: Standard #1	
Date: 3/20/2019		Project Number: 017817006	
Logged By: Eric Carroll		Drilled By: Cascade	
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (15' - 27')		Seal: Bentonite Chips (14' - 15')	Grout: Bentonite Slurry (0' - 14')
Casing Type: Schedule 40 PVC		Diameter: 2" Length: 20'	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" Length: 10'	Total Depth: 27' / Depth to Water: 18'

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		SC	Moist, brown, sandy clay, trace gravel <20%, no staining, no odor	Stick Up
					1					
					2					
					3					
					4					
	Dry	0.8	No		5			SM	Dry, light brown, silty sand with gravel <35%, no stain/odor	
					6	2				
					7					
					8					
					9					
					10			SM	SAA, trace clay < 10%, no stain/odor	
	Moist	2.1	No		11	3		SP	Moist, brown, poorly graded sand with gravel <40%, cobbles up to 5" diameter, no stain/odor	
					12					
					13					
					14					
	Wet	4.7	No		15			SP-SC	SAA, with clay <25%, no stain/odor	

Advancing Opportunity

Boring/Well #	MW18
Project:	Standard #1
Project #	017817006
Date	3/20/2019

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	4				
					19					
					20			SP-SC	Tan brown, poorly graded sand with clay, trace gravel and silt <20%, no staining, HC odor	
	Moist	2642	Yes, gray and orange	MW18 @ 18'-20'	21			SC	Moist, tan brown, sandy clay, trace gravel <5%, gray and orange staining, strong HC odor	
					22					
					23	5				
					24					
	Moist	2222	Yes, dark gray	MW18 @ 25'-27'	25			CL	Moist, dark gray with light brown mottling, clay, dark gray staining and strong HC odor	
					26	6				
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					

Advancing Opportunity

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BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: MW19			Project: Standard #1
Date: 3/20/2019			Project Number: 017817006
Logged By: Eric Carroll			Drilled By: Cascade
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (15' - 27')		Seal: Bentonite Chips (14' - 15')	Grout: Bentonite Slurry (0' - 14')
Casing Type: Schedule 40 PVC		Diameter: 2" / Length: 20'	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" / Length: 10'	Total Depth: 27' / Depth to Water: 18'

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			SC	Moist, brown, sandy clay, trace silt <10%, no staining, no odor	Stick Up
					1					
					2					
					3	1				
					4					
	Dry	18.8	No		5			SM	Dry, brown, silty sand with gravel <40%, cobbles up to 6" diameter, no stain/odor	
					6					
					7					
					8	2				
					9					
	Dry	18.9	No		10			SM	SAA, no stain/odor	
					11					
					12					
					13	3				
					14					
	Moist	2580	Yes, orange	MW19 @ 13'-15'	15			SP	Moist, brown, poorly graded sand with gravel, trace clay <10%, trace orange staining, slight HC odor	

Advancing Opportunity

Boring/Well #	MW19
Project:	Standard #1
Project #	017817006
Date	3/20/2019

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16			SP	SAA, olive-green color with dark gray staining, very strong HC odor	
					17	4				
					18					
					19					
	Moist	87.2	Yes, gray and orange		20			CL-SC	Moist, tan brown to dark gray, clay with sand <35%, trace gray and orange staining, slight HC odor	
					21					
					22	5				
					23					
					24					
	Moist	11.3	Yes, trace gray	MW19 @ 25'-27'	25			CL	SAA, tan brown color with trace gray staining and HC odor	
					26	6				
					27			CL	SAA, trace gray staining, no odor	
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					

Advancing Opportunity

848 E. 2nd Ave
Durango, Colorado 81301

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: MW20		Project: Standard #1	
Date: 3/20/2019		Project Number: 017817006	
Logged By: Eric Carroll		Drilled By: Cascade	
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (15' - 27')		Seal: Bentonite Chips (14' - 15')	Grout: Bentonite Slurry (0' - 14')
Casing Type: Schedule 40 PVC		Diameter: 2" Length: 20'	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" Length: 10'	Total Depth: 27' / 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	0.0	No		0	1		SC	Moist, brown, sandy clay with gravel <30%, no staining, no odor	Stick Up
					1					
					2					
					3					
					4					
	Dry	13.8	No		5			SM	Dry, light brown, silty sand with gravel <35%, no stain/odor	
					6	2				
					7					
					8					
					9					
					10			SM	SAA, slight orange and reddish-brown staining and no odor	
	Dry	10.6	Yes, slight orange and reddish-brown		11	3				
					12					
					13					
					14					
	Moist	31.0	No		15			CL	Moist, dark gray with mottled brown, clay with sand, no stain/odor	

Advancing Opportunity

Boring/Well #	MW20
Project:	Standard #1
Project #	017817006
Date	3/20/2019

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	26.3	No	MW20 @ 18'-20'	15–20	4		CL	Moist, layered tan brown and gray, clay with sand, no stain/no odor	
	Dry	26.0	No	MW20 @ 25'-27'	21–25	5		CL	SAA, no stain/odor	
					26–27	6				
					28–37					

Advancing Opportunity

848 E. 2nd Ave
Durango, Colorado 81301

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: MW21		Project: Standard #1	
Date: 3/20/2019		Project Number: 017817006	
Logged By: Eric Carroll		Drilled By: Cascade	
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (15' - 27')		Seal: Bentonite Chips (14' - 15')	Grout: Bentonite Slurry (0' - 14')
Casing Type: Schedule 40 PVC		Diameter: 2" Length: 20'	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" Length: 10'	Total Depth: 27' / 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	0.0	No		0			SC	Moist, brown, sandy clay with gravel <30%, no staining, no odor	Stick Up
					1					
					2					
					3	1				
					4					
	Dry	3.7	No		5			SM	Dry, light brown, silty sand with gravel <45%, no stain/odor	
								SP-SC	Light brown, poorly graded sand with clay <35% and gravel <30%, no stain/odor	
					6					
					7					
					8	2				
					9					
	Dry	1.1	No		10			SP-SC	SAA, no stain/odor	
					11					
					12					
					13	3				
					14					
	Dry	4.3	No	MW21 @ 13'-15'	15			SM	Dry, brown, silty sand with gravel <45%, cobbles up to 6" diameter, no stain/odor	

Advancing Opportunity

Boring/Well #	MW21
Project:	Standard #1
Project #	017817006
Date	3/20/2019

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
					15					
					16					
					17	4				
					18					
					19					
	Dry	2.6	No		20			SP-SM	Dry, light brown, poorly graded sand with silt <20% and gravel <20%, no stain/odor	
					21					
					22	5				
					23					
					24					
					25				No sample, large boulder	
	Dry	2.3	No	MW21 @ 25'-27'	26	6		SP-SM	SAA, silt and gravel at <30%, dark red brown, no stain/odor	
					27					
					28					
					29					
					30					
					31					
					32					
					33					
					34					
					35					
					36					
					37					

Advancing Opportunity

848 E. 2nd Ave
Durango, Colorado 81301

BORING LOG/MONITORING WELL COMPLETION DIAGRAM

Boring/Well Number: MW22		Project: Standard #1	
Date: 3/21/2019		Project Number: 017817006	
Logged By: Eric Carroll		Drilled By: Cascade	
Elevation: 5,795	Detector: PID	Drilling Method: Sonic	Sampling Method: Continuous
Gravel Pack: 10-20 Silica Sand (15' - 27')		Seal: Bentonite Chips (14' - 15')	Grout: Bentonite Slurry (0' - 14')
Casing Type: Schedule 40 PVC		Diameter: 2" Length: 20'	Hole Diameter: 6" / Depth to Liquid: NA
Screen Type: Schedule 40 PVC	Slot: 0.010"	Diameter: 2" Length: 10'	Total Depth: 20' / 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
	Dry	0.0	No		0			SM	Loose, dry, reddish-brown, silty sand, no staining, no odor	Stick Up
					1					
					2					
					3	1				
					4					
	Dry	0.4	No		5			SM	Loose, dry, reddish-brown, silty sand with gravel, no stain/odor	
					6					
					7					
					8	2				
					9					
	Moist	0.6	No	MW22 @ 8'-10'	10			SP	Loose, moist, poorly graded sand and gravel, cobbles up to 6" diameter, no stain/odor	
								SP	SAA, no stain/odor	
					11					
					12					
					13	3				
					14					
	Moist	0.0	No					CL-ML	Dense, moist, dark yellow brown, silty clay, no stain/odor	
					15					

Advancing Opportunity

Boring/Well #	MW22
Project:	Standard #1
Project #	017817006
Date	3/21/2019

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lithology/Remarks	Well Completion
	Moist	0.3	No	MW22 @ 18'-20'	15 16 17 18 19 20	4		CL-ML	SAA, no stain/odor	
					21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37					

ATTACHMENT 2: LABORATORY ANALYTICAL REPORTS

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

April 01, 2019

Jennifer Deal

Hilcorp Energy
PO Box 61529
Houston, TX 77208-1529
TEL: (337) 276-7676
FAX

RE: Standard 1 OrderNo.: 1903A69

Dear Jennifer Deal:

Hall Environmental Analysis Laboratory received 16 sample(s) on 3/22/2019 for the analyses presented in the following report.

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

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

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

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 15 18-20'
Project: Standard 1
Collection Date: 3/19/2019 3:00:00 PM
Lab ID: 1903A69-001 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	230	9.7		mg/Kg	1	3/26/2019 9:26:35 AM	43859
Motor Oil Range Organics (MRO)	310	48		mg/Kg	1	3/26/2019 9:26:35 AM	43859
Surr: DNOP	101	70-130		%Rec	1	3/26/2019 9:26:35 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	800	93		mg/Kg	20	3/28/2019 12:11:00 AM	43839
Surr: BFB	198	73.8-119	S	%Rec	20	3/28/2019 12:11:00 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	0.83	0.47		mg/Kg	20	3/28/2019 12:11:00 AM	43839
Toluene	23	0.93		mg/Kg	20	3/28/2019 12:11:00 AM	43839
Ethylbenzene	6.7	0.93		mg/Kg	20	3/28/2019 12:11:00 AM	43839
Xylenes, Total	74	1.9		mg/Kg	20	3/28/2019 12:11:00 AM	43839
Surr: 4-Bromofluorobenzene	105	80-120		%Rec	20	3/28/2019 12:11:00 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 15 33-35'
Project: Standard 1
Collection Date: 3/19/2019 3:30:00 PM
Lab ID: 1903A69-002 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	100	9.4		mg/Kg	1	3/26/2019 5:43:41 PM	43859
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	3/26/2019 5:43:41 PM	43859
Surr: DNOP	89.6	70-130		%Rec	1	3/26/2019 5:43:41 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	350	23		mg/Kg	5	3/28/2019 12:34:36 AM	43839
Surr: BFB	307	73.8-119	S	%Rec	5	3/28/2019 12:34:36 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	0.31	0.12		mg/Kg	5	3/28/2019 12:34:36 AM	43839
Toluene	8.9	0.23		mg/Kg	5	3/28/2019 12:34:36 AM	43839
Ethylbenzene	2.7	0.23		mg/Kg	5	3/28/2019 12:34:36 AM	43839
Xylenes, Total	30	0.46		mg/Kg	5	3/28/2019 12:34:36 AM	43839
Surr: 4-Bromofluorobenzene	109	80-120		%Rec	5	3/28/2019 12:34:36 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 16 15-17'
Project: Standard 1
Collection Date: 3/19/2019 6:20:00 PM
Lab ID: 1903A69-003 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	34	9.9		mg/Kg	1	3/26/2019 6:32:01 PM	43859
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	3/26/2019 6:32:01 PM	43859
Surr: DNOP	99.5	70-130		%Rec	1	3/26/2019 6:32:01 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	55	5.0		mg/Kg	1	3/26/2019 2:38:12 AM	43839
Surr: BFB	307	73.8-119	S	%Rec	1	3/26/2019 2:38:12 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	0.032	0.025		mg/Kg	1	3/26/2019 2:38:12 AM	43839
Toluene	0.28	0.050		mg/Kg	1	3/26/2019 2:38:12 AM	43839
Ethylbenzene	0.28	0.050		mg/Kg	1	3/26/2019 2:38:12 AM	43839
Xylenes, Total	3.3	0.10		mg/Kg	1	3/26/2019 2:38:12 AM	43839
Surr: 4-Bromofluorobenzene	113	80-120		%Rec	1	3/26/2019 2:38:12 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 16 25-27'
Project: Standard 1
Collection Date: 3/20/2019 8:45:00 AM
Lab ID: 1903A69-004 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	3/27/2019 6:00:44 PM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/27/2019 6:00:44 PM	43859
Surr: DNOP	97.6	70-130		%Rec	1	3/27/2019 6:00:44 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	3/28/2019 12:58:09 AM	43839
Surr: BFB	94.4	73.8-119		%Rec	1	3/28/2019 12:58:09 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	0.054	0.024		mg/Kg	1	3/28/2019 12:58:09 AM	43839
Toluene	0.38	0.048		mg/Kg	1	3/28/2019 12:58:09 AM	43839
Ethylbenzene	ND	0.048		mg/Kg	1	3/28/2019 12:58:09 AM	43839
Xylenes, Total	0.38	0.097		mg/Kg	1	3/28/2019 12:58:09 AM	43839
Surr: 4-Bromofluorobenzene	95.3	80-120		%Rec	1	3/28/2019 12:58:09 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 17 18-20'
Project: Standard 1
Collection Date: 3/20/2019 11:15:00 AM
Lab ID: 1903A69-005 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	3/26/2019 8:09:32 PM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/26/2019 8:09:32 PM	43859
Surr: DNOP	97.1	70-130		%Rec	1	3/26/2019 8:09:32 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	3/28/2019 1:21:43 AM	43839
Surr: BFB	90.2	73.8-119		%Rec	1	3/28/2019 1:21:43 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.023		mg/Kg	1	3/28/2019 1:21:43 AM	43839
Toluene	0.11	0.046		mg/Kg	1	3/28/2019 1:21:43 AM	43839
Ethylbenzene	ND	0.046		mg/Kg	1	3/28/2019 1:21:43 AM	43839
Xylenes, Total	0.10	0.093		mg/Kg	1	3/28/2019 1:21:43 AM	43839
Surr: 4-Bromofluorobenzene	92.5	80-120		%Rec	1	3/28/2019 1:21:43 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 17 25-27'
Project: Standard 1
Collection Date: 3/20/2019 11:25:00 AM
Lab ID: 1903A69-006 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	3/26/2019 8:58:16 PM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/26/2019 8:58:16 PM	43859
Surr: DNOP	89.4	70-130		%Rec	1	3/26/2019 8:58:16 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	3/28/2019 1:45:21 AM	43839
Surr: BFB	87.9	73.8-119		%Rec	1	3/28/2019 1:45:21 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.024		mg/Kg	1	3/28/2019 1:45:21 AM	43839
Toluene	0.067	0.048		mg/Kg	1	3/28/2019 1:45:21 AM	43839
Ethylbenzene	ND	0.048		mg/Kg	1	3/28/2019 1:45:21 AM	43839
Xylenes, Total	ND	0.097		mg/Kg	1	3/28/2019 1:45:21 AM	43839
Surr: 4-Bromofluorobenzene	90.0	80-120		%Rec	1	3/28/2019 1:45:21 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 18 18-20'
Project: Standard 1
Collection Date: 3/20/2019 1:30:00 PM
Lab ID: 1903A69-007 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	71	9.7		mg/Kg	1	3/26/2019 9:47:02 PM	43859
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	3/26/2019 9:47:02 PM	43859
Surr: DNOP	93.1	70-130		%Rec	1	3/26/2019 9:47:02 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	48	24		mg/Kg	5	3/28/2019 2:08:53 AM	43839
Surr: BFB	113	73.8-119		%Rec	5	3/28/2019 2:08:53 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	0.14	0.12		mg/Kg	5	3/28/2019 2:08:53 AM	43839
Toluene	1.9	0.24		mg/Kg	5	3/28/2019 2:08:53 AM	43839
Ethylbenzene	0.49	0.24		mg/Kg	5	3/28/2019 2:08:53 AM	43839
Xylenes, Total	6.0	0.48		mg/Kg	5	3/28/2019 2:08:53 AM	43839
Surr: 4-Bromofluorobenzene	94.6	80-120		%Rec	5	3/28/2019 2:08:53 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 18 25-27'
Project: Standard 1
Collection Date: 3/20/2019 1:45:00 PM
Lab ID: 1903A69-008 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	190	9.6		mg/Kg	1	3/26/2019 11:00:09 PM	43859
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	3/26/2019 11:00:09 PM	43859
Surr: DNOP	101	70-130		%Rec	1	3/26/2019 11:00:09 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	1400	24		mg/Kg	5	3/28/2019 2:32:24 AM	43839
Surr: BFB	741	73.8-119	S	%Rec	5	3/28/2019 2:32:24 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	1.8	1.2		mg/Kg	50	3/28/2019 7:47:53 PM	43839
Toluene	41	2.4		mg/Kg	50	3/28/2019 7:47:53 PM	43839
Ethylbenzene	9.5	2.4		mg/Kg	50	3/28/2019 7:47:53 PM	43839
Xylenes, Total	100	4.8		mg/Kg	50	3/28/2019 7:47:53 PM	43839
Surr: 4-Bromofluorobenzene	102	80-120		%Rec	50	3/28/2019 7:47:53 PM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 19 13-15'
Project: Standard 1
Collection Date: 3/20/2019 3:00:00 PM
Lab ID: 1903A69-009 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	20	9.8		mg/Kg	1	3/26/2019 11:48:47 PM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/26/2019 11:48:47 PM	43859
Surr: DNOP	97.5	70-130		%Rec	1	3/26/2019 11:48:47 PM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	220	4.7		mg/Kg	1	3/28/2019 2:56:02 AM	43839
Surr: BFB	469	73.8-119	S	%Rec	1	3/28/2019 2:56:02 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.024		mg/Kg	1	3/28/2019 2:56:02 AM	43839
Toluene	1.3	0.047		mg/Kg	1	3/28/2019 2:56:02 AM	43839
Ethylbenzene	0.70	0.047		mg/Kg	1	3/28/2019 2:56:02 AM	43839
Xylenes, Total	6.7	0.095		mg/Kg	1	3/28/2019 2:56:02 AM	43839
Surr: 4-Bromofluorobenzene	115	80-120		%Rec	1	3/28/2019 2:56:02 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 19 25-27'
Project: Standard 1
Collection Date: 3/20/2019 3:15:00 PM
Lab ID: 1903A69-010 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	3/27/2019 12:37:19 AM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/27/2019 12:37:19 AM	43859
Surr: DNOP	90.2	70-130		%Rec	1	3/27/2019 12:37:19 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	3/28/2019 3:19:40 AM	43839
Surr: BFB	92.1	73.8-119		%Rec	1	3/28/2019 3:19:40 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.024		mg/Kg	1	3/28/2019 3:19:40 AM	43839
Toluene	ND	0.049		mg/Kg	1	3/28/2019 3:19:40 AM	43839
Ethylbenzene	ND	0.049		mg/Kg	1	3/28/2019 3:19:40 AM	43839
Xylenes, Total	ND	0.097		mg/Kg	1	3/28/2019 3:19:40 AM	43839
Surr: 4-Bromofluorobenzene	93.1	80-120		%Rec	1	3/28/2019 3:19:40 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 20 18-20'
Project: Standard 1
Collection Date: 3/20/2019 5:00:00 PM
Lab ID: 1903A69-011 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	3/27/2019 1:25:47 AM	43859
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	3/27/2019 1:25:47 AM	43859
Surr: DNOP	92.7	70-130		%Rec	1	3/27/2019 1:25:47 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	3/28/2019 3:43:18 AM	43839
Surr: BFB	91.0	73.8-119		%Rec	1	3/28/2019 3:43:18 AM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.023		mg/Kg	1	3/28/2019 3:43:18 AM	43839
Toluene	ND	0.047		mg/Kg	1	3/28/2019 3:43:18 AM	43839
Ethylbenzene	ND	0.047		mg/Kg	1	3/28/2019 3:43:18 AM	43839
Xylenes, Total	ND	0.093		mg/Kg	1	3/28/2019 3:43:18 AM	43839
Surr: 4-Bromofluorobenzene	92.5	80-120		%Rec	1	3/28/2019 3:43:18 AM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 20 25-27'
Project: Standard 1
Collection Date: 3/20/2019 5:15:00 PM
Lab ID: 1903A69-012 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	3/27/2019 2:14:15 AM	43859
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	3/27/2019 2:14:15 AM	43859
Surr: DNOP	90.5	70-130		%Rec	1	3/27/2019 2:14:15 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	3/28/2019 8:11:23 PM	43839
Surr: BFB	94.6	73.8-119		%Rec	1	3/28/2019 8:11:23 PM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.024		mg/Kg	1	3/28/2019 8:11:23 PM	43839
Toluene	ND	0.049		mg/Kg	1	3/28/2019 8:11:23 PM	43839
Ethylbenzene	ND	0.049		mg/Kg	1	3/28/2019 8:11:23 PM	43839
Xylenes, Total	ND	0.098		mg/Kg	1	3/28/2019 8:11:23 PM	43839
Surr: 4-Bromofluorobenzene	97.3	80-120		%Rec	1	3/28/2019 8:11:23 PM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 21 13-15'
Project: Standard 1
Collection Date: 3/21/2019 9:00:00 AM
Lab ID: 1903A69-013 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	3/27/2019 3:02:36 AM	43859
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	3/27/2019 3:02:36 AM	43859
Surr: DNOP	98.8	70-130		%Rec	1	3/27/2019 3:02:36 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	3/28/2019 8:34:59 PM	43839
Surr: BFB	97.4	73.8-119		%Rec	1	3/28/2019 8:34:59 PM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.024		mg/Kg	1	3/28/2019 8:34:59 PM	43839
Toluene	ND	0.049		mg/Kg	1	3/28/2019 8:34:59 PM	43839
Ethylbenzene	ND	0.049		mg/Kg	1	3/28/2019 8:34:59 PM	43839
Xylenes, Total	ND	0.097		mg/Kg	1	3/28/2019 8:34:59 PM	43839
Surr: 4-Bromofluorobenzene	101	80-120		%Rec	1	3/28/2019 8:34:59 PM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 21 25-27'
Project: Standard 1
Collection Date: 3/21/2019 9:30:00 AM
Lab ID: 1903A69-014 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	3/27/2019 3:50:49 AM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/27/2019 3:50:49 AM	43859
Surr: DNOP	92.8	70-130		%Rec	1	3/27/2019 3:50:49 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.6		mg/Kg	1	3/28/2019 8:58:35 PM	43839
Surr: BFB	91.2	73.8-119		%Rec	1	3/28/2019 8:58:35 PM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.023		mg/Kg	1	3/28/2019 8:58:35 PM	43839
Toluene	ND	0.046		mg/Kg	1	3/28/2019 8:58:35 PM	43839
Ethylbenzene	ND	0.046		mg/Kg	1	3/28/2019 8:58:35 PM	43839
Xylenes, Total	ND	0.093		mg/Kg	1	3/28/2019 8:58:35 PM	43839
Surr: 4-Bromofluorobenzene	93.5	80-120		%Rec	1	3/28/2019 8:58:35 PM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 22 8-10'
Project: Standard 1
Collection Date: 3/21/2019 11:30:00 AM
Lab ID: 1903A69-015 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.9		mg/Kg	1	3/27/2019 4:38:58 AM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/27/2019 4:38:58 AM	43859
Surr: DNOP	94.9	70-130		%Rec	1	3/27/2019 4:38:58 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	5.0		mg/Kg	1	3/28/2019 9:22:05 PM	43839
Surr: BFB	93.1	73.8-119		%Rec	1	3/28/2019 9:22:05 PM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.025		mg/Kg	1	3/28/2019 9:22:05 PM	43839
Toluene	ND	0.050		mg/Kg	1	3/28/2019 9:22:05 PM	43839
Ethylbenzene	ND	0.050		mg/Kg	1	3/28/2019 9:22:05 PM	43839
Xylenes, Total	ND	0.099		mg/Kg	1	3/28/2019 9:22:05 PM	43839
Surr: 4-Bromofluorobenzene	95.8	80-120		%Rec	1	3/28/2019 9:22:05 PM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Client Sample ID: MW 22 18-20'
Project: Standard 1
Collection Date: 3/21/2019 12:00:00 PM
Lab ID: 1903A69-016 **Matrix:** SOIL **Received Date:** 3/22/2019 8:15:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **JME**	
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	3/27/2019 5:26:58 AM	43859
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	3/27/2019 5:26:58 AM	43859
Surr: DNOP	91.4	70-130		%Rec	1	3/27/2019 5:26:58 AM	43859
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	4.8		mg/Kg	1	3/28/2019 9:45:23 PM	43839
Surr: BFB	92.0	73.8-119		%Rec	1	3/28/2019 9:45:23 PM	43839
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**	
Benzene	ND	0.024		mg/Kg	1	3/28/2019 9:45:23 PM	43839
Toluene	ND	0.048		mg/Kg	1	3/28/2019 9:45:23 PM	43839
Ethylbenzene	ND	0.048		mg/Kg	1	3/28/2019 9:45:23 PM	43839
Xylenes, Total	ND	0.095		mg/Kg	1	3/28/2019 9:45:23 PM	43839
Surr: 4-Bromofluorobenzene	95.1	80-120		%Rec	1	3/28/2019 9:45:23 PM	43839

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

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1903A69**

01-Apr-19

Client: Hilcorp Energy

Project: Standard 1

Sample ID: **MB-43859**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **43859**	RunNo: **58633**
Prep Date: **3/25/2019**	Analysis Date: **3/26/2019**	SeqNo: **1969067** 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	9.2		10.00		92.4	70	130			

Sample ID: **LCS-43859**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **43859**	RunNo: **58633**
Prep Date: **3/25/2019**	Analysis Date: **3/26/2019**	SeqNo: **1969068** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	44	10	50.00	0	88.0	63.9	124			
Surr: DNOP	4.4		5.000		87.3	70	130			

Sample ID: **1903A69-001AMS**	SampType: **MS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **MW 15 18-20'**	Batch ID: **43859**	RunNo: **58633**
Prep Date: **3/25/2019**	Analysis Date: **3/26/2019**	SeqNo: **1969427** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	310	9.7	48.50	234.0	152	53.5	126			S
Surr: DNOP	5.5		4.850		113	70	130			

Sample ID: **1903A69-001AMSD**	SampType: **MSD**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **MW 15 18-20'**	Batch ID: **43859**	RunNo: **58633**
Prep Date: **3/25/2019**	Analysis Date: **3/26/2019**	SeqNo: **1969428** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	290	10	49.90	234.0	106	53.5	126	6.93	21.7	
Surr: DNOP	5.4		4.990		108	70	130	0	0	

Qualifiers:

- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative 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 at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1903A69**

01-Apr-19

Client: Hilcorp Energy

Project: Standard 1

Sample ID: **MB-43828**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS**	Batch ID: **43828**	RunNo: **58605**
Prep Date: **3/22/2019**	Analysis Date: **3/25/2019**	SeqNo: **1967510** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	970		1000		97.4	73.8	119			

Sample ID: **LCS-43828**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS**	Batch ID: **43828**	RunNo: **58605**
Prep Date: **3/22/2019**	Analysis Date: **3/25/2019**	SeqNo: **1967511** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: BFB	1100		1000		106	73.8	119			

Sample ID: **MB-43839**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS**	Batch ID: **43839**	RunNo: **58605**
Prep Date: **3/22/2019**	Analysis Date: **3/25/2019**	SeqNo: **1967528** 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		104	73.8	119			

Sample ID: **LCS-43839**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS**	Batch ID: **43839**	RunNo: **58605**
Prep Date: **3/22/2019**	Analysis Date: **3/25/2019**	SeqNo: **1967529** 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	96.8	80.1	123			
Surr: BFB	1100		1000		107	73.8	119			

Sample ID: **1903A69-001AMS**	SampType: **MS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **MW 15 18-20'**	Batch ID: **43839**	RunNo: **58605**
Prep Date: **3/22/2019**	Analysis Date: **3/25/2019**	SeqNo: **1967531** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	840	4.6	22.87	871.1	-143	69.1	142			ES
Surr: BFB	24000		914.9		2670	73.8	119			S

Sample ID: **1903A69-001AMSD**	SampType: **MSD**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **MW 15 18-20'**	Batch ID: **43839**	RunNo: **58605**
Prep Date: **3/22/2019**	Analysis Date: **3/25/2019**	SeqNo: **1967532** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	680	5.0	24.78	871.1	-751	69.1	142	20.1	20	ERS
Surr: BFB	20000		991.1		1990	73.8	119	0	0	S

Qualifiers:

- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative 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 at testcode

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1903A69**
01-Apr-19

Client: Hilcorp Energy
Project: Standard 1

Sample ID: **MB-43828** SampType: **MBLK** TestCode: **EPA Method 8021B: Volatiles**
Client ID: **PBS** Batch ID: **43828** RunNo: **58605**
Prep Date: **3/22/2019** Analysis Date: **3/25/2019** SeqNo: **1967549** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	1.0		1.000		101	80	120			

Sample ID: **LCS-43828** SampType: **LCS** TestCode: **EPA Method 8021B: Volatiles**
Client ID: **LCSS** Batch ID: **43828** RunNo: **58605**
Prep Date: **3/22/2019** Analysis Date: **3/25/2019** SeqNo: **1967550** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	0.99		1.000		99.3	80	120			

Sample ID: **MB-43839** SampType: **MBLK** TestCode: **EPA Method 8021B: Volatiles**
Client ID: **PBS** Batch ID: **43839** RunNo: **58605**
Prep Date: **3/22/2019** Analysis Date: **3/25/2019** SeqNo: **1967569** 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-43839** SampType: **LCS** TestCode: **EPA Method 8021B: Volatiles**
Client ID: **LCSS** Batch ID: **43839** RunNo: **58605**
Prep Date: **3/22/2019** Analysis Date: **3/25/2019** SeqNo: **1967570** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.95	0.025	1.000	0	94.7	80	120			
Toluene	0.99	0.050	1.000	0	98.7	80	120			
Ethylbenzene	0.99	0.050	1.000	0	99.1	80	120			
Xylenes, Total	3.0	0.10	3.000	0	101	80	120			
Surr: 4-Bromofluorobenzene	0.99		1.000		98.6	80	120			

Sample ID: **1903A69-002AMS** SampType: **MS** TestCode: **EPA Method 8021B: Volatiles**
Client ID: **MW 15 33-35'** Batch ID: **43839** RunNo: **58605**
Prep Date: **3/22/2019** Analysis Date: **3/25/2019** SeqNo: **1967573** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.0	0.023	0.9311	0.3000	76.2	63.9	127			
Toluene	7.2	0.047	0.9311	9.086	-204	69.9	131			ES
Ethylbenzene	3.2	0.047	0.9311	2.844	41.6	71	132			S
Xylenes, Total	26	0.093	2.793	28.09	-73.5	71.8	131			ES

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1903A69**

01-Apr-19

Client: Hilcorp Energy

Project: Standard 1

Sample ID: **1903A69-002AMS** SampType: **MS** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **MW 15 33-35'** Batch ID: **43839** RunNo: **58605**

Prep Date: **3/22/2019** Analysis Date: **3/25/2019** SeqNo: **1967573** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	1.5		0.9311		164	80	120			S

Sample ID: **1903A69-002AMSD** SampType: **MSD** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **MW 15 33-35'** Batch ID: **43839** RunNo: **58605**

Prep Date: **3/22/2019** Analysis Date: **3/25/2019** SeqNo: **1967574** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.98	0.023	0.9276	0.3000	73.4	63.9	127	2.87	20	
Toluene	6.6	0.046	0.9276	9.086	-265	69.9	131	8.16	20	ES
Ethylbenzene	3.0	0.046	0.9276	2.844	14.8	71	132	8.07	20	S
Xylenes, Total	24	0.093	2.783	28.09	-164	71.8	131	10.1	20	ES
Surr: 4-Bromofluorobenzene	1.5		0.9276		160	80	120	0	0	S

Qualifiers:

E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: **HILCORP ENERGY** Work Order Number: **1903A69** RcptNo: **1**

Received By: **Leah Baca** **3/22/2019 8:15:00 AM** Leah Baca

Completed By: **Erin Melendrez** **3/22/2019 9:33:25 AM**

Reviewed By: ENM 3/22/19

LB: DAD 3/22/19

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? (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: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: DAD 3/22/19

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	5.0	Good	Yes			

Chain-of-Custody Record

Client: Hilcorp Energy company
Jennifer Deal
Mailing Address: PO BOX 61529
Houston, Tx. 77208
Phone #:
email or Fax#: Jdeal@Hilcorp.com
QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)
Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☒ EDD (Type) PDF

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Standard #1
Project #:
Project Manager:
Jennifer Deal - Hilcorp
Danny Burns - LTE
Sampler: E. Carroll & M. Mrdjenovich
On Ice: ☒ Yes ☐ No
# of Coolers: (1)
Cooler Temp (including CF): 4.9+1.0=5.0

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

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 1903A69	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)
3/19/19	1500	Soil	MW15 18-20'	1 4oz	Cool	-001	X	X								
3/19/19	1530		MW15 33-35'			-002	X	X								
3/19/19	1820		MW16 15-17'			-003	X	X								
3/20/19	0845		MW16 25-27'			-004	X	X								
	1115		MW17 18-20'			-005	X	X								
	1125		MW17 25-27'			-006	X	X								
	1330		MW18 18-20'			-007	X	X								
	1345		MW18 25-27'			-008	X	X								
	1500		MW19 13-15'			-009	X	X								
	1515		MW19 25-27'			-010	X	X								
	1700		MW20 18-20'			-011	X	X								
	1715		MW20 25-27'			-012	X	X								

Date	Time	Relinquished by:	Received by:	Via:	Date	Time
3-21-19	1511				3-21-19	1511
3-21-19	1535			Courier	3/22/19	0815

Remarks:
Please cc: dburns@lteenv.com

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

Chain-of-Custody Record

Client: Hilcorp Energy
Jennifer Deal
Mailing Address: PO Box 61529
Houston, Tx 77208
Phone #:
email or Fax#: JDeal@hilcorp.com
QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)
Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☒ EDD (Type) PDF

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Standard #1
Project #:
Project Manager: Jennifer Deal - Hilcorp
Danny Burns - LTE
Sampler: Eric Carroll
On Ice: ☒ Yes ☐ No
# of Coolers: (1)
Cooler Temp(including CF): 4.9+1.0 -50

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

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No 1903A09	BTEX / MTBE / TMBs (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)
3/21	0900	soil	MW21 13-15'	14oz	cool	-013	X	X								
↓	0930	↓	MW21 25-27'	↓	↓	-014	X	X								
	1130		MW22 8-10'			-015	X	X								
	1200		MW22 18-20'			-016	X	X								

Date	Time	Relinquished by:	Received by:	Via:	Date	Time
3-21-19	1511				3-21-19	1511
3-21-19	1535			Courier	3/22/19	0815

Analysis Request

Remarks: please cc: dburns@ltenv.com

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

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

October 29, 2018

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

RE: Standard 1 OrderNo.: 1810B75

Dear Jennifer Deal:

Hall Environmental Analysis Laboratory received 5 sample(s) on 10/23/2018 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 or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

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

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

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order **1810B75**
Date Reported: **10/29/2018**

CLIENT: HILCORP ENERGY
Client Sample ID: MW-02
Project: Standard 1
Collection Date: 10/22/2018 1:32:00 PM
Lab ID: 1810B75-001
Matrix: GROUNDWA
Received Date: 10/23/2018 6:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **AG**	
Benzene	14000	500		µg/L	500	10/24/2018 3:52:51 PM	A55139
Toluene	7100	500		µg/L	500	10/24/2018 3:52:51 PM	A55139
Ethylbenzene	1200	50		µg/L	50	10/24/2018 4:21:34 PM	A55139
Xylenes, Total	12000	75		µg/L	50	10/24/2018 4:21:34 PM	A55139
Surr: 1,2-Dichloroethane-d4	89.1	70-130		%Rec	50	10/24/2018 4:21:34 PM	A55139
Surr: 4-Bromofluorobenzene	99.1	70-130		%Rec	50	10/24/2018 4:21:34 PM	A55139
Surr: Dibromofluoromethane	92.3	70-130		%Rec	50	10/24/2018 4:21:34 PM	A55139
Surr: Toluene-d8	94.5	70-130		%Rec	50	10/24/2018 4:21:34 PM	A55139

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

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	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 Quanitative 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.

CLIENT: HILCORP ENERGY
Client Sample ID: MW-10
Project: Standard 1
Collection Date: 10/22/2018 1:48:00 PM
Lab ID: 1810B75-002
Matrix: GROUNDWA
Received Date: 10/23/2018 6:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **AG**	
Benzene	22000	2000		µg/L	2E	10/24/2018 4:50:15 PM	A55139
Toluene	21000	2000		µg/L	2E	10/24/2018 4:50:15 PM	A55139
Ethylbenzene	1600	200		µg/L	200	10/24/2018 5:18:51 PM	A55139
Xylenes, Total	13000	300		µg/L	200	10/24/2018 5:18:51 PM	A55139
Surr: 1,2-Dichloroethane-d4	89.4	70-130		%Rec	200	10/24/2018 5:18:51 PM	A55139
Surr: 4-Bromofluorobenzene	97.0	70-130		%Rec	200	10/24/2018 5:18:51 PM	A55139
Surr: Dibromofluoromethane	87.7	70-130		%Rec	200	10/24/2018 5:18:51 PM	A55139
Surr: Toluene-d8	97.3	70-130		%Rec	200	10/24/2018 5:18:51 PM	A55139

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

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	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 Quanitative 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.

CLIENT: HILCORP ENERGY
Client Sample ID: MW-11
Project: Standard 1
Collection Date: 10/22/2018 1:05:00 PM
Lab ID: 1810B75-003
Matrix: GROUNDWA
Received Date: 10/23/2018 6:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **AG**	
Benzene	ND	1.0		µg/L	1	10/25/2018 11:38:49 AM	C55173
Toluene	ND	1.0		µg/L	1	10/25/2018 11:38:49 AM	C55173
Ethylbenzene	ND	1.0		µg/L	1	10/25/2018 11:38:49 AM	C55173
Xylenes, Total	ND	1.5		µg/L	1	10/25/2018 11:38:49 AM	C55173
Surr: 1,2-Dichloroethane-d4	88.3	70-130		%Rec	1	10/25/2018 11:38:49 AM	C55173
Surr: 4-Bromofluorobenzene	103	70-130		%Rec	1	10/25/2018 11:38:49 AM	C55173
Surr: Dibromofluoromethane	89.4	70-130		%Rec	1	10/25/2018 11:38:49 AM	C55173
Surr: Toluene-d8	99.8	70-130		%Rec	1	10/25/2018 11:38:49 AM	C55173

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

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	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 Quanitative 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.

CLIENT: HILCORP ENERGY
Client Sample ID: MW-12
Project: Standard 1
Collection Date: 10/22/2018 12:55:00 PM
Lab ID: 1810B75-004
Matrix: GROUNDWA
Received Date: 10/23/2018 6:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **AG**	
Benzene	2400	50		µg/L	50	10/24/2018 5:47:32 PM	A55139
Toluene	3800	50		µg/L	50	10/24/2018 5:47:32 PM	A55139
Ethylbenzene	1100	50		µg/L	50	10/24/2018 5:47:32 PM	A55139
Xylenes, Total	5000	75		µg/L	50	10/24/2018 5:47:32 PM	A55139
Surr: 1,2-Dichloroethane-d4	89.0	70-130		%Rec	50	10/24/2018 5:47:32 PM	A55139
Surr: 4-Bromofluorobenzene	102	70-130		%Rec	50	10/24/2018 5:47:32 PM	A55139
Surr: Dibromofluoromethane	88.6	70-130		%Rec	50	10/24/2018 5:47:32 PM	A55139
Surr: Toluene-d8	96.2	70-130		%Rec	50	10/24/2018 5:47:32 PM	A55139

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

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	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 Quanitative 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.

CLIENT: HILCORP ENERGY
Client Sample ID: MW-14
Project: Standard 1
Collection Date: 10/22/2018 12:40:00 PM
Lab ID: 1810B75-005
Matrix: GROUNDWA
Received Date: 10/23/2018 6:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **AG**	
Benzene	13000	500		µg/L	500	10/24/2018 6:16:13 PM	A55139
Toluene	26000	500		µg/L	500	10/24/2018 6:16:13 PM	A55139
Ethylbenzene	1100	100		µg/L	100	10/24/2018 6:44:54 PM	A55139
Xylenes, Total	10000	150		µg/L	100	10/24/2018 6:44:54 PM	A55139
Surr: 1,2-Dichloroethane-d4	87.2	70-130		%Rec	100	10/24/2018 6:44:54 PM	A55139
Surr: 4-Bromofluorobenzene	101	70-130		%Rec	100	10/24/2018 6:44:54 PM	A55139
Surr: Dibromofluoromethane	89.4	70-130		%Rec	100	10/24/2018 6:44:54 PM	A55139
Surr: Toluene-d8	98.2	70-130		%Rec	100	10/24/2018 6:44:54 PM	A55139

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

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	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 Quanitative 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#: **1810B75**

29-Oct-18

Client: HILCORP ENERGY

Project: Standard 1

Sample ID **100ng lcs2**	SampType: **LCS**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **LCSW**	Batch ID: **A55139**	RunNo: **55139**
Prep Date:	Analysis Date: **10/24/2018**	SeqNo: **1833385** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	19	1.0	20.00	0	95.9	70	130			
Toluene	19	1.0	20.00	0	96.0	70	130			
Surr: 1,2-Dichloroethane-d4	9.1		10.00		91.2	70	130			
Surr: 4-Bromofluorobenzene	9.9		10.00		99.4	70	130			
Surr: Dibromofluoromethane	9.2		10.00		92.3	70	130			
Surr: Toluene-d8	9.6		10.00		95.8	70	130			

Sample ID **rb2**	SampType: **MBLK**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **PBW**	Batch ID: **A55139**	RunNo: **55139**
Prep Date:	Analysis Date: **10/24/2018**	SeqNo: **1833404** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	8.7		10.00		87.3	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	8.8		10.00		87.5	70	130			
Surr: Toluene-d8	9.7		10.00		96.9	70	130			

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **LCSW**	Batch ID: **C55173**	RunNo: **55173**
Prep Date:	Analysis Date: **10/25/2018**	SeqNo: **1834391** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	18	1.0	20.00	0	92.5	70	130			
Toluene	19	1.0	20.00	0	97.5	70	130			
Surr: 1,2-Dichloroethane-d4	8.9		10.00		88.6	70	130			
Surr: 4-Bromofluorobenzene	9.9		10.00		99.4	70	130			
Surr: Dibromofluoromethane	9.2		10.00		92.3	70	130			
Surr: Toluene-d8	9.7		10.00		96.7	70	130			

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **PBW**	Batch ID: **C55173**	RunNo: **55173**
Prep Date:	Analysis Date: **10/25/2018**	SeqNo: **1834399** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								

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 Quanitative 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#: **1810B75**

29-Oct-18

Client: HILCORP ENERGY

Project: Standard 1

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **PBW**	Batch ID: **C55173**	RunNo: **55173**
Prep Date:	Analysis Date: **10/25/2018**	SeqNo: **1834399** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	8.9		10.00		88.5	70	130			
Surr: 4-Bromofluorobenzene	11		10.00		110	70	130			
Surr: Dibromofluoromethane	9.0		10.00		90.1	70	130			
Surr: Toluene-d8	9.7		10.00		97.5	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 Quanitative 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

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: 1810B75 RcptNo: 1

Received By: **Anne Thorne** 10/23/2018 6:45:00 AM Anne Thorne

Completed By: **Anne Thorne** 10/23/2018 10:06:57 AM Anne Thorne

Reviewed By: 10/23/18 LABELED BY: DAD 10/23/18

~~Labeled by: AT 10/23/18~~

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° 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? (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: _____ (<2 or >12 unless noted)

Adjusted? _____

Checked by: DAD 10/23/18

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	2.2	Good	Yes			

Chain-of-Custody Record

Client: Hilcorp

Mailing Address: Jennifer Deal

Phone #: 9763851873

email or Fax#: jdeal@hilcorp.com

QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: Standard #1

Project #:

Project Manager: D. Burns

Sampler: C Jones

On Ice: ☒ Yes ☐ No

Sample Temperature: 2.6-CF-0.4=2.2

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1810B75	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (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,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA) BTEX	8270 (Semi-VOA)	Air Bubbles (Y or N)
10/22	1332	GW	MW-02	~~3x40ml~~ 1/VOA	HCL	001										X		
	1348		MW-10			002										X		
	1305		MW-11			003										X		
	1255		MW-12			004										X		
	1240		MW-14			005										X		

Date:	Time:	Relinquished by:	Received by:	Date	Time
10/22/18	1540			10/22/18	1540
10/22/18	1804			10/23/18	0645

Remarks: cc: dburns@ltenv.com

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

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

April 10, 2019

Jennifer Deal

Hilcorp Energy
PO Box 61529
Houston, TX 77208-1529
TEL: (337) 276-7676
FAX

RE: Standard #1 OrderNo.: 1904030

Dear Jennifer Deal:

Hall Environmental Analysis Laboratory received 8 sample(s) on 3/30/2019 for the analyses presented in the following report.

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

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

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

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Project: Standard #1
Lab Order: 1904030

Lab ID: 1904030-001 **Collection Date:** 3/29/2019 12:30:00 PM
Client Sample ID: MW03 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **RAA**	
Benzene	21000	500		µg/L	500	4/8/2019 4:28:00 PM	A58995
Toluene	110	10		µg/L	10	4/3/2019 11:36:40 PM	B58841
Ethylbenzene	270	10		µg/L	10	4/3/2019 11:36:40 PM	B58841
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	10	4/3/2019 11:36:40 PM	B58841
1,2,4-Trimethylbenzene	550	10		µg/L	10	4/3/2019 11:36:40 PM	B58841
1,3,5-Trimethylbenzene	240	10		µg/L	10	4/3/2019 11:36:40 PM	B58841
Xylenes, Total	11000	750		µg/L	500	4/8/2019 4:28:00 PM	A58995
Surr: 1,2-Dichloroethane-d4	84.9	70-130		%Rec	10	4/3/2019 11:36:40 PM	B58841
Surr: 4-Bromofluorobenzene	118	70-130		%Rec	10	4/3/2019 11:36:40 PM	B58841
Surr: Dibromofluoromethane	85.6	70-130		%Rec	10	4/3/2019 11:36:40 PM	B58841
Surr: Toluene-d8	96.7	70-130		%Rec	10	4/3/2019 11:36:40 PM	B58841

Lab ID: 1904030-002 **Collection Date:** 3/29/2019 12:40:00 PM
Client Sample ID: MW16 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **RAA**	
Benzene	7700	100		µg/L	100	4/8/2019 4:52:00 PM	A58995
Toluene	14000	1000		µg/L	1E+	4/9/2019 12:55:00 PM	R59003
Ethylbenzene	940	100		µg/L	100	4/8/2019 4:52:00 PM	A58995
Methyl tert-butyl ether (MTBE)	ND	100		µg/L	100	4/8/2019 4:52:00 PM	A58995
1,2,4-Trimethylbenzene	380	100		µg/L	100	4/8/2019 4:52:00 PM	A58995
1,3,5-Trimethylbenzene	170	100		µg/L	100	4/8/2019 4:52:00 PM	A58995
Xylenes, Total	8600	150		µg/L	100	4/8/2019 4:52:00 PM	A58995
Surr: 1,2-Dichloroethane-d4	101	70-130		%Rec	100	4/8/2019 4:52:00 PM	A58995
Surr: 4-Bromofluorobenzene	101	70-130		%Rec	100	4/8/2019 4:52:00 PM	A58995
Surr: Dibromofluoromethane	98.0	70-130		%Rec	100	4/8/2019 4:52:00 PM	A58995
Surr: Toluene-d8	98.1	70-130		%Rec	100	4/8/2019 4:52:00 PM	A58995

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

Qualifiers:

H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative 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 at testcode

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Project: Standard #1
Lab Order: 1904030

Lab ID: 1904030-003
Collection Date: 3/29/2019 1:00:00 PM
Client Sample ID: MW20
Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **RAA**	
Benzene	1000	100		µg/L	100	4/9/2019 1:19:00 PM	R59003
Toluene	900	10		µg/L	10	4/8/2019 5:16:00 PM	A58995
Ethylbenzene	30	10		µg/L	10	4/8/2019 5:16:00 PM	A58995
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	10	4/8/2019 5:16:00 PM	A58995
1,2,4-Trimethylbenzene	ND	10		µg/L	10	4/8/2019 5:16:00 PM	A58995
1,3,5-Trimethylbenzene	ND	10		µg/L	10	4/8/2019 5:16:00 PM	A58995
Xylenes, Total	230	15		µg/L	10	4/8/2019 5:16:00 PM	A58995
Surr: 1,2-Dichloroethane-d4	103	70-130		%Rec	10	4/8/2019 5:16:00 PM	A58995
Surr: 4-Bromofluorobenzene	102	70-130		%Rec	10	4/8/2019 5:16:00 PM	A58995
Surr: Dibromofluoromethane	102	70-130		%Rec	10	4/8/2019 5:16:00 PM	A58995
Surr: Toluene-d8	97.2	70-130		%Rec	10	4/8/2019 5:16:00 PM	A58995

Lab ID: 1904030-004
Collection Date: 3/29/2019 1:15:00 PM
Client Sample ID: MW22
Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **RAA**	
Benzene	1.0	1.0		µg/L	1	4/8/2019 5:40:00 PM	A58995
Toluene	2.0	1.0		µg/L	1	4/8/2019 5:40:00 PM	A58995
Ethylbenzene	ND	1.0		µg/L	1	4/8/2019 5:40:00 PM	A58995
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	4/8/2019 5:40:00 PM	A58995
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	4/8/2019 5:40:00 PM	A58995
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	4/8/2019 5:40:00 PM	A58995
Xylenes, Total	2.0	1.5		µg/L	1	4/8/2019 5:40:00 PM	A58995
Surr: 1,2-Dichloroethane-d4	107	70-130		%Rec	1	4/8/2019 5:40:00 PM	A58995
Surr: 4-Bromofluorobenzene	98.7	70-130		%Rec	1	4/8/2019 5:40:00 PM	A58995
Surr: Dibromofluoromethane	107	70-130		%Rec	1	4/8/2019 5:40:00 PM	A58995
Surr: Toluene-d8	95.7	70-130		%Rec	1	4/8/2019 5:40:00 PM	A58995

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

Qualifiers:

H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative 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 at testcode

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Project: Standard #1
Lab Order: 1904030

Lab ID: 1904030-005 **Collection Date:** 3/29/2019 2:15:00 PM
Client Sample ID: MW12 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **RAA**	
Benzene	870	10		µg/L	10	4/8/2019 6:04:00 PM	A58995
Toluene	18	10		µg/L	10	4/8/2019 6:04:00 PM	A58995
Ethylbenzene	1200	100		µg/L	100	4/9/2019 1:43:00 PM	R59003
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	10	4/8/2019 6:04:00 PM	A58995
1,2,4-Trimethylbenzene	180	10		µg/L	10	4/8/2019 6:04:00 PM	A58995
1,3,5-Trimethylbenzene	83	10		µg/L	10	4/8/2019 6:04:00 PM	A58995
Xylenes, Total	1500	15		µg/L	10	4/8/2019 6:04:00 PM	A58995
Surr: 1,2-Dichloroethane-d4	105	70-130		%Rec	10	4/8/2019 6:04:00 PM	A58995
Surr: 4-Bromofluorobenzene	103	70-130		%Rec	10	4/8/2019 6:04:00 PM	A58995
Surr: Dibromofluoromethane	104	70-130		%Rec	10	4/8/2019 6:04:00 PM	A58995
Surr: Toluene-d8	96.2	70-130		%Rec	10	4/8/2019 6:04:00 PM	A58995

Lab ID: 1904030-006 **Collection Date:** 3/29/2019 2:00:00 PM
Client Sample ID: MW11 **Matrix:** AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **DJF**	
Benzene	3.6	1.0		µg/L	1	4/4/2019 2:56:20 AM	B58841
Toluene	ND	1.0		µg/L	1	4/4/2019 2:56:20 AM	B58841
Ethylbenzene	ND	1.0		µg/L	1	4/4/2019 2:56:20 AM	B58841
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	4/4/2019 2:56:20 AM	B58841
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	4/4/2019 2:56:20 AM	B58841
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	4/4/2019 2:56:20 AM	B58841
Xylenes, Total	ND	1.5		µg/L	1	4/4/2019 2:56:20 AM	B58841
Surr: 1,2-Dichloroethane-d4	84.0	70-130		%Rec	1	4/4/2019 2:56:20 AM	B58841
Surr: 4-Bromofluorobenzene	105	70-130		%Rec	1	4/4/2019 2:56:20 AM	B58841
Surr: Dibromofluoromethane	82.4	70-130		%Rec	1	4/4/2019 2:56:20 AM	B58841
Surr: Toluene-d8	94.9	70-130		%Rec	1	4/4/2019 2:56:20 AM	B58841

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

Qualifiers:

H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative 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 at testcode

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Hilcorp Energy
Project: Standard #1
Lab Order: 1904030

Lab ID: 1904030-007
Collection Date: 3/29/2019 12:42:00 PM
Client Sample ID: MW05
Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **RAA**	
Benzene	10000	1000		µg/L	1E+	4/9/2019 2:07:00 PM	R59003
Toluene	880	100		µg/L	100	4/8/2019 6:28:00 PM	A58995
Ethylbenzene	450	100		µg/L	100	4/8/2019 6:28:00 PM	A58995
Methyl tert-butyl ether (MTBE)	ND	100		µg/L	100	4/8/2019 6:28:00 PM	A58995
1,2,4-Trimethylbenzene	360	100		µg/L	100	4/8/2019 6:28:00 PM	A58995
1,3,5-Trimethylbenzene	140	100		µg/L	100	4/8/2019 6:28:00 PM	A58995
Xylenes, Total	2900	150		µg/L	100	4/8/2019 6:28:00 PM	A58995
Surr: 1,2-Dichloroethane-d4	103	70-130		%Rec	100	4/8/2019 6:28:00 PM	A58995
Surr: 4-Bromofluorobenzene	99.7	70-130		%Rec	100	4/8/2019 6:28:00 PM	A58995
Surr: Dibromofluoromethane	103	70-130		%Rec	100	4/8/2019 6:28:00 PM	A58995
Surr: Toluene-d8	98.4	70-130		%Rec	100	4/8/2019 6:28:00 PM	A58995

Lab ID: 1904030-008
Collection Date: 3/29/2019 1:15:00 PM
Client Sample ID: MW19
Matrix: AQUEOUS

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8260: VOLATILES SHORT LIST						Analyst: **RAA**	
Benzene	14000	1000		µg/L	1E+	4/8/2019 6:52:00 PM	A58995
Toluene	10000	1000		µg/L	1E+	4/8/2019 6:52:00 PM	A58995
Ethylbenzene	930	100		µg/L	100	4/8/2019 7:16:00 PM	A58995
Methyl tert-butyl ether (MTBE)	ND	100		µg/L	100	4/8/2019 7:16:00 PM	A58995
1,2,4-Trimethylbenzene	400	100		µg/L	100	4/8/2019 7:16:00 PM	A58995
1,3,5-Trimethylbenzene	170	100		µg/L	100	4/8/2019 7:16:00 PM	A58995
Xylenes, Total	6200	150		µg/L	100	4/8/2019 7:16:00 PM	A58995
Surr: 1,2-Dichloroethane-d4	107	70-130		%Rec	100	4/8/2019 7:16:00 PM	A58995
Surr: 4-Bromofluorobenzene	100	70-130		%Rec	100	4/8/2019 7:16:00 PM	A58995
Surr: Dibromofluoromethane	105	70-130		%Rec	100	4/8/2019 7:16:00 PM	A58995
Surr: Toluene-d8	98.1	70-130		%Rec	100	4/8/2019 7:16:00 PM	A58995

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

Qualifiers:

H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904030**

10-Apr-19

Client: Hilcorp Energy

Project: Standard #1

Sample ID: **100ng lcs2** SampType: **LCS** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **LCSW** Batch ID: **B58841** RunNo: **58841**

Prep Date: Analysis Date: **4/3/2019** SeqNo: **1980221** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	16	1.0	20.00	0	82.0	70	130			
Toluene	21	1.0	20.00	0	105	70	130			
Surr: 1,2-Dichloroethane-d4	8.6		10.00		85.5	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		105	70	130			
Surr: Dibromofluoromethane	8.4		10.00		84.4	70	130			
Surr: Toluene-d8	10		10.00		100	70	130			

Sample ID: **1904030-004A MS** SampType: **MS** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **MW22** Batch ID: **B58841** RunNo: **58841**

Prep Date: Analysis Date: **4/4/2019** SeqNo: **1980235** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	17	1.0	20.00	1.030	79.0	70	130			
Toluene	22	1.0	20.00	2.699	95.6	70	130			
Surr: 1,2-Dichloroethane-d4	8.5		10.00		84.8	70	130			
Surr: 4-Bromofluorobenzene	11		10.00		106	70	130			
Surr: Dibromofluoromethane	8.3		10.00		82.5	70	130			
Surr: Toluene-d8	9.6		10.00		95.8	70	130			

Sample ID: **1904030-004A MSD** SampType: **MSD** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **MW22** Batch ID: **B58841** RunNo: **58841**

Prep Date: Analysis Date: **4/4/2019** SeqNo: **1980236** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	16	1.0	20.00	1.030	75.9	70	130	3.81	20	
Toluene	20	1.0	20.00	2.699	87.9	70	130	7.31	20	
Surr: 1,2-Dichloroethane-d4	8.6		10.00		86.5	70	130	0	0	
Surr: 4-Bromofluorobenzene	10		10.00		103	70	130	0	0	
Surr: Dibromofluoromethane	8.3		10.00		83.1	70	130	0	0	
Surr: Toluene-d8	9.6		10.00		95.9	70	130	0	0	

Sample ID: **rb1** SampType: **MBLK** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **PBW** Batch ID: **B58841** RunNo: **58841**

Prep Date: Analysis Date: **4/3/2019** SeqNo: **1980249** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								

Qualifiers:

H Holding times for preparation or analysis exceeded

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

ND Not Detected at the Reporting Limit

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904030**

10-Apr-19

Client: Hilcorp Energy

Project: Standard #1

Sample ID: **rb1**	SampType: **MBLK**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **PBW**	Batch ID: **B58841**	RunNo: **58841**
Prep Date:	Analysis Date: **4/3/2019**	SeqNo: **1980249** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	8.7		10.00		87.2	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	8.5		10.00		85.3	70	130			
Surr: Toluene-d8	9.6		10.00		96.3	70	130			

Sample ID: **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **LCSW**	Batch ID: **A58995**	RunNo: **58995**
Prep Date:	Analysis Date: **4/8/2019**	SeqNo: **1985094** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	106	70	130			
Toluene	21	1.0	20.00	0	105	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		101	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		98.4	70	130			
Surr: Dibromofluoromethane	9.9		10.00		99.0	70	130			
Surr: Toluene-d8	9.6		10.00		95.8	70	130			

Sample ID: **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260: Volatiles Short List**
Client ID: **PBW**	Batch ID: **A58995**	RunNo: **58995**
Prep Date:	Analysis Date: **4/8/2019**	SeqNo: **1985095** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	10		10.00		102	70	130			
Surr: 4-Bromofluorobenzene	9.7		10.00		97.1	70	130			
Surr: Dibromofluoromethane	10		10.00		100	70	130			
Surr: Toluene-d8	9.6		10.00		95.8	70	130			

Qualifiers:

H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904030**

10-Apr-19

Client: Hilcorp Energy

Project: Standard #1

Sample ID: **100ng lcs** SampType: **LCS** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **LCSW** Batch ID: **R59003** RunNo: **59003**

Prep Date: Analysis Date: **4/9/2019** SeqNo: **1985945** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	22	1.0	20.00	0	111	70	130			
Toluene	21	1.0	20.00	0	103	70	130			
Surr: 1,2-Dichloroethane-d4	11		10.00		108	70	130			
Surr: 4-Bromofluorobenzene	9.9		10.00		99.2	70	130			
Surr: Dibromofluoromethane	11		10.00		105	70	130			
Surr: Toluene-d8	9.5		10.00		95.0	70	130			

Sample ID: **rb** SampType: **MBLK** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **PBW** Batch ID: **R59003** RunNo: **59003**

Prep Date: Analysis Date: **4/9/2019** SeqNo: **1985946** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Surr: 1,2-Dichloroethane-d4	11		10.00		107	70	130			
Surr: 4-Bromofluorobenzene	9.5		10.00		95.2	70	130			
Surr: Dibromofluoromethane	11		10.00		106	70	130			
Surr: Toluene-d8	9.5		10.00		95.1	70	130			

Sample ID: **100ng lcs2** SampType: **LCS** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **LCSW** Batch ID: **B59003** RunNo: **59003**

Prep Date: Analysis Date: **4/10/2019** SeqNo: **1986087** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 1,2-Dichloroethane-d4	10		10.00		99.8	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		98.2	70	130			
Surr: Dibromofluoromethane	9.9		10.00		99.1	70	130			
Surr: Toluene-d8	9.4		10.00		94.4	70	130			

Sample ID: **rb2** SampType: **MBLK** TestCode: **EPA Method 8260: Volatiles Short List**

Client ID: **PBW** Batch ID: **B59003** RunNo: **59003**

Prep Date: Analysis Date: **4/10/2019** SeqNo: **1986088** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 1,2-Dichloroethane-d4	10		10.00		101	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		98.2	70	130			
Surr: Dibromofluoromethane	10		10.00		101	70	130			
Surr: Toluene-d8	9.4		10.00		94.2	70	130			

Qualifiers:

H Holding times for preparation or analysis exceeded

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

ND Not Detected at the Reporting Limit

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified at testcode

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: **HILCORP ENERGY** Work Order Number: **1904030** RcptNo: **1**

Received By: **Anne Thorne** **3/30/2019 9:20:00 AM** Anne Thorne

Completed By: **Yazmine Garduno** **4/1/2019 11:51:45 AM** Yazmine Garduno

Reviewed By: YG 3 YG 4/1/19

LB: ENM 4/1/19

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? (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: (<2 or >12 unless noted)

Adjusted?

Checked by:

ENM 4/1/19

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			

Chain-of-Custody Record

Client: Hilcorp Energy
Jennifer Deal
Mailing Address:
Phone #: 970-385-1096
email or Fax#: jdeal@hilcorp.com
QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)
Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☒ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Standard #1
Project #:
Project Manager: Jennifer - hilcorp, Danny Burns - LTE
Sampler: Eric Carroll
On Ice: ☒ Yes ☐ No
# of Coolers: 3
Cooler Temp(including CF): 1.0°C ea

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

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 1904030	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)
3/29/19	1230	GW	MW03	3 VOAs		-001	X									
	1240		MW06			-002	X									
	1300		MW20			-003	X									
	1315		MW22			-004	X									
	1415		MW12			-005	X									
	1400		MW11			-006	X									
	1242		MW05			-007	X									
	1315		MW19			-008	X									

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
3/29	1500	Eric Carroll	Chantz Walters		3/29/19	1500
3/29/19	1840	Chantz Walters			03/30/19	0920

Remarks: Please CC: dburns@ltenv.com
ecarroll@ltenv.com

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