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

State of New Mexico Energy Minerals and Natural Resources Department

Oil Conservation Division 1220 South St. Francis Dr. Santa Fe, NM 87505 Form C-141 Revised August 24, 2018 Submit to appropriate OCD District office

Incident ID	NCS1913741281
District RP	
Facility ID	
Application ID	

## **Release Notification**

### **Responsible Party**

Responsible Party Hilcorp Energy Company		OGRID 372171					
Contact Name Jennifer Deal			Contact Telephone 505-801-6517				
Contact email jdeal@hilcorp.com			Incident #	NCS19137	741281		
Contact mail	ing address	382 Road 3100,	Aztec NM 8741	0			
			Location	n of R	delease S	ource	
Latitude 36.	7778969					-107.8062668_	
			(NAD 83 in a	decimal de	grees to 5 decin	nal places)	
Site Name N	Mansfield 11				Site Type	Gas Well	
Date Release	Discovered	5/2/2019 @ 4:00	)pm		API# 30-04.	5-20992	
	I ~ .	T =					
Unit Letter	Section	Township	Range	C	Cour	nty	_
N	29	30N	09W	San	Juan		
Surface Owner	r: State		ribal 🗌 Private	(Name:			)
			Nature ar	nd Vol	lume of l	Release	
		ıl(s) Released (Select a	all that apply and atta	ch calculat	ions or specific	justification for the	e volumes provided below)
Crude Oil	1	Volume Release	ed (bbls)			Volume Reco	overed (bbls)
Produced	Water	Volume Release	ed (bbls)			Volume Reco	overed (bbls)
		Is the concentra	tion of dissolved	l chloride	e in the	☐ Yes ☐ N	No
Condensa	ite		ed (bbls) 10.44			Volume Reco	overed (bbls) 0
☐ Natural G	ias	Volume Release	ed (Mcf)			Volume Reco	overed (Mcf)
Other (de	scribe)	_	t Released (provi	ide units)	)	Volume/Wei	ght Recovered (provide units)
Historic Con	tamination	Unknown					
Cause of Rel		- <b>L</b>					
		a new BGT at the ation to determine		storic con	itamination v	was encountered	d at approximately 4 feet deep. Hilcorp
Will assess th	e comamme	tion to determine	u puui ioi wuiu.				

#### **Smith, Cory, EMNRD**

**From:** Smith, Cory, EMNRD

Sent: Tuesday, December 3, 2019 10:11 AM

To: Jennifer Deal Cc: Josh Adams

**Subject:** Mansfield #11 Remediation plan approval incident# NCS1913741281

Ms. Deal,

OCD has reviewed the remediation plan received on September 9, 2019 for a suspected historic hydrocarbon release discovered on May 2, 2019 at the Mansfield #11 (30-045-20992). The release has been assigned to incident# nCS1913741281 the submitted remediation plan has been approved with the following conditions of approval.

- HEC will physically mark/identify the current excavation side walls prior to the construction of the slopes and will maintain this mark so accurate sampling can be collected during final confirmation.
  - HEC will observe and verify with field PID that soils removed for slope construction is not impacted, these soils must be segregated from any impacted soils.
  - o Failure to mark/monitor the overburden soils may result in HEC being required to verify those area are not impacted via soil sampling.
- OCD denies HEC request to collect an open excavation water sample for the purpose determining ground water impacts in the source area.
  - HEC will return to the site to install a temporary monitor well, develop and collect a ground water sample from the source area.
- HEC will provide OCD notice prior to the collection of final confirmation sampling per 19.15.29.12 NMAC.
- OCD has granted HEC an extension to submit the final closure report no later than February 21, 2020.
  - o If additional ground water impacts are found, HEC will submit an updated remediation plan that includes all of the soil sampling results, updated maps, etc. no later than February 21, 2020.

This condition of approval will be attached to the signed copy of the remediation plan and uploaded to the OCD imaging system. If you have any additional questions please give me a call.

Cory Smith
Environmental Specialist
Oil Conservation Division
Energy, Minerals, & Natural Resources
1000 Rio Brazos, Aztec, NM 87410
(505)334-6178 ext 115
cory.smith@state.nm.us

## State of New Mexico Oil Conservation Division

Incident ID	NCS1913741281
District RP	
Facility ID	
Application ID	

Was this a major	If YES, for what reason(s) does the respon	sible party consider this a major release?
release as defined by		
19.15.29.7(A) NMAC?		
☐ Yes ⊠ No		
If YES, was immediate no	Lotice given to the OCD? By whom? To what is a second of the OCD?	om? When and by what means (phone, email, etc)?
,	,	, u
	Initial R	esponse
The responsible p	party must undertake the following actions immediated	wunless they could create a safety hazard that would result in injury
The source of the rele	ease has been stopped.	
☐ The impacted area has	s been secured to protect human health and	the environment.
Released materials ha	ive been contained via the use of berms or o	ikes, absorbent pads, or other containment devices.
	ecoverable materials have been removed an	l managed appropriately.
If all the actions described	d above have <u>not</u> been undertaken, explain	vhy:
Day 10 15 20 9 D (4) NM	A C 41	
		emediation immediately after discovery of a release. If remediation efforts have been successfully completed or if the release occurred
		lease attach all information needed for closure evaluation.
I hereby certify that the infor	rmation given above is true and complete to the	pest of my knowledge and understand that pursuant to OCD rules and
regulations all operators are	required to report and/or file certain release noti	fications and perform corrective actions for releases which may endanger
		CD does not relieve the operator of liability should their operations have at to groundwater, surface water, human health or the environment. In
addition, OCD acceptance of		responsibility for compliance with any other federal, state, or local laws
and/or regulations.		
Printed Name:Jennifer	Deal	Title:Environmental Specialist
Signatura	Gym for Deal	Deta: 5/12/2010
Signature:		Date: 3/13/2019
email:jdeal@hilcorp.o	com_	Telephone:505-801-6517
OCD Only		
OCD OHLY		
Received by:		Date:

## State of New Mexico Oil Conservation Division

Incident ID	NCS1913741281
District RP	
Facility ID	
Application ID	

### **Site Assessment/Characterization**

This information must be provided to the appropriate district office no later than 90 days after the release discovery date.

This information must be provided to the appropriate district office no taler than 20 days after the release discovery date.		
What is the shallowest depth to groundwater beneath the area affected by the release?	25-28 (ft bgs)	
Did this release impact groundwater or surface water?	☐ Yes 🗶 No	
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	Yes X No	
Are the lateral extents of the release within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark)?	Yes X No	
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	Yes X No	
Are the lateral extents of the release within 500 horizontal feet of a spring or a private domestic fresh water well used by less than five households for domestic or stock watering purposes?	Yes X No	
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	Yes X No	
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	Yes X No	
Are the lateral extents of the release within 300 feet of a wetland?	Yes X No	
Are the lateral extents of the release overlying a subsurface mine?	Yes X No	
Are the lateral extents of the release overlying an unstable area such as karst geology?	Yes X No	
Are the lateral extents of the release within a 100-year floodplain?	☐ Yes 🗶 No	
Did the release impact areas <b>not</b> on an exploration, development, production, or storage site?	Yes X No	
Attach a comprehensive report (electronic submittals in .pdf format are preferred) demonstrating the lateral and vertical extents of soil contamination associated with the release have been determined. Refer to 19.15.29.11 NMAC for specifics.		
Characterization Report Checklist: Each of the following items must be included in the report.		
<ul> <li>Scaled site map showing impacted area, surface features, subsurface features, delineation points, and monitoring wells.</li> <li>Field data</li> <li>Data table of soil contaminant concentration data</li> </ul>		

Depth to water determination

Determination of water sources and significant watercourses within ½-mile of the lateral extents of the release

**X** Boring or excavation logs

X Photographs including date and GIS information

X Topographic/Aerial maps

X Laboratory data including chain of custody

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

## State of New Mexico Oil Conservation Division

Incident ID	NCS1913741281
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regulations all operators are required to report and/or file certain release notion public health or the environment. The acceptance of a C-141 report by the Called to adequately investigate and remediate contamination that pose a threaddition, OCD acceptance of a C-141 report does not relieve the operator of and/or regulations.	fications and perform corrective actions for releases which may endanger DCD does not relieve the operator of liability should their operations have eat to groundwater, surface water, human health or the environment. In
Printed Name:Jennifer Deal	Title: Environmental Specialist
Signature: Jenn fe Deal	Date:9/12/2019 Telephone:505-801-6517
OCD Only	
Received by:	Date:

## State of New Mexico Oil Conservation Division

Incident ID	
District RP	
Facility ID	
Application ID	

## **Remediation Plan**

Remediation Plan Checklist: Each of the following items must be	included in the plan.		
<ul> <li>X Detailed description of proposed remediation technique</li> <li>X Scaled sitemap with GPS coordinates showing delineation points</li> <li>X Estimated volume of material to be remediated</li> <li>X Closure criteria is to Table 1 specifications subject to 19.15.29.12(C)(4) NMAC</li> <li>X Proposed schedule for remediation (note if remediation plan timeline is more than 90 days OCD approval is required)</li> </ul>			
Deferral Requests Only: Each of the following items must be con-	firmed as part of any request for deferral of remediation.		
Contamination must be in areas immediately under or around predeconstruction.	oduction equipment where remediation could cause a major facility		
Extents of contamination must be fully delineated.			
Contamination does not cause an imminent risk to human health	, the environment, or groundwater.		
I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.			
Printed Name: Jennifer Deal	Title: Environmental Specialist		
Printed Name: Jennifer Deal  Signature: Gennifer Deal	Date:9/12/2019		
email:jdeal@hilcorp.com	Telephone:505-801-6517		
OCD Only			
Received by: OCD	Date: 9/9/19		
☐ Approved ☐ Approved with Attached Conditions of A	Approval		
Signature: Long R. S	Date: 12/3/19		

#### **Smith, Cory, EMNRD**

**From:** Smith, Cory, EMNRD

Sent: Tuesday, December 3, 2019 10:11 AM

To: Jennifer Deal Cc: Josh Adams

**Subject:** Mansfield #11 Remediation plan approval incident# NCS1913741281

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Cory Smith
Environmental Specialist
Oil Conservation Division
Energy, Minerals, & Natural Resources
1000 Rio Brazos, Aztec, NM 87410
(505)334-6178 ext 115
cory.smith@state.nm.us



## REMEDIATION WORK PLAN

# MANSFIELD #11 SAN JUAN COUNTY, NEW MEXICO

**September 13, 2019** 

#### **Prepared for:**

MS. JENNIFER DEAL HILCORP LOWER 48 382 Road 3100 Aztec, New Mexico 87410

#### Prepared by:

LT ENVIRONMENTAL, INC. 848 East Second Avenue Durango, Colorado 81301 970.385.1096



### **Remediation Work Plan**

### MANSFIELD #11 SAN JUAN COUNTY, NEW MEXICO

Project Number: 017819011

	Jehr Odans	
Prepared by:		September 13, 2019
	Josh Adams LTE Staff Geologist	Date
	ashley L. ager	
Reviewed by:	$\sigma$	September 13, 2019
	Ashley Ager, M.S., P.G.	Date
	LTE Senior Geologist	



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LTE BORELOGS

APPENDIX B

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APPENDIX C

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APPENDIX D

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LABORATORY ANALYTICAL REPORTS

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PHOTOGRAPHIC LOG





#### **REMEDIATION WORK PLAN**

LT Environmental, Inc. (LTE), on behalf of Hilcorp Lower 48 (Hilcorp), presents this Remediation Work Plan associated with subsurface hydrocarbon impacts encountered at the Mansfield #11 (Site) incident number NCS1913741281. This plan details the site description and background, initial response and assessment, and site characterization. The plan proposes additional investigation activities and proposed remediation per Title 19, Chapter 15, Part 29 (10.15.29) of the New Mexico Administrative Code (NMAC).





#### 1.0 SITE DESCRIPTION AND BACKGROUND

The Site is located approximately 2,800 feet northwest of Mansfield Canyon in Unit N of Section 29 of Township 30 North, Range 9 West, San Juan County, New Mexico. The Site is approximately 3 miles northwest of Turley, New Mexico, south of New Mexico State Road 173 (Figure 1). The Site is an active natural gas production well that produces gas from the Dakota and Mesa Verde Formations. On May 2, 2019, soil impacted by a historical release was discovered during installation of a new below grade tank (BGT). Upon discovery, Hilcorp submitted an initial C-141 to the New Mexico Oil Conservation Division (NMOCD) on May 13, 2019. The NMOCD assigned incident number NCS1913741281 to the release.

#### 1.1 Site Characterization

The Site is approximately 1.75 miles west of the Caballo Canyon Wash and approximately 2 miles northwest of the San Juan River. The Site is approximately 330 feet higher in elevation then the San Juan River. Multiple first-, second-, and third-order tributaries to the San Juan River are located within one mile of the Site, including Pemada Canyon Wash and its tributaries and Mansfield Canyon Wash and its tributaries (Figure 2). The Site is greater than 200 feet from any lakebed, sinkhole, or playa lake. A natural spring was identified by LTE just north of the well location, approximately 85 feet away. The Site is greater the 300 feet from any wetland.

The closest water well to the Site is SJ-4305, located approximately 1.0 miles south of the Site, but the nearest water well with a recorded depth to water is the SJ-03490 located approximately 1.5 miles to the southeast of the Site (Figure 2). Depth to water is reported at 20 feet bgs and total depth of the well is 42 feet bgs.

Boreholes at the Site indicate groundwater is present between approximately 25 to 28 feet below ground surface (bgs). It is well known that shallow discontinuous aquifers and seasonal springs are abundant in the areas east of Aztec, New Mexico before you reach the San Juan River and Navajo Reservoir. The nearby spring, along with seasonal precipitation, are likely the main contributors to the recharge of groundwater identified at the Site. Geology at the Site was determined through observations during excavation of impacted soil and a soil boring investigation. Near surface sediments consist mainly of sand with minor occurrences of fine-grained lithology. Below the surface grade, compacted and lithified sandstone is the dominant lithology. Borelogs are included as Appendix A.

Land use surrounding the Site consists of natural gas development and livestock grazing areas. No occupied permanent residences, schools, hospitals, institutions, or churches are within 300 feet of the Site. The nearest residence is located approximately 1.3 miles southeast of the Site. The Site is not within the area of a subsurface mine or unstable area and is not within the 100-year flood plain (Figure 2).

LTE characterized the Site according to Table 1, Closure Criteria for Soils Impacted by a Release, of 19.15.29.12 NMAC. Due to the Site having a depth to groundwater of less than 50 feet and a natural spring 85 feet north of the Site, the following NMOCD Table 1 closure criteria apply: 10 milligrams per kilogram (mg/kg) benzene; 50 mg/kg total benzene, toluene, ethylbenzene, and total xylenes (BTEX); 100 mg/kg total petroleum hydrocarbons (TPH); and 600 mg/kg chloride.





#### 1.2 Initial Response

On May 2, 2019, an unknown volume of historical contamination was discovered at the Site while Hilcorp was replacing a BGT. On May 13, 2019 Hilcorp began excavating to remove impacted soil. Hilcorp ultimately excavated approximately 2,000 cubic yards of both impacted soil and clean overburden at the Site before groundwater was discovered in the base of the excavation at approximately 17 feet bgs. A total of 1,425 yds<sup>3</sup> of soil was disposed of at Industrial Ecosystems Inc. (IMI) in Aztec, New Mexico. The total extent of the excavation was approximately 90 feet by 60 feet with depths ranging from 4 feet bgs in the western portion to approximately 17 feet bgs in the eastern portion of the excavation.

On June 10, 2019, Hilcorp retained LT Environmental (LTE) to assess remediation and delineation options at the Site. In order to delineate impacts to soil and groundwater off the location, a Sundry Notice for a temporary use agreement (TUA) was requested from the Bureau of Land Management (BLM) on June 17, 2019. Approval from the BLM was obtained on July 11<sup>th</sup>, 2019. As a result, Hilcorp requested an extension to the 90-day requirement for site characterization or closure reporting required in 19.15.29.11.A NMAC. Approval of the extension request was received from the NMOCD on July 22, 2019, with the conditions of approval included in Appendix B.





#### 2.0 SOIL AND GROUNDWATER SITE INVESTIGATION

After the discovery of historical impact, Hilcorp and LTE conducted soil and groundwater investigations at the Site in an attempt to define the vertical and lateral extent of the impact. Hilcorp conducted the initial soil investigation, which included composite sampling of the existing BGT cellar, a hand-auger investigation, and sampling of soil in the excavation. LTE continued the investigation by advancing soil borings and installing monitoring wells, during which both soil and groundwater samples were collected. LTE also conducted soil sampling of the excavation to characterize the source material. These activities are described below.

#### 2.1 Initial Soil Investigation

Upon removal of the BGT and as part of BGT closure, Hilcorp collected composite soil samples [Walls (Composite) and Base (Composite)] from the sidewalls and the bottom of the former BGT footprint. Analytical results of these composite samples indicated hydrocarbon-impacted soil remained in the subsurface. On May 14, 2019, Hilcorp advanced two boreholes with a hand auger to 10 feet and 12 feet bgs. Based on elevated TPH concentrations in those samples, Hilcorp proceeded with excavation of impacted soil. To evaluate excavation progress on May 30, 2019, Hilcorp collected two composite soil samples from the excavation, one from the north sidewall (North Wall) and one from the base of the northern part of the excavation at approximately 8 feet bgs (NW Base).

Laboratory analytical results indicated the concentration of total BTEX exceeded NMOCD closure criteria in soil collected from the sidewall of the original BGT footprint. Both BGT closure soil samples, hand auger soil samples, and the excavation sample from the base of the northern part of the excavation exceeded the NMOCD Table 1 closure criteria for TPH. Soil analytical results are included in Table 1.

#### 2.2 Delineation Activates

Between August 19, 2019, and August 22, 2019, LTE conducted soil delineation activities at the Site using a 75 Central Mining Equipment (CME) hollow-stem auger drilling rig. A total of five boreholes were advanced at the Site ranging from 28 feet to 32 feet bgs. Soil borings were advanced in each cardinal direction outside of the known impacted area/open excavation. 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. Two soil samples from each soil boring were submitted for laboratory analysis; the most impacted samples based on field screening results and the terminus of the boreholes. Soil samples were submitted for laboratory analysis of BTEX by United States Environmental Protection Agency (EPA) method 8021, TPH-gasoline range organics (GRO), TPH-diesel range organics (DRO), and TPH-motor oil range organics (MRO) by EPA Method 8015, and chloride by EPA method 300.0. LTE's borelogs are included as Appendix A.

#### 2.3 Monitoring Well Installation

Prior to the installation of groundwater monitoring wells, the New Mexico Office of the State Engineer (NMOSE) approved the application for the installation of monitoring wells on June 25, 2019. Groundwater





monitoring wells were constructed in each borehole by installing screened casing across the groundwater interface and solid casing to surface. 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 three feet above the screened interval, then two feet of hydrated bentonite seal, and then grouted to ground surface. The wells are completed with a combination of aboveground locking, steel protective casing and flush-mount protective well vaults. All surface protective installations were cemented into the ground. Monitoring well locations are depicted on Figure 3 and Figure 4. Borelogs with well completion diagrams are included as Appendix A.

#### 2.4 Monitoring Well Development Groundwater Sampling

Following well construction, monitoring wells were developed between August 20, 2019 and August 22, 2019 using a disposable bailer. Fluid-level measurements were collected using an oil/water interface probe. During well development, 10 well casing volumes of groundwater were removed from each monitoring well or the well was purged dry. Monitoring wells were allowed to recharge for at least 24 hours after development prior to the collection of groundwater samples. LTE's Monitoring Well Development Forms are included as Appendix C.

To accurately determine groundwater elevations, a rotating laser level surveying tool was used to obtain elevation of the top-of-casing for each well. These elevations, along with depth to groundwater in each well are used to determine groundwater elevations in feet above mean sea level. Groundwater elevations were used to determine gradients and infer flow direction of groundwater at the Site. Groundwater elevations are summarized in Table 2 and displayed on Figure 4.

Groundwater monitoring wells were sampled by purging a minimum of three casing volumes from each well and collecting parameters of the purged groundwater. Monitoring wells MW01, MW02, MW03, and MW04 were sampled during this sampling event. MW05 was dry during this sampling event and was not sampled. The LTE Groundwater Sample Collection Forms are included as Appendix D.

As requested in the conditions of approval by the NMOCD (Appendix B), groundwater samples were submitted for laboratory analysis of volatiles by EPA Method 8260B, general water chemistry (GWC) parameters including total dissolved solids (TDS) by EPA Standard Method 2540C, alkalinity by EPA Standard Method 2320B, anions (bromide, chloride, sulfate, fluoride, nitrite-nitrate, and phosphorus) by EPA Method 300.0, and cations (calcium, iron, magnesium, potassium, and sodium) by EPA Method 200.7. All samples were placed on ice to maintain a temperature of approximately 4 degrees Celsius (°C) and sealed in a cooler for delivery to Hall Environmental Analysis Laboratory (Hall), of Albuquerque, New Mexico, for analysis. Samples were labeled with the date and time of collection, sample name, sampler's name, and parameters to be analyzed. Strict chain-of-custody procedures were documented including the date and time sampled, sample number, type of sample, sampler's name and signature, preservative used, and analyses required.

#### 2.5 Excavation Confirmation Samples and Source Characterization

On September 10, 2019, LTE returned to the Site to collect additional confirmation soil and groundwater samples for source characterization from the existing excavation. LTE collected a total of 3 composite soil samples from the floor of the excavation during this event. The purpose of this sampling event was to





characterize the source material still present in the excavation. Confirmation soil samples were collected as five-point composite samples approximately every 800 square feet of the excavation sidewalls and floor. The sample-handling methods and analytical tests described in the above soil sampling sections were repeated for this sampling event. Soil sample locations from this event are depicted on Figure 3.

Groundwater was originally observed at the base of the excavation at approximately 17 feet bgs. There was not a sufficient volume at the time of discovery for removal. Over the course of the summer, the groundwater evaporated and dropped below the depth of the base of the excavation. Although attempted on September 10, 2019, groundwater sampling was not possible because the track hoe was unable to penetrate the hard sandstone at the bottom of the excavation.

#### 2.6 Results

Laboratory analytical results of soil samples collected by LTE during delineation indicate concentrations of benzene, total BTEX, TPH, and chloride were compliant with the NMOCD closure criteria. Soil samples MW01 at 10'-11' and MW04 at 25'-27' contained detectable concentrations of TPH including 11 mg/kg and 20.3 mg/kg, respectively. All other samples collected were below laboratory detection limits for the listed parameters. The soil analytical results as compared to the NMOCD closure criteria are presented in Figure 3 and Table 1. The laboratory analytical reports are included as Appendix E.

Depth to groundwater ranged from 14.46 feet below top of casing (btoc) in MW02 to 21.00 feet btoc in MW03. Based on topography, measured groundwater elevation data, and regional groundwater trends, the groundwater flow direction is to the southeast with an overall change in elevation of 6.54 feet from the most upgradient well (MW02) to the most downgradient well (MW04). The total groundwater gradient between BH01 and BH06 was calculated to be approximately 0.0681 feet per foot for the August 26, 2019, monitoring event. Groundwater elevations are summarized in Table 2. Groundwater elevations and inferred flow direction are depicted on Figure 4.

Laboratory analytical results of groundwater samples collected from MW01, MW02, MW03, and MW04 on August 26, 2019, indicate all concentrations of volatiles were compliant with the New Mexico Water Quality Control Commission (NMWQCC) standards. All sample concentrations were below the laboratory detection limit for volatile analytes. Analytical results indicated concentrations exceeding the NMWQCC standard for sulfate in samples from MW01, MW02, MW03, and MW04 with concentrations of 2,100 milligrams per liter (mg/L), 2,200 mg/L, 2,000 mg/L, and 2,300 mg/L, respectively. Analytical results indicated concentrations exceeding the NMWQCC standard for total dissolved solids in samples from MW01, MW02, MW03, and MW04 with concentrations of 3,400 mg/L, 4,160 mg/L, 3,250 mg/L, and 3,400 mg/L, respectively. The sample collected from MW04 exceeded the NMWQCC standard for fluoride with a concentration of 1.6 mg/L. All other analytes from groundwater samples collected during this sampling event were compliant with the NMWQCC standards for groundwater. Groundwater analytical results for BETX are displayed on Figure 4 and summarized in Table 3 and the complete laboratory report is included in Appendix E.

Laboratory analytical results of soil samples collected by LTE from the excavation during the source characterization event indicate concentrations of TPH exceed the NMOCD remediation action levels in soil sample EXFS02 with a concentration of 220 mg/kg. Soil samples EXFS01 and EXFS03 were compliant with NMOCD remediation action levels. All other samples collected were below laboratory detection limits for the listed parameters. The soil analytical results for the excavation samples as compared to the NMOCD





closure criteria for the source characterization event are presented in Figure 3 and Table 1. The laboratory analytical reports are included as Appendix E.

#### 2.7 Conclusions

Hydrocarbon impacts to soil and groundwater were delineated by LTE during the 2019 delineation event. The majority of the impacted soil has been removed during the excavation and any remaining impacted material exists between the delineation points and the open excavation and at depths ranging from eight to seventeen feet bgs. Impacts are characterized by elevated field screening results collected from the sidewalls and floor of the excavation and laboratory analyzed TPH concentrations in excavation samples. LTE estimates that approximately 1,320 cubic yards of impacted soil remain in the excavation floor and sidewalls, primarily based on the field screening results and visible soil discoloration with strong odor evident on the sidewalls and portions of the excavation floor. The estimated remaining area to be removed is displayed with the hatched pattern on Figure 5.

The concentrations of fluoride, sulfate, and TDS observed in multiple groundwater samples the exceed NMWQCC standards are common in this area and likely indicative of the characteristics expected in shallow groundwater aquifers the interact with the dominate lithologies in the area. The results from upgradient wells and downgradient wells for these constituents are consistent in all four wells. As groundwater infiltrates from the surface through lithologies that contain carbonates, they inherit chemical properties from the rocks as the water percolates downwards and interacts with readily-dissolvable minerals. The Nacimiento Formation is well known to have carbonate-rich lithologies and, although carbonate-dominant lithologies were not encountered during excavation/delineation activities, carbonaceous cement (i.e gypsum and calcite) is likely the dominant binding material within the sandstone present at the Site. The interaction of surface/groundwater with the carbonate-rich binding material is the likely culprit for elevated sulfate, fluoride, and TDS levels observed in groundwater samples.





#### 3.0 REMEDIATION PLAN

Although groundwater was not available for sampling in the excavation, soil sampling results from the base of the excavation and known depth to groundwater suggest the historical impacts may be in contact with groundwater. However, delineation and source characterization sample points from soil indicate the remaining impact is small in extent. Because a large volume of soil has already been removed, the excavation remains open, and groundwater volumes appear small, LTE recommends continued excavation of remaining impacts for timely closure of this release.

#### 3.1 Remediation

Hilcorp intends to excavate the remaining hydrocarbon impacted soil using stronger and reinforced teeth on a track hoe bucket to advance the excavation and dispose of impacted soil at the IMI Landfarm in Aztec, New Mexico. Hilcorp estimates removing a total of 3,570 cubic yards of soil, of which it is estimated that 2,250 cubic yards will be clean overburden stockpiled on site and 1,320 cubic yards will be impacted soil to be disposed. Figure 5 presents the anticipated extent of the excavation after all impacted soil is removed and the anticipated footprint of the excavation to achieve proper sloping requirements for the engineered excavation. The size of the excavation will be adjusted according to field screening and laboratory analytical results in order to effectively remove the source material.

Hilcorp is requesting a variance to the 200-square foot confirmation sampling requirement for the area to be excavated, which would require an estimated 20 floor samples and up to 26 sidewall samples within the proposed excavation extents. Due to the large size the affected area, LTE proposes increasing the confirmation sampling size to a 500-square foot area and collecting a 5-point composite sample to represent each 500-square foot area. An estimated 10 samples will be collected from the excavation floor to address the excavation extent. The attached Figure 5 illustrates the proposed sampling grids overlaying the anticipated excavation areas. Each square in the grid represents a 500 square foot composite sample area. Figure 5 does not illustrate sidewall sample locations, which will also be collected to represent 500 square feet sampling areas .LTE anticipates collecting approximately five composite sidewall samples from the excavation.

The soil samples will be placed directly into pre-cleaned glass jars, labeled with the location, date, time, sampler, method of analysis, and immediately placed on ice. The soil samples will be shipped at 4 °C under strict chain-of-custody procedures for analysis of BTEX, TPH – GRO, DRO, and MRO.

To evaluate impacts to groundwater within the excavation, Hilcorp will remove impacted soil from the excavation and then collect a grab sample of groundwater the accumulates in the excavation. A groundwater grab sample will only be collected from the excavation if all impacted soil can be removed. Samples will be submitted for laboratory analysis of the analytes requested by NMOCD in the conditions of approval (Appendix B). If analytical results of the groundwater within the excavation or below NMOCD remediation action levels, the excavation will by backfilled with clean material, the monitoring wells will be plugged with bentonite and abandoned, and Hilcorp will submit closure documentation for the Site.

If the groundwater sample collected from the excavation exceeds the NMOCD remediation action levels, the excavation will be backfilled with clean material and a monitoring well will be installed within the impacted zone. If water sampled from the monitoring well does not meet NMWQCC standards, LTE and





Hilcorp will then submit a Stage 2 abatement plan with remediation recommendations to be approved by the NMOCD.

#### 3.2 Proposed Schedule

Hilcorp proposes to begin excavation within 2 weeks of the approval of this Remediation Work Plan. Hilcorp expects the excavation to require approximately 2 weeks for completion, then closure samples will be collected. Once soil samples are in compliance with NMOCD Closure Criteria, the groundwater sample will be collected from the excavation. A report detailing closure sample results will be submitted two weeks after receipt of laboratory analytical results if groundwater analytical results are compliant with NMOCD and NMWQCC standards.

If, for any reason, Hilcorp has not achieved closure of soil and groundwater through excavation within 3 months (December 2019), Hilcorp will conduct quarterly groundwater monitoring at the existing monitoring wells.

LTE appreciates the opportunity to provide this report to the NMOCD. If you have any questions or comments regarding this Remediation Work Plan, do not hesitate to contact Ashley Ager at (970) 385-1096 or via email at <a href="mailto:aager@ltenv.com">aager@ltenv.com</a> or Jennifer Deal at (505)-599-3400 or at <a href="mailto:jdeal@hilcorp.com">jdeal@hilcorp.com</a>.





#### **4.0 REFERENCES**

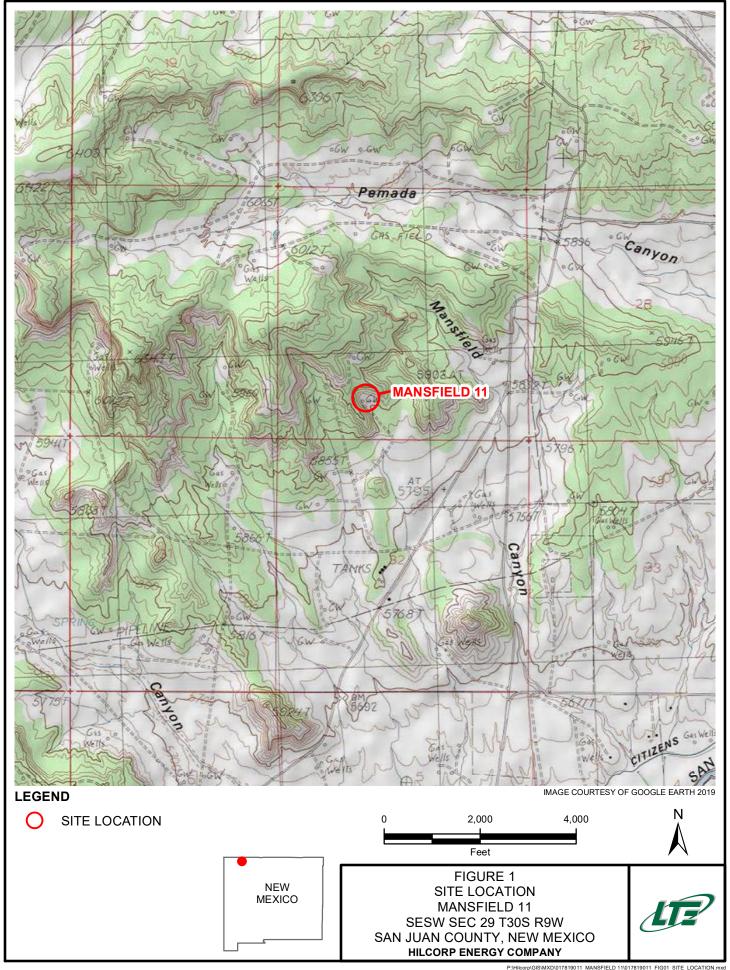
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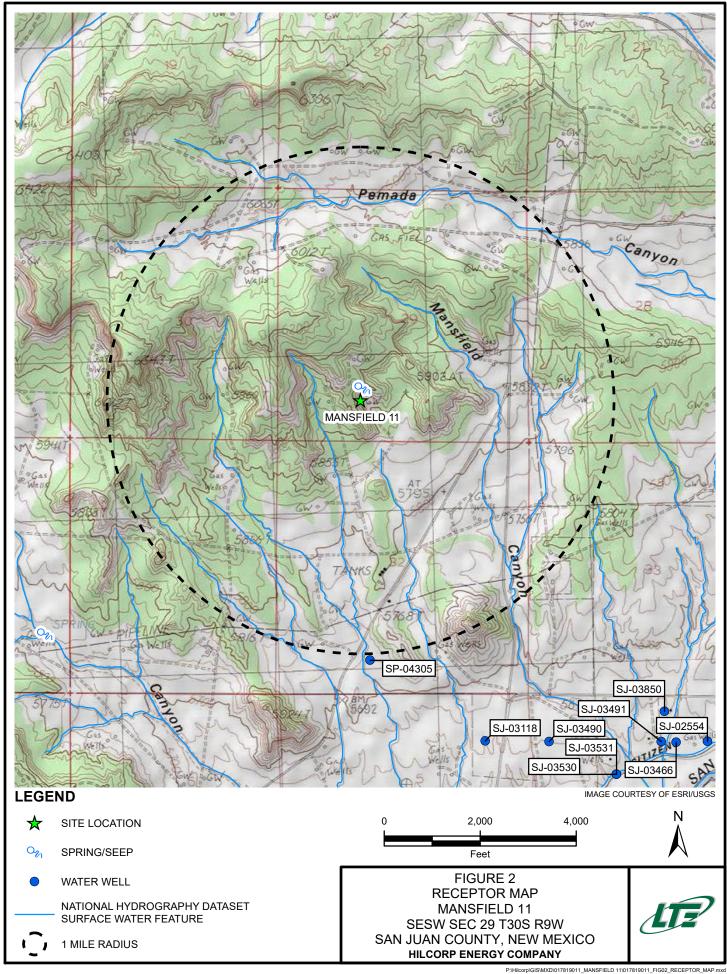
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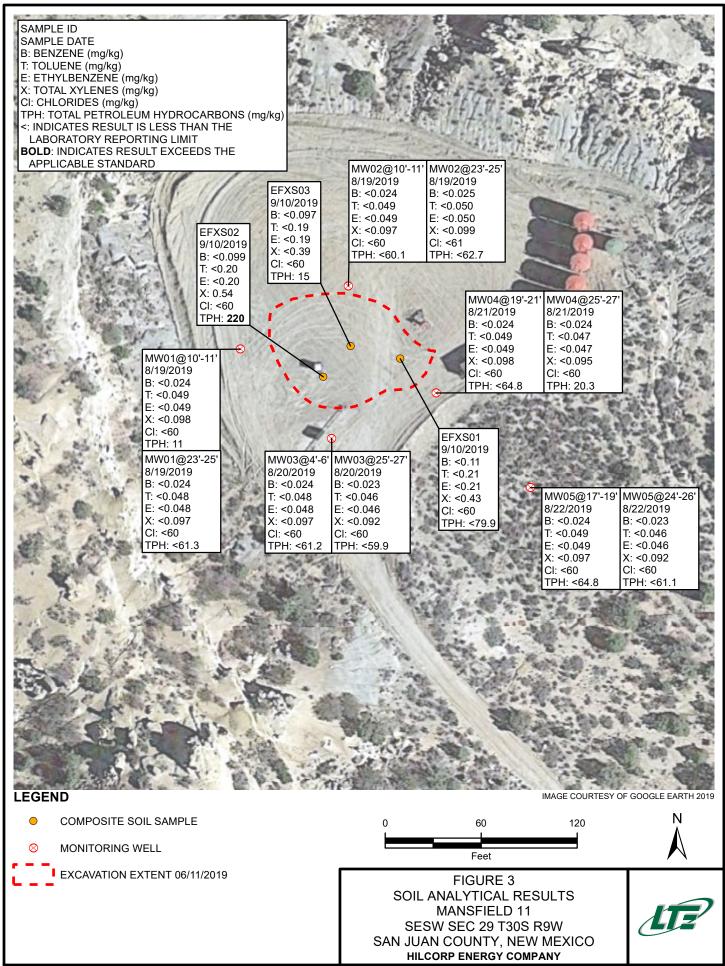
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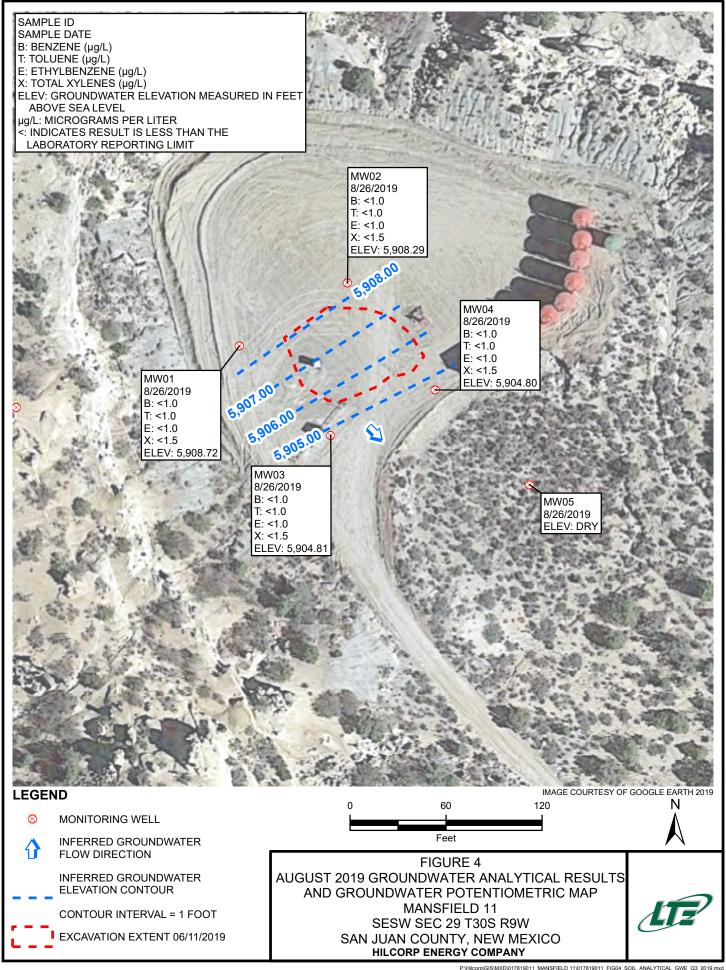


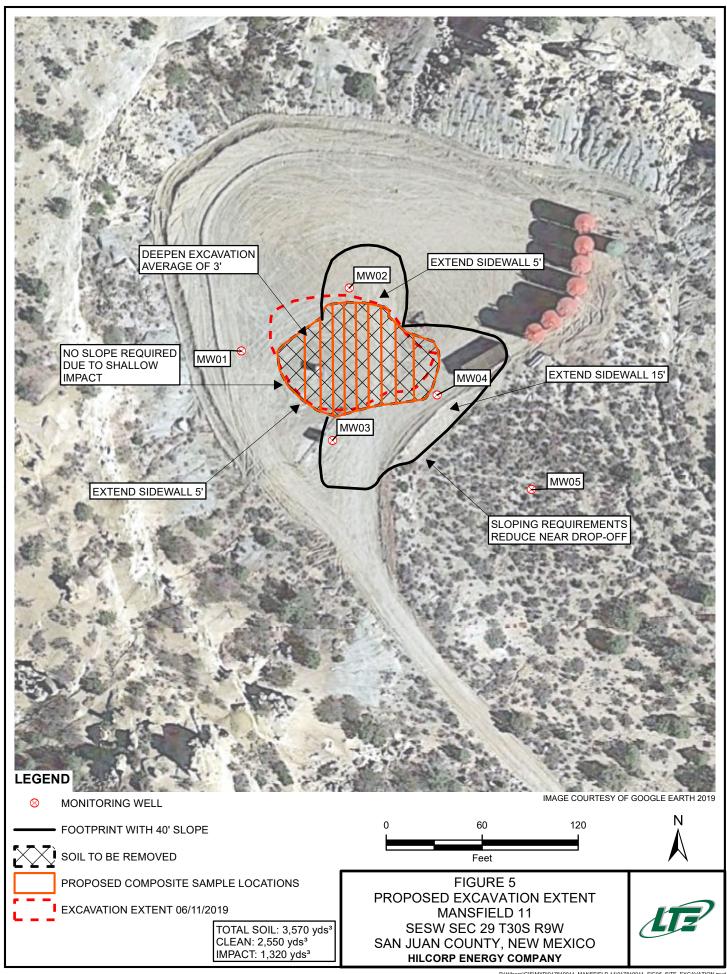














## TABLE 1 SOIL ANALYTICAL RESULTS

## MANSFIELD #11 SAN JUAN COUNTY, NEW MEXICO HILCORP ENERGY COMPANY

Soil Sample Identification	Sample Date	Field Headspace (ppm)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total BTEX (mg/kg)	Chloride (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	MRO (mg/kg)	TPH (mg/kg)
	Soil Samples Collected by Hilcorp											
Walls (Composite)	5/2/2019	NA	0.711	<1.25	3.42	74.5	78.631	<10	1,520	2,460	<40	3,980
Base (Composite)	5/2/2019	NA	0.134	<1.25	<0.125	26.3	26.4	<10	830	1,700	<40	2,530
AH #1 @ 10'	5/14/2019	3,137	<0.250	<2.50	<0.250	14.6	14.6	<10	627	1,370	<40	1,997
AH #5 @ 12'	5/14/2019	180	<0.0125	<0.125	<0.0125	0.0876	0.0876	<10	13.7	641	<20	655
North Wall	5/30/2019	NA	<0.0005	<0.005	<0.0005	<0.0015	<0.005	<10	<0.1	<4.0	<4.0	<4.0
NW Base	5/30/2019	NA	0.031	<0.125	0.235	0.446	0.712	19	30.9	76	<4.0	106
					Delineat	ion Soil Samples						
MW01 @ 10'-11'	8/19/2019	15.5	<0.024	<0.049	<0.049	<0.098	<0.220	<60	<4.9	11	<46	11
MW01 @ 23'-25'	8/19/2019	0.7	<0.024	<0.048	<0.048	<0.097	<0.217	<60	<4.8	<9.6	<48	<61.3
MW02 @ 10'-11'	8/19/2019	0.8	<0.024	<0.049	<0.049	<0.097	<0.219	<60	<4.9	<9.2	<46	<60.1
MW02 @ 23'-25'	8/19/2019	1.4	<0.025	<0.050	<0.050	<0.099	<0.224	<61	<5.0	<9.7	<48	<62.7
MW03 @ 4'-6'	8/20/2019	5.0	<0.024	<0.048	<0.048	<0.097	<0.217	<60	<4.8	<9.4	<47	<61.2
MW03 @ 25'-27'	8/20/2019	1.1	<0.023	<0.046	<0.046	<0.092	<0.207	<60	<4.6	<9.3	<46	<59.9
MW04 @ 19'-21'	8/21/2019	58.4	<0.024	<0.049	<0.049	<0.098	<0.220	<60	<4.9	<9.9	<50	<64.8
MW04 @ 25'-27'	8/21/2019	12.0	<0.024	<0.047	<0.047	<0.095	<0.213	<60	6.3	14	<50	20.3
MW05 @ 17'-19'	8/22/2019	4.5	<0.024	<0.049	<0.049	<0.097	<0.219	<60	<4.9	<9.9	<50	<64.8
MW05 @ 24'-26'	8/22/2019	1.4	<0.023	<0.046	<0.046	<0.092	<0.207	<60	<4.6	<9.5	<47	<61.1
	Source Characterization Soil Samples											
EXFS01	9/10/2013	65.2	<0.11	<0.21	<0.21	<0.43	<0.96	<60	<21	<9.9	<49	<79.9
EXFS02	9/10/2013	1,176	<0.099	<0.20	<0.20	0.54	0.54	<60	<20	220	<47	220
EXFS03	9/10/2013	1,533	<0.097	<0.19	<0.19	<0.39	<0.867	<60	<19	15	<49	15
NMOCD Closure Criteria		NE	10	NE	NE	NE	50	600	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 analyzed

NE - not established

NMOCD - New Mexico Oil Conservation Division

ppm - parts per million

TPH - total petroleum hydrocarbons (sum of GRO, DRO, and MRO)

Bold - indicates result exceeds NMOCD closure criteria

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



## TABLE 2 GROUNDWATER ELEVATION SUMMARY

# MANSFIELD #11 SAN JUAN COUNTY, NEW MEXICO HILCORP ENERGY COMPANY

Well ID	Sample Date	Top of Casing Elevation (feet AMSL)	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)	
MW01	8/26/2019	5,923.46	14.74	5,908.72	
MW02	8/26/2019	5,922.75	14.46	5,908.29	
MW03	8/26/2019	5,925.81	21.00	5,904.81	
MW04	8/26/2019	5,922.58	17.78	5,904.80	
MW05	8/26/2019	5,912.29	Dry	Dry	

1 of 1

#### Notes:

AMSL - above mean sea level BTOC - below top of casing



## TABLE 3 GROUNDWATER ANALYTICAL RESULTS

#### MANSFIELD #11 SAN JUAN COUNTY, NEW MEXICO HILCORP ENERGY COMPANY

	NMWQCC		MW-01	MW-02	MW-03	MW-04	
Analyte	Standard	Unit	26-Aug	26-Aug	26-Aug	26-Aug	
USEPA Method 8260B - Volatiles							
benzene	10	μg/L	<1.0	<1.0	<1.0	<1.0	
toluene	750	μg/L	<1.0	<1.0	<1.0	<1.0	
ethylbenzene	750	μg/L	<1.0	<1.0	<1.0	<1.0	
methyl tert-butyl ether (MTBE)	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2,4-trimethylbenzene	620	μg/L	<1.0	<1.0	<1.0	<1.0	
1,3,5-trimethylbenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2-dichloroethane (EDC)	10	μg/L	<1.0	<1.0	<1.0	1.2	
1,2-dibromoethane (EDB)	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
naphthalene	NE	μg/L	<2.0	<2.0	<2.0	<2.0	
1-methylnaphthalene	NE	μg/L	<4.0	<4.0	<4.0	<4.0	
2-methylnaphthalene	NE	μg/L	<4.0	<4.0	<4.0	<4.0	
acetone	NE	μg/L	<10	<10	<10	<10	
bromobenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
bromodichloromethane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
bromoform	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
bromomethane	NE	μg/L	<3.0	<3.0	<3.0	<3.0	
2-butanone	NE	μg/L	<10	<10	<10	<10	
carbon disulfide	NE	μg/L	<10	<10	<10	<10	
carbon tetrachloride	10	μg/L	<1.0	<1.0	<1.0	<1.0	
chlorobenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
chloroethane	NE	μg/L	<2.0	<2.0	<2.0	<2.0	
chloroform	100	μg/L	<1.0	<1.0	<1.0	<1.0	
chloromethane	NE	μg/L	<3.0	<3.0	<3.0	<3.0	
2-chlorotoluene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
4-chlorotoluene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
cis-1,2-DCE	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
cis-1,3-dichloropropene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2-dibromo-3-chloropropane	NE	μg/L	<2.0	<2.0	<2.0	<2.0	
dibromochloromethane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
dibromomethane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2-dichlorobenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,3-dichlorobenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,4-dichlorobenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
dichlorodifluoromethane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,1-dichloroethane	25	μg/L	<1.0	<1.0	<1.0	<1.0	
1,1-dichloroethene	5	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2-dichloropropane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,3-dichloropropane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
2,2-dichloropropane	NE	μg/L	<2.0	<2.0	<2.0	<2.0	
1,1-dichloropropene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
hexachlorobutadiene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
2-hexanone	NE	μg/L	<10	<10	<10	<10	



## TABLE 3 GROUNDWATER ANALYTICAL RESULTS

#### MANSFIELD #11 SAN JUAN COUNTY, NEW MEXICO HILCORP ENERGY COMPANY

	NMWQCC		MW-01	MW-02	MW-03	MW-04	
Analyte	Standard	Unit	26-Aug	26-Aug	26-Aug	26-Aug	
isopropylbenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
4-isopropytoluene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
4-methyl-2-pentanone	NE	μg/L	<10	<10	<10	<10	
methylene chloride	100	μg/L	<3.0	<3.0	<3.0	<3.0	
n-butylbenzene	NE	μg/L	<3.0	<3.0	<3.0	<3.0	
n-propylbenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
sec-butylbenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
styrene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
tert-butylbenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,1,1,2-tetrachloroethane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,1,2,2-tetrachloroethane	10	μg/L	<2.0	<2.0	<2.0	<2.0	
tetrachloroethene (PCE)	20	μg/L	<1.0	<1.0	<1.0	<1.0	
trans-1,2-DCE	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
trans-1,3-dichloropropene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2,3-trichlorobenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2,4-trichlorobenzene	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,1,1-trichloroethane	60	μg/L	<1.0	<1.0	<1.0	<1.0	
1,1,2-trichloroethane	10	μg/L	<1.0	<1.0	<1.0	<1.0	
trichloroethene (TCE)	100	μg/L	<1.0	<1.0	<1.0	<1.0	
trichlorofluoromethane	NE	μg/L	<1.0	<1.0	<1.0	<1.0	
1,2,3-trichloropropane	NE	μg/L	<2.0	<2.0	<2.0	<2.0	
vinyl chloride	1	μg/L	<1.0	<1.0	<1.0	<1.0	
xylenes, total	620	μg/L	<1.5	<1.5	<1.5	<1.5	
USEPA Method 300.0: Anions							
bromide	NE	mg/L	0.13	0.13	0.32	0.15	
chloride	250	mg/L	28	22	88	28	
sulfate	600	mg/L	2,100	2,200	2,000	2,300	
fluoride	1.6	mg/L	1.3	1.3	1.4	1.6	
nitrate + nitrite as N	NE	mg/L	<0.10	<0.10	<0.10	<0.10	
phosphorus, orthophosphate (As P)	NE	mg/L	<0.50	<0.50	<0.50	<0.50	
USEPA Method 200.7: Metals							
Calcium	NE	mg/L	580	650	620	570	
Magnesium	NE	mg/L	130	150	83	140	
Potassium	NE	mg/L	10	16	13	11	
Sodium	NE	mg/L	230	210	510	220	
USEPA Method SM2540C Modified: Total	Dissolved Solids						
total dissolved solids	1,000	mg/L	3,400	4,160	3,250	3,400	

#### Notes:

 $\mu g/L$  - micrograms per liter

**BOLD** - indicates concentration exceeds the NMWQCC standard

mg/L - milligrams per liter

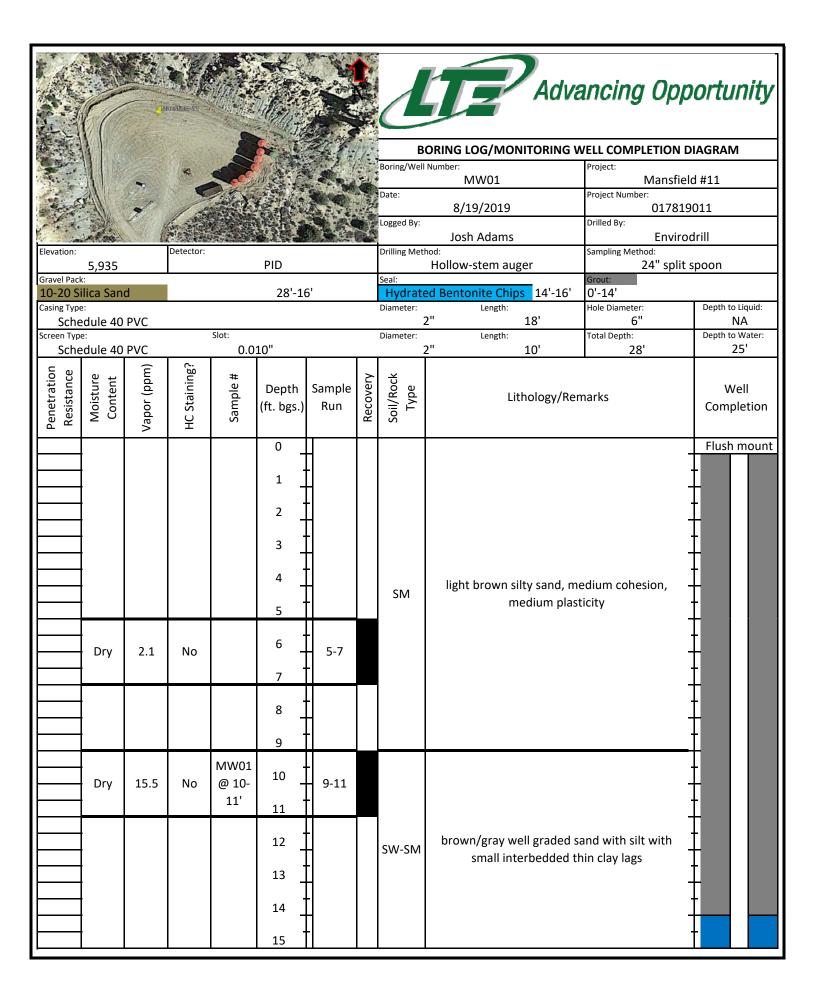
NE - not established

NMWQCC - New Mexico Water Quality Control Commission

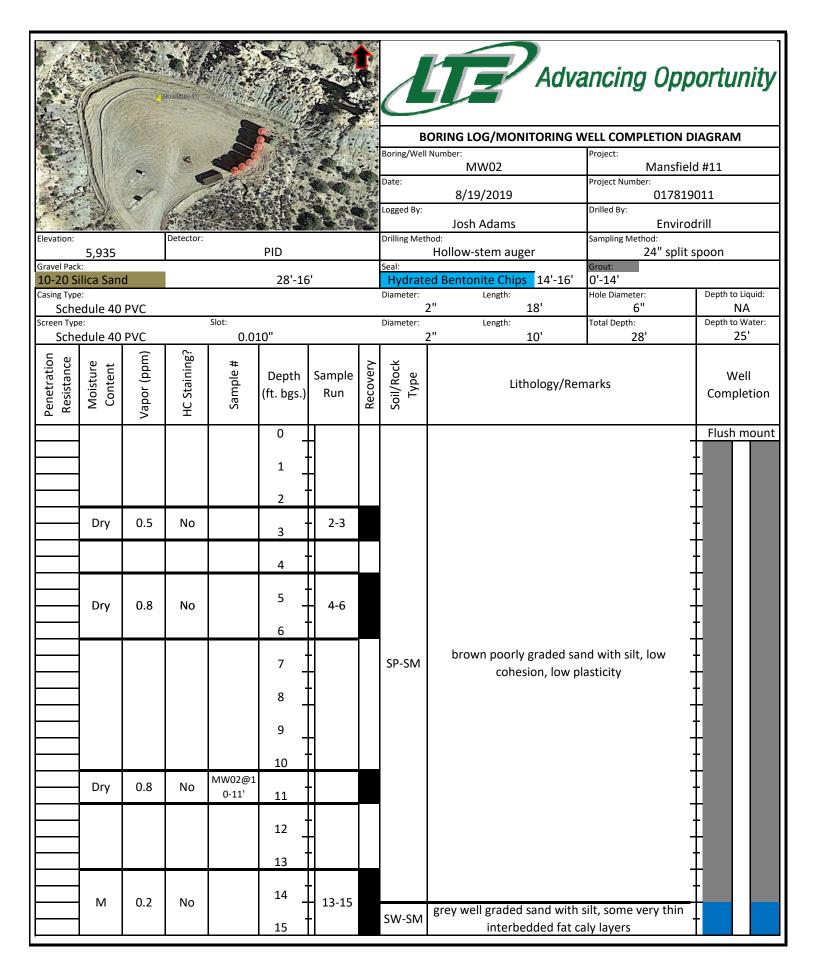
USEPA - United States Environmental Protection Agency



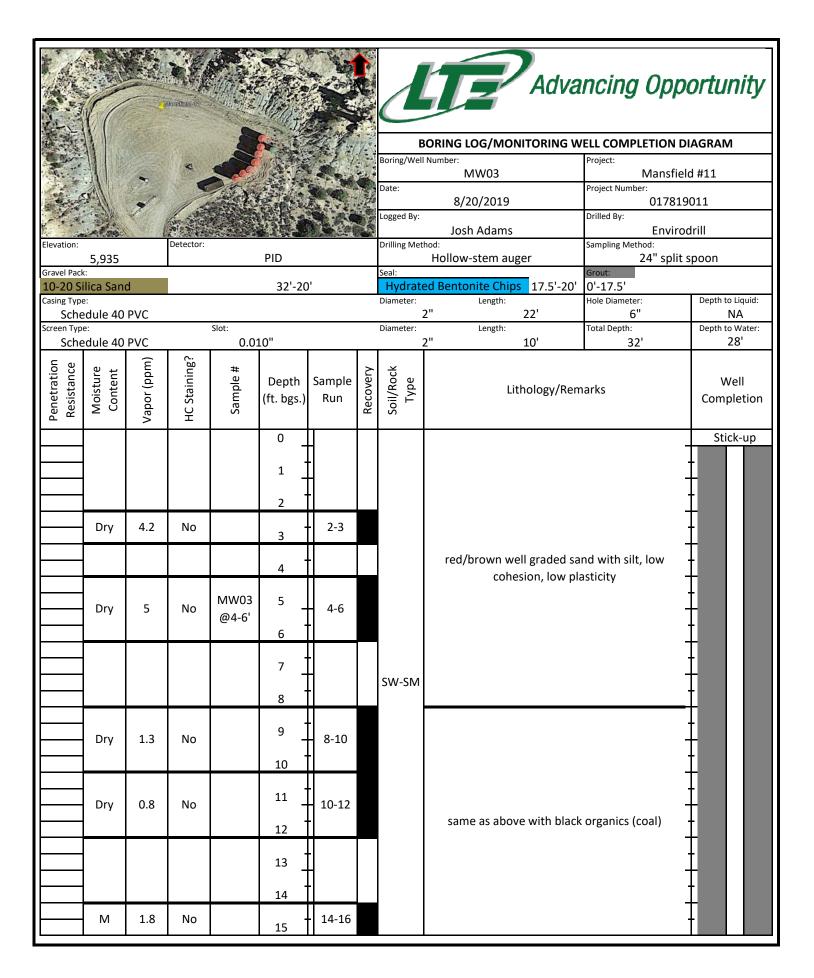




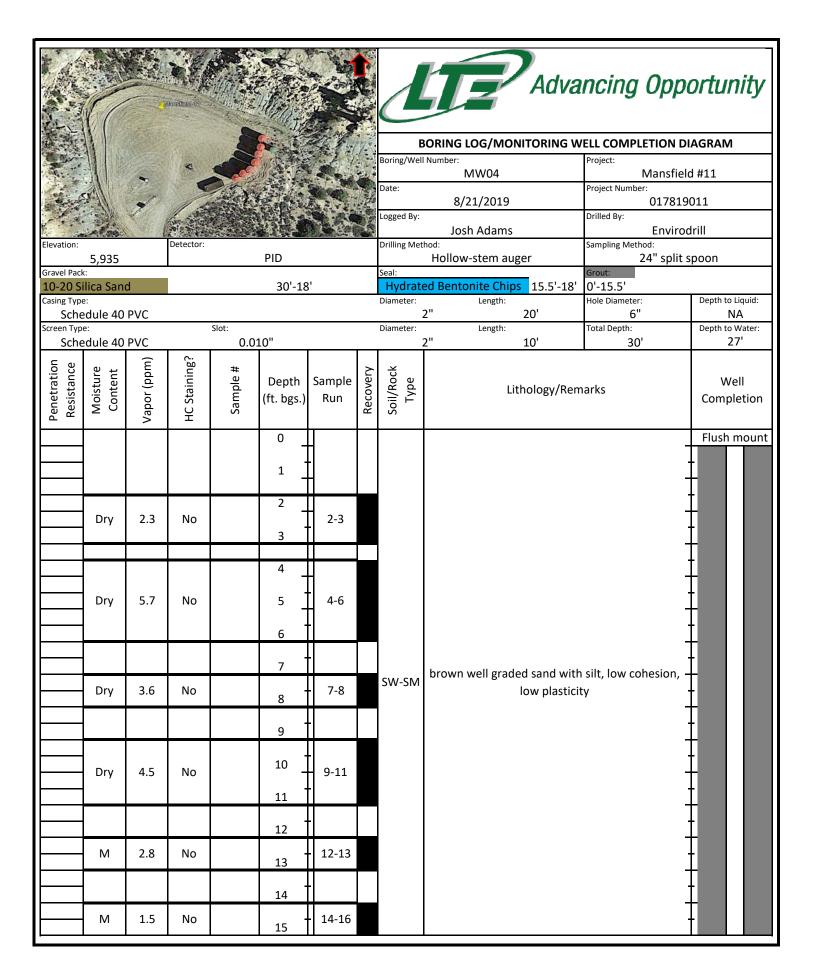
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									Boring/Well # MW01			
Advancing Opportunity								Project:	Mansfield #11 017819011			
					,		-7		Project #	Date 8/19/219		
E 0									+	8/19/219		
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Litho	Well Completion		
Pe R	2 0		• • •	0)			K	S				
	М	11.0	No		15 _ 16 _ 17	15-17			sal	- me as above		
					18 _ 19 _ 20							
	M	0.5	No		21	20-22		SW-SM		h more moisture (1) 2" thick		
					23	<u> </u>				†		
	VM	0.7	No	MW01 @23- 25'	24 _ - 25	23-25			layer of fat clay			
	SAT	0.5	No		26	- 25-27				saturated, GW encountered		
	SAT	0.8	NO		28 <u> </u>	28-29				at 25'bgs		
						$\sqcup$				TD @ 29'	ļ l	
					30 <u>-</u> 31	<del> </del>  -				-	+	
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					33	<del> </del> <del> </del>				-	<u> </u>	
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					36 <u>-</u> 37	<del> </del>  -				-	+	
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									Boring/Well #	MW02	
	1		) Andres		. 0	والمراجع والمراجع	L.		Project:	Mansfield #11	
	4///		Aava	ancing	i uppo	ortunii	.y		Project #	017819011	
									Date	8/19/219	
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Litho	Well Completion	
					15 _ 16 _ 17	-					
	M	0.2	No		18 _	- 17-19 -				-	
	M	0.5	No		20 21	- - 20-22		SP-SM	same as ab	+ - -	
	VM	1.4	No	MW02 @23-25'	23 24 24 25	- - 23-25				- - - -	
	SAT	0.5	No		26 <u>-</u> 27 -	- 25-27 -				saturated, GW encountered at 25'bgs	+ + +
	SAT	0.8	No		28	- 27-28					+
					29 30 31 32 33 34 35 36 37	-				TD @ 28'	



		$\overline{}$							Boring/Well #	MW03			
			Adva	ancing	ı Oppo	ortunit	V		Project: Project #	Mansfield #11 017819011			
					• • •				Date	8/20/2019			
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type		ology/Remarks	Well Completion		
<u> </u>					15 16	14-16							
					17	- - - -				+			
	М	4.9	No		20	- 19-21 -			grey/brown poor				
					22	-		SP-SM	0	+			
	VM	2.0	No		24 	23-25		3P-3IVI		+			
	VM	1.1	No	MW03 @ 25- 27'	26 	- 25-27 -				+			
					28	-					_		
	SAT	1.8	No		29 - 30	- 28-30				GW encountered at 28' bgs, Same as above bu			
					31 <u>-</u> 32 -	- - -				saturated	- - -		
					33	<u> </u>				TD @ 32'	+		
					34 - 35	- -					‡		
					36 <u>-</u> 37	- - -					‡		



		7	Adva	ancing	орро	ortunit	ty		Boring/Well # Project: Project #	MW04 Mansfield #11 017819011 8/21/2019			
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Date Litho	Well Completion			
					15 <u> </u>	14-16		SW-SM	Sa	ame as above	+		
	M	4.2	No		17 18	17-18					+		
					19						<b>†</b>		
	M	58.4	No	MW04 @ 19- 21'	20	19-21			grey poorly	graded sand with silt	+		
					22	-				+			
	М	4.5	No		23 _	23-25		SP-SM					
	M	12.0	No	MW04 @ 25- 27'	25 26 27	25-27			same as above,	more compact sandstone	+ + +		
	SAT	0.5	No		28	27-29			GW at 27', Sam	e as above but saturated	-		
					30						+		
					31 _	-  -  -				TD @ 30'	<b>‡</b>		
					32	<del> </del> 					†		
					33						Ŧ		
					34 <u>-</u> 35	H H				†			
					36					<u> </u>			
					37						<u>†                                    </u>		

			lanaficia 19					4			ncing Opp	
							1	Boring/Well		IITORING W	YELL COMPLETION D Project:	IAGRAM
				5					MW05		Mansfiel	d #11
		4	1				The state of the s	Date:	8/22/2019		Project Number: 017819	011
							No.	Logged By:	Josh Adams		Drilled By: Enviro	drill
Elevation:	F 02F		Detector:		PID			Drilling Met		tor	Sampling Method: 24" split	
Gravel Pack								Seal:			Grout:	<b>БРООП</b>
10-20 Si		<u>d</u>			30'-18	'		Diameter:	ed Bentonite Chips Length:	15.5'-18'	0'-15.5' Hole Diameter:	Depth to Liquid:
Sche	dule 40	PVC		Slot:				Diameter:	2" Length:	20'	6" Total Depth:	NA Depth to Water:
	dule 40	PVC		0.02	LO"				2"	10'	30'	26'
Penetration Resistance	Moisture Content	Vapor (ppm)	HC Staining?	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Lit	:hology/Rem	narks	Well Completion
	Dry	1.2	No		0	2-3		SM		and medium city, no stain	cohesion, medium or odor	Stick-up
	Dry	2.4	No		8	7-8						+
	Dry	2.8	No		10 _ 11	- 9-11 -		SW-SM	brown well grade low plas			
					12					+		
	М	2.6	No			- 12-13						
	141	2.0	.,,		13	12 13						
					14							
	М	2.2	No		15	14-16		SP-SM		ed sand with low plasticit	silt, low cohesion, ty	+

									Boring/Well #	MW0		
	T.		Adva	ancing	ı Oppo	ortunit	y		Project: Project #	Mansfield 0178190		
				_					Date	8/22/20		
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Recovery	Soil/Rock Type	Litho	Well Completion		
					15 <u> </u>	14-16				+		
	M	4.5	No	MW05 @ 17- 19'	17 18 19	17-19						
	М	3.5	No		20 <u> </u>	19-21			Sa			
					22	-		SP-SM		<b>-</b>		
	M	0.0	No		23 <u> </u>	22-24		31 <sup>-</sup> 31VI		<b>-</b>		
	VM	1.4	No	MW05 @ 24- 26'	25 	- 26-26						
					27 	- - -			CW at 36' Sam	e as above but saturated	-	
	SAT	0.5	No		29 	28-30			GW at 20 , Sam	- -		
					_					TD @ 30'	1	
					31 _						‡ ‡	
					33 <u> </u>	<del> </del>  -  -					†	
					35 <u> </u>	<u> </u>  -			<del>-</del>			
					37						<u> </u>	

#### **Josh Adams**

From: Smith, Cory, EMNRD < Cory.Smith@state.nm.us>

**Sent:** Monday, July 22, 2019 8:12 AM

**To:** Jennifer Deal

**Cc:** Josh Adams; Ashley Ager

**Subject:** RE: NCS1913741281 Extension Request

Jennifer,

OCD approves HEC request for an extension for incident# nCS1913741281 to submit a completed Stage 1 and a proposed Stage 2 abatement plan no later than September 13, 2019.

For soil delineation at a minimum OCD recommends that HEC follows the guidelines of 19.15.29.11 NMAC for vertical and horizontal soil delineation. In addition please ensure that water samples collected for ground water delineation are sampled at a minimum for EPA 8260 (Full list), TDS and Cation/Anions. OCD also recommends the installation of an upgradient monitoring well.

Please include this approval in your Stage 1/2 report.

If you have any questions please give me a call.

Cory Smith
Environmental Specialist
Oil Conservation Division
Energy, Minerals, & Natural Resources
1000 Rio Brazos, Aztec, NM 87410
(505)334-6178 ext 115
cory.smith@state.nm.us

From: Ashley Ager <aager@ltenv.com> Sent: Friday, July 19, 2019 8:51 AM

To: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>; Jennifer Deal <jdeal@hilcorp.com>

Cc: Josh Adams < jadams@ltenv.com>

Subject: [EXT] RE: NCS1913741281 Extension Request

Cory,

Following our discussion yesterday regarding transitions from remediation of soil impact (Part 29) to include remediation of groundwater impact (Part 30) and conversations with Hilcorp about timelines for drilling and response: Hilcorp requests the original extension of the 90-day deadline in Part 29 to September 13, 2019 with the understanding that the report submitted to NMOCD by that deadline will consist of a combined Stage 1 and Stage 2 abatement plan as required by Part 30. That means we will report full vertical and lateral delineation of soil and groundwater, and provide a plan for remediation of both soil and groundwater. A proposal for public notification will also be included.

Please let us know if that is acceptable and thanks for your help.



# **Monitoring Well Development Form**



Du

Pro	oject Name:	Mansifeld #11					
Proje	ct Number:	17818011					-
,	Well Name:	MWOI			Sampler:	Josh Adams	
	Start Date:	8-20-14			Start Time:	0830	
Dept	th to Water:				Depth of Well:		
	Time:		.1	De	oth to Product:		-
	ng Volume: of Purging:		llons		(height of water colu	amn * 0.1631 for 2" well or 0.6524 for 4" wel	<u>n</u>
	f Sampling:	_ wate pu	тр				-
Time	Vol. Removed	Total Vol. Removed (gallons)	pH (std. units)	Temp.	Conductivit y (us or ms)	Comments	
	0.25	0.25	213	16.7	256	grey chudy no odol	4
	275	300	7.16	17.2	2.44	light grey no odo	sheen
	3.0	5.0	7.17	17.1	2.85	grey cloudy no odo	sheen
	20	10.0	7.17	16.8	2.65	'( '/	11
	2.0	12.0	7.17	16.9	2.42	11	
							-
							1
	-				~		
		YANA ANA					1
			- 4				
Comments:							
Describe D	eviations fi	rom SOP:	well pu	mped o	dry after	-12 gallon purg	
Signature:	Gul	e allhur >			Date:_	8-20-19	

A COLOR

Duri

Proje	ct Number:	17818011					
7	Well Name:	MWOZ			Sampler:	X.A	
	Start Date:		9		Sampler: Start Time:	1145	
		17.23					
Dept	n to Water: Time:			Total I	Depth of Well: pth to Product:	NO*	
Casii	ıg Volume:	~21	gallon	_	3	nn * 0.1631 for 2" well or 0.	6524 for 4"
Method	of Purging:	suhq	gallon te pun	A	(neight of water conti	m · 0.1031 for 2 well or 0.1	3324 IOF 4" W
lethod of	Sampling:	<i>\\\A</i>	t '				
Time	Vol. Removed	Total Vol. Removed (gallons)	pH (std. units)	Temp.	Conductivit y (us or ms)	Commen	ts
	0.25	0.25	7.03	24.8	2.59	grey cloudy	nood
	175	2.0	7.05	19.0	2.84		-12
	20	6.0	7.05	193	2.60	. (	21
	1.0	7.0	7.08	18.6	224	VI.	11
	2.0	9.0	7.18	(8.6	2.26	u	١٤
	1.0	(0.0)	720	17,0	2.77	( )	46
	2.0	12.0	t.16	17.4	2.65	u	1.
	3.0	15.0	7.15	18.7	2.40		//
	20	17.0	715	17.8	254	t e Ve	r(
	2.0	21.0	7.13	17.3	255		۲/
			FILE	17.2	432		
					- Spirit	e''' .	
						***	
						¥	
ments:		$\sim$	s Sha	en/od	br		
scribe D	eviations f	rom SOP:					



**Monitoring Well Development Form** Project Name: Mansifeld #11 Project Number: 17818011 Well Name: MW03 JA Sampler: Start Date: 8-22-19 Start Time: 0950 Depth to Water: 19.20 35.70 Total Depth of Well: Time: Depth to Product: Casing Volume: 27 gallons
Method of Purging: whole Pump/ AVC bailer (height of water column \* 0.1631 for 2" well or 0.6524 for 4" well) Method of Sampling: Vol. Total Vol. Removed pН Temp. Conductivit Time **Comments** Removed (gallons) (std. units) JF)0( y (us or/ms) 025 7.11 18.0 0.25 clear no oder/sheh 2.75 2.54 3.0 7.14 7.21 20 5.0 16.6 74 3.0 8.0 light gray cloudy no streen looks 710 20 10.0 7.20 2.46 16-8 7.17 no steen/ador Comments: well **Describe Deviations from SOP:** Signature:

# **Monitoring Well Development Form**



Du

D <sub>***</sub>	oiect Name:	Mansifeld #11							
	ect Number:								
,	Well Name:	MWOY			Sampler:	: JA			
	Start Date:	8-22-19			Start Time:	1050			
Dep	th to Water: Time:	18.00		Total I					
Method	ng Volume: of Purging: f Sampling:	2 whale	18 gallo	(height of water column * 0.1631 for 2" well or 0.6524 for 4" well)					
Time	Vol. Removed	Total Vol. Removed (gallons)	pH (std. units)	Temp.	Conductivit y (us or ms)	Comments			
	0.25	0.25 2.0 5.0 7.0 9.0	7.11 7.21 7.21 7.22 7.20	23.2 20.7 19.3 18.7 18.5	2.58 2.78 2.77 2.77 2.77 2.71	arey cloudy no share I willy dear, light	ledo vezh		
	C								
Comments:									
Describe I	Deviations f	rom SOP:	well bo	iled al	y after o	agallon purg			
Signature:		le Allant	7		Date:	8-22-19			





#### LT Environmental, Inc.

848 E. 2nd Ave Durango, Colorado 81301

8/26/2019

	Ground	water Sample Colle	ection Forn	n		Durango, Colorado 8130 T 970.385.109	
Proje Sa	Sample ID: nmple Date: Laboratory: Analyses: h to Water:	Hall Environmental VOCs 8260, Cation/A	Anion, TDS	Project Location: Mansfield #11 Sampler: Travis Short  Matrix: Groundwater Sample Time: PVC Bailer Shipping Method: Hand Delivery  Total Depth of Well: 27.83 Depth to Product:			
Method	er to Purge:	13.09 x 0.1631= Bailer Railer	2.1×3-{6	(1)		for 2" well or 0.6524 for 4" well) * 3 well vi	
Time	Vol. Removed	Total Vol. Removed (gallons)	pH (std. units)	Temp. (F)	Conductivit y (us or ms)	Comments	
1230 1232 1234 1236 1236 1240 1241 1246 1246 1250 1257	0.5	1	8.00 7.59 7.76 7.30 7.63 7.81 7.48 7.51 7.61 7.68 7.51 7.59	20.30 21.68 23.24 24.34 20.48 20.08 19.10 18.42 18.31 18.31 18.31		Clar, no ador  Cloudy  Cloudy  Cloudy  Cloudy  Cloudy	
Describe D	Deviations f	rom SOP:	None				



Groundwater Sample Collection Form

### LT Environmental, Inc.

848 E. 2nd Ave. Durango, Colorado. 8130 ° T. 970,385,1096

Sample Date: Laboratory: Analyses: Depth to Water: Time:	017819011  MW - 02  8/26/2019  Hall Environmental  VOCs 8260, Cation/A  11, 16  11,55  13,45 x 0,1631 =		Shi Total I De	Sampler:  Matrix: Sample Time: pping Method:  Depth of Well: pth to Product:	Hand Delivery
Time Vol. Removed	Total Vol. Removed (gallons)	(std. units) 7.81 7.76	Temp. (F) 20.05	Conductivit y (us or ms)	Cloudy gret/no act
1128 0,5 1130 0,5 1133 0,5 1134 0,5 1134 0,5 1144 0,5 1144 0,5 1148 0,5 1148 0,5	2 2 3 3 3 4 4 5 5 5 5 5	7.56 7.56 7.57 7.57 7.57 7.58 7.57 7.64 7.64 7.68	18.26 17.84 18.21 20.74 21.00 21.20 70.62 19.84 19.55 19.53 19.43	1.732 1.686 1.544 1.032 1.066 0.026 1.010 1.029 1.602 1.621	
Comments:					V
Describe Deviations f	rom SOP:	M	one		
Signature:	it-			Date:	8/26/2019



### Groundwater Sample Collection Form

LT Environmental, Inc.

848 E. 2nd Ave Durango, Colorado 81301 T 970.385.1096

Project S Sar L Depth Vol. of Wate Method of	t Number: cample ID: nple Date: aboratory: Analyses: to Water: Time: r to Purge: of Purging:	Hall Environmental VOCs 8260, Cation/A		Project Location: Mansfield #11 Sampler: Travis Short  Matrix: Groundwater Sample Time: PVC Bailer Shipping Method: Hand Delivery  Total Depth of Well: 35, 15 Depth to Product: 5, 15  (height of water column * 0.1631 for 2" well or 0.6524 for 4" well) * 3 well or 0.6524 for 4" well or 0.6524 for 4" well) * 3 well or 0.6524 for 4" well or 0.6524 for 4" well or 0.6524 for 4" well o				
Time	Vol. Removed	Total Vol. Removed (gallons)	pH (std. units)	Temp. (F)	Conductivit y (us or ms)	C	omments	
1324 1326 1328 1336 1334 1336 1338 1340 1342 1346 1348 1346	, \( \),	3.5 3.5 4.5 5.5 6.5	8,45 8,11 7,98 7,94 7,76 7,71 7,63 7,55 7,55 7,55 7,55 7,50	19.92 19.22 18.96 18.51 18.32 18.14 17.99 17.99 17.90 17.90 17.60 17.55	COO.07 COO.00	Cleut	70000	
Comments:		from SOP:	^ -					
Signature:		7 p		Me	Date:		8/26/2019	



Groundwater Sample Collection Form

#### LT Environmental, Inc.

848 E 2nd Ave. Durango, Colorado 81301 T 970.385 1096

8/26/2019

							. 0,0.000 ,000			
Pro	oject Name:	Mansfield #11		Pro	oject Location:	Mansfield #1	1			
Proje	ect Number:	017819011		_	Sampler:	Travis Short				
	Sample ID:	MW-04				Groundwater				
		8/26/2019		Sample Time: PVC Bailer						
]	Laboratory:	Hall Environmental		Shipping Method: Hand Delivery						
		VOCs 8260, Cation/A	Anion, TDS							
Dept	th to Water: Time:	17.78		Total I	Depth of Well:	28.66	,			
T. TOTHOU	or runging.	10.88×0.1631=1.7 Railer Bailer	77x3=[S.	_						
Time	Vol. Removed	(ganons)	(std. units)	Temp. (F)	Conductivit y (us or ms)	Com	nments			
1415	, 5	, 5	7.76	23,50	0,001	Clear.	no ador			
1414	,5	1	7.77	21.44	0.000	01000	120 0200			
	,5	1.5	7.77	20.61	0.007					
1416	,5	2	7.78	20-41	0.000					
1418	15	2.5	7,81	20:33	0,000					
1420	,5	3	7.84	20:15	0,000	-				
1422	,5	3.5	7.85	19.99	(2000)					
1424	15	4	7.82	20,56	0,000					
1426	15	4.5	7,71		0.00					
1458	. 5		1	21.08	0,000					
1430	,5	5.5	7.11	21.31	0.000		1			
		3,3	7,62	21,49	0,00	1	1			
							~			
-										
Comments:										
Describe D	Deviations f	rom SOP:	None	>						
			100110							
Signature		11								





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

September 05, 2019

Jennifer Deal HILCORP ENERGY PO Box 4700 Farmington, NM 87499

TEL: (505) 564-0733

FAX

RE: Mansfield 11 OrderNo.: 1908E64

#### Dear Jennifer Deal:

Hall Environmental Analysis Laboratory received 10 sample(s) on 8/24/2019 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

andyl

4901 Hawkins NE

Albuquerque, NM 87109

# Lab Order **1908E64**Date Reported: **9/5/2019**

### Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW01@10-11'

**Project:** Mansfield 11
 Collection Date: 8/19/2019 12:30:00 PM

 **Lab ID:** 1908E64-001
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qu	ial Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORG	GANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	11	9.2	mg/Kg	1	8/28/2019 3:16:22 PM
Motor Oil Range Organics (MRO)	ND	46	mg/Kg	1	8/28/2019 3:16:22 PM
Surr: DNOP	97.6	70-130	%Rec	1	8/28/2019 3:16:22 PM
EPA METHOD 8015D: GASOLINE RANGE					Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.9	mg/Kg	1	8/28/2019 1:24:09 AM
Surr: BFB	95.9	77.4-118	%Rec	1	8/28/2019 1:24:09 AM
EPA METHOD 8021B: VOLATILES					Analyst: NSB
Benzene	ND	0.024	mg/Kg	1	8/28/2019 1:24:09 AM
Toluene	ND	0.049	mg/Kg	1	8/28/2019 1:24:09 AM
Ethylbenzene	ND	0.049	mg/Kg	1	8/28/2019 1:24:09 AM
Xylenes, Total	ND	0.098	mg/Kg	1	8/28/2019 1:24:09 AM
Surr: 4-Bromofluorobenzene	87.1	80-120	%Rec	1	8/28/2019 1:24:09 AM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 1:06:20 AM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

Page 1 of 16

# **Analytical Report**

# Lab Order **1908E64**Date Reported: **9/5/2019**

### Hall Environmental Analysis Laboratory, Inc.

**CLIENT: HILCORP ENERGY** 

Client Sample ID: MW01@23-25'

 Project:
 Mansfield 11
 Collection Date: 8/19/2019 12:35:00 PM

 Lab ID:
 1908E64-002
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qu	ial Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORG	ANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.6	mg/Kg	1	8/28/2019 3:40:27 PM
Motor Oil Range Organics (MRO)	ND	48	mg/Kg	1	8/28/2019 3:40:27 PM
Surr: DNOP	99.7	70-130	%Rec	1	8/28/2019 3:40:27 PM
EPA METHOD 8015D: GASOLINE RANGE					Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.8	mg/Kg	1	8/28/2019 1:47:10 AM
Surr: BFB	100	77.4-118	%Rec	1	8/28/2019 1:47:10 AM
EPA METHOD 8021B: VOLATILES					Analyst: NSB
Benzene	ND	0.024	mg/Kg	1	8/28/2019 1:47:10 AM
Toluene	ND	0.048	mg/Kg	1	8/28/2019 1:47:10 AM
Ethylbenzene	ND	0.048	mg/Kg	1	8/28/2019 1:47:10 AM
Xylenes, Total	ND	0.097	mg/Kg	1	8/28/2019 1:47:10 AM
Surr: 4-Bromofluorobenzene	91.1	80-120	%Rec	1	8/28/2019 1:47:10 AM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 1:18:45 AM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

Page 2 of 16

## **Analytical Report**

# Lab Order **1908E64**Date Reported: **9/5/2019**

### Hall Environmental Analysis Laboratory, Inc.

**CLIENT: HILCORP ENERGY** 

Client Sample ID: MW02@10-11'

 Project:
 Mansfield 11
 Collection Date: 8/19/2019 3:35:00 PM

 Lab ID:
 1908E64-003
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qu	ial Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE (	ORGANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.2	mg/Kg	1	8/28/2019 4:04:35 PM
Motor Oil Range Organics (MRO)	ND	46	mg/Kg	1	8/28/2019 4:04:35 PM
Surr: DNOP	103	70-130	%Rec	1	8/28/2019 4:04:35 PM
EPA METHOD 8015D: GASOLINE RANGE					Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.9	mg/Kg	1	8/28/2019 2:10:14 AM
Surr: BFB	97.2	77.4-118	%Rec	1	8/28/2019 2:10:14 AM
EPA METHOD 8021B: VOLATILES					Analyst: NSB
Benzene	ND	0.024	mg/Kg	1	8/28/2019 2:10:14 AM
Toluene	ND	0.049	mg/Kg	1	8/28/2019 2:10:14 AM
Ethylbenzene	ND	0.049	mg/Kg	1	8/28/2019 2:10:14 AM
Xylenes, Total	ND	0.097	mg/Kg	1	8/28/2019 2:10:14 AM
Surr: 4-Bromofluorobenzene	88.1	80-120	%Rec	1	8/28/2019 2:10:14 AM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 1:31:10 AM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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# **Analytical Report**

#### Lab Order 1908E64

### Hall Environmental Analysis Laboratory, Inc.

Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW02@23-25'

 Project:
 Mansfield 11
 Collection Date: 8/19/2019 3:40:00 PM

 Lab ID:
 1908E64-004
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Q	ual Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE OF	RGANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.7	mg/Kg	1	8/28/2019 4:28:44 PM
Motor Oil Range Organics (MRO)	ND	48	mg/Kg	1	8/28/2019 4:28:44 PM
Surr: DNOP	101	70-130	%Rec	1	8/28/2019 4:28:44 PM
EPA METHOD 8015D: GASOLINE RANGE					Analyst: NSB
Gasoline Range Organics (GRO)	ND	5.0	mg/Kg	1	8/28/2019 2:33:16 AM
Surr: BFB	97.8	77.4-118	%Rec	1	8/28/2019 2:33:16 AM
EPA METHOD 8021B: VOLATILES					Analyst: NSB
Benzene	ND	0.025	mg/Kg	1	8/28/2019 2:33:16 AM
Toluene	ND	0.050	mg/Kg	1	8/28/2019 2:33:16 AM
Ethylbenzene	ND	0.050	mg/Kg	1	8/28/2019 2:33:16 AM
Xylenes, Total	ND	0.099	mg/Kg	1	8/28/2019 2:33:16 AM
Surr: 4-Bromofluorobenzene	88.8	80-120	%Rec	1	8/28/2019 2:33:16 AM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	61	mg/Kg	20	8/29/2019 2:51:39 PM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW03@4-6'

 Project:
 Mansfield 11
 Collection Date: 8/20/2019 10:50:00 AM

 Lab ID:
 1908E64-005
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qu	al Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORG	ANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.4	mg/Kg	1	8/28/2019 4:52:51 PM
Motor Oil Range Organics (MRO)	ND	47	mg/Kg	1	8/28/2019 4:52:51 PM
Surr: DNOP	102	70-130	%Rec	1	8/28/2019 4:52:51 PM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 3:04:04 PM
<b>EPA METHOD 8260B: VOLATILES SHORT LIS</b>	т				Analyst: DJF
Benzene	ND	0.024	mg/Kg	1	8/28/2019 1:46:53 AM
Toluene	ND	0.048	mg/Kg	1	8/28/2019 1:46:53 AM
Ethylbenzene	ND	0.048	mg/Kg	1	8/28/2019 1:46:53 AM
Xylenes, Total	ND	0.097	mg/Kg	1	8/28/2019 1:46:53 AM
Surr: 1,2-Dichloroethane-d4	111	70-130	%Rec	1	8/28/2019 1:46:53 AM
Surr: 4-Bromofluorobenzene	84.8	70-130	%Rec	1	8/28/2019 1:46:53 AM
Surr: Dibromofluoromethane	111	70-130	%Rec	1	8/28/2019 1:46:53 AM
Surr: Toluene-d8	103	70-130	%Rec	1	8/28/2019 1:46:53 AM
EPA METHOD 8015D MOD: GASOLINE RANG	E				Analyst: <b>DJF</b>
Gasoline Range Organics (GRO)	ND	4.8	mg/Kg	1	8/28/2019 1:46:53 AM
Surr: BFB	92.4	70-130	%Rec	1	8/28/2019 1:46:53 AM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW03@25-27'

 Project:
 Mansfield 11
 Collection Date: 8/20/2019 10:55:00 AM

 Lab ID:
 1908E64-006
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qu	al Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGA	ANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.3	mg/Kg	1	8/28/2019 5:17:08 PM
Motor Oil Range Organics (MRO)	ND	46	mg/Kg	1	8/28/2019 5:17:08 PM
Surr: DNOP	101	70-130	%Rec	1	8/28/2019 5:17:08 PM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 3:16:28 PM
EPA METHOD 8260B: VOLATILES SHORT LIST	Г				Analyst: <b>DJF</b>
Benzene	ND	0.023	mg/Kg	1	8/28/2019 2:16:09 AM
Toluene	ND	0.046	mg/Kg	1	8/28/2019 2:16:09 AM
Ethylbenzene	ND	0.046	mg/Kg	1	8/28/2019 2:16:09 AM
Xylenes, Total	ND	0.092	mg/Kg	1	8/28/2019 2:16:09 AM
Surr: 1,2-Dichloroethane-d4	109	70-130	%Rec	1	8/28/2019 2:16:09 AM
Surr: 4-Bromofluorobenzene	86.8	70-130	%Rec	1	8/28/2019 2:16:09 AM
Surr: Dibromofluoromethane	107	70-130	%Rec	1	8/28/2019 2:16:09 AM
Surr: Toluene-d8	99.5	70-130	%Rec	1	8/28/2019 2:16:09 AM
EPA METHOD 8015D MOD: GASOLINE RANGE	:				Analyst: <b>DJF</b>
Gasoline Range Organics (GRO)	ND	4.6	mg/Kg	1	8/28/2019 2:16:09 AM
Surr: BFB	97.4	70-130	%Rec	1	8/28/2019 2:16:09 AM

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

Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW04@19-21'

 Project:
 Mansfield 11
 Collection Date: 8/21/2019 10:45:00 AM

 Lab ID:
 1908E64-007
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qu	al Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE OR	GANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.9	mg/Kg	1	8/28/2019 5:41:44 PM
Motor Oil Range Organics (MRO)	ND	50	mg/Kg	1	8/28/2019 5:41:44 PM
Surr: DNOP	102	70-130	%Rec	1	8/28/2019 5:41:44 PM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 3:28:53 PM
EPA METHOD 8260B: VOLATILES SHORT L	IST				Analyst: <b>DJF</b>
Benzene	ND	0.024	mg/Kg	1	8/28/2019 2:45:21 AM
Toluene	ND	0.049	mg/Kg	1	8/28/2019 2:45:21 AM
Ethylbenzene	ND	0.049	mg/Kg	1	8/28/2019 2:45:21 AM
Xylenes, Total	ND	0.098	mg/Kg	1	8/28/2019 2:45:21 AM
Surr: 1,2-Dichloroethane-d4	106	70-130	%Rec	1	8/28/2019 2:45:21 AM
Surr: 4-Bromofluorobenzene	90.7	70-130	%Rec	1	8/28/2019 2:45:21 AM
Surr: Dibromofluoromethane	101	70-130	%Rec	1	8/28/2019 2:45:21 AM
Surr: Toluene-d8	102	70-130	%Rec	1	8/28/2019 2:45:21 AM
EPA METHOD 8015D MOD: GASOLINE RAN	GE				Analyst: <b>DJF</b>
Gasoline Range Organics (GRO)	ND	4.9	mg/Kg	1	8/28/2019 2:45:21 AM
Surr: BFB	96.3	70-130	%Rec	1	8/28/2019 2:45:21 AM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW04@25-27'

 Project:
 Mansfield 11
 Collection Date: 8/21/2019 10:50:00 AM

 Lab ID:
 1908E64-008
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qua	al Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE O	RGANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	14	9.9	mg/Kg	1	8/28/2019 6:06:07 PM
Motor Oil Range Organics (MRO)	ND	50	mg/Kg	1	8/28/2019 6:06:07 PM
Surr: DNOP	101	70-130	%Rec	1	8/28/2019 6:06:07 PM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 3:41:18 PM
EPA METHOD 8260B: VOLATILES SHORT	LIST				Analyst: DJF
Benzene	ND	0.024	mg/Kg	1	8/28/2019 3:14:50 AM
Toluene	ND	0.047	mg/Kg	1	8/28/2019 3:14:50 AM
Ethylbenzene	ND	0.047	mg/Kg	1	8/28/2019 3:14:50 AM
Xylenes, Total	ND	0.095	mg/Kg	1	8/28/2019 3:14:50 AM
Surr: 1,2-Dichloroethane-d4	112	70-130	%Rec	1	8/28/2019 3:14:50 AM
Surr: 4-Bromofluorobenzene	82.0	70-130	%Rec	1	8/28/2019 3:14:50 AM
Surr: Dibromofluoromethane	113	70-130	%Rec	1	8/28/2019 3:14:50 AM
Surr: Toluene-d8	100	70-130	%Rec	1	8/28/2019 3:14:50 AM
EPA METHOD 8015D MOD: GASOLINE RA	NGE				Analyst: DJF
Gasoline Range Organics (GRO)	6.3	4.7	mg/Kg	1	8/28/2019 3:14:50 AM
Surr: BFB	94.0	70-130	%Rec	1	8/28/2019 3:14:50 AM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW05@17-19'

 Project:
 Mansfield 11
 Collection Date: 8/22/2019 9:25:00 AM

 Lab ID:
 1908E64-009
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qua	al Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORG	SANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.9	mg/Kg	1	8/28/2019 6:30:33 PM
Motor Oil Range Organics (MRO)	ND	50	mg/Kg	1	8/28/2019 6:30:33 PM
Surr: DNOP	102	70-130	%Rec	1	8/28/2019 6:30:33 PM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 4:18:30 PM
EPA METHOD 8260B: VOLATILES SHORT LIS	ST				Analyst: DJF
Benzene	ND	0.024	mg/Kg	1	8/28/2019 3:44:08 AM
Toluene	ND	0.049	mg/Kg	1	8/28/2019 3:44:08 AM
Ethylbenzene	ND	0.049	mg/Kg	1	8/28/2019 3:44:08 AM
Xylenes, Total	ND	0.097	mg/Kg	1	8/28/2019 3:44:08 AM
Surr: 1,2-Dichloroethane-d4	107	70-130	%Rec	1	8/28/2019 3:44:08 AM
Surr: 4-Bromofluorobenzene	84.7	70-130	%Rec	1	8/28/2019 3:44:08 AM
Surr: Dibromofluoromethane	108	70-130	%Rec	1	8/28/2019 3:44:08 AM
Surr: Toluene-d8	101	70-130	%Rec	1	8/28/2019 3:44:08 AM
EPA METHOD 8015D MOD: GASOLINE RANG	BE .				Analyst: DJF
Gasoline Range Organics (GRO)	ND	4.9	mg/Kg	1	8/28/2019 3:44:08 AM
Surr: BFB	93.0	70-130	%Rec	1	8/28/2019 3:44:08 AM

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

Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW05@24-26'

 Project:
 Mansfield 11
 Collection Date: 8/22/2019 9:30:00 AM

 Lab ID:
 1908E64-010
 Matrix: SOIL
 Received Date: 8/24/2019 10:00:00 AM

Analyses	Result	RL Qua	l Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE OR	RGANICS				Analyst: <b>JME</b>
Diesel Range Organics (DRO)	ND	9.5	mg/Kg	1	8/28/2019 6:54:56 PM
Motor Oil Range Organics (MRO)	ND	47	mg/Kg	1	8/28/2019 6:54:56 PM
Surr: DNOP	101	70-130	%Rec	1	8/28/2019 6:54:56 PM
EPA METHOD 300.0: ANIONS					Analyst: CAS
Chloride	ND	60	mg/Kg	20	8/29/2019 4:55:44 PM
EPA METHOD 8260B: VOLATILES SHORT L	IST				Analyst: DJF
Benzene	ND	0.023	mg/Kg	1	8/28/2019 4:13:42 AM
Toluene	ND	0.046	mg/Kg	1	8/28/2019 4:13:42 AM
Ethylbenzene	ND	0.046	mg/Kg	1	8/28/2019 4:13:42 AM
Xylenes, Total	ND	0.092	mg/Kg	1	8/28/2019 4:13:42 AM
Surr: 1,2-Dichloroethane-d4	115	70-130	%Rec	1	8/28/2019 4:13:42 AM
Surr: 4-Bromofluorobenzene	90.2	70-130	%Rec	1	8/28/2019 4:13:42 AM
Surr: Dibromofluoromethane	114	70-130	%Rec	1	8/28/2019 4:13:42 AM
Surr: Toluene-d8	95.5	70-130	%Rec	1	8/28/2019 4:13:42 AM
EPA METHOD 8015D MOD: GASOLINE RAN	IGE				Analyst: DJF
Gasoline Range Organics (GRO)	ND	4.6	mg/Kg	1	8/28/2019 4:13:42 AM
Surr: BFB	92.5	70-130	%Rec	1	8/28/2019 4:13:42 AM

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- $ND \qquad Not \ Detected \ at \ the \ Reporting \ Limit$
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E64** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: MB-47134 SampType: MBLK TestCode: EPA Method 300.0: Anions

Client ID: PBS Batch ID: 47134 RunNo: 62503

Prep Date: 8/28/2019 Analysis Date: 8/28/2019 SeqNo: 2126703 Units: mg/Kg

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Chloride ND 1.5

Sample ID: LCS-47134 SampType: LCS TestCode: EPA Method 300.0: Anions

Client ID: LCSS Batch ID: 47134 RunNo: 62503

Prep Date: 8/28/2019 Analysis Date: 8/28/2019 SeqNo: 2126704 Units: mg/Kg

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Chloride 14 1.5 15.00 0 92.6 90 110

Sample ID: MB-47159 SampType: mblk TestCode: EPA Method 300.0: Anions

Client ID: PBS Batch ID: 47159 RunNo: 62527

Prep Date: **8/29/2019** Analysis Date: **8/29/2019** SeqNo: **2128255** Units: **mg/Kg** 

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Chloride ND 1.5

Sample ID: LCS-47159 SampType: Ics TestCode: EPA Method 300.0: Anions

Client ID: LCSS Batch ID: 47159 RunNo: 62527

Prep Date: 8/29/2019 Analysis Date: 8/29/2019 SeqNo: 2128256 Units: mg/Kg

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Chloride 14 1.5 15.00 0 94.2 90 110

#### Qualifiers:

Value exceeds Maximum Contaminant Level

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

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### Hall Environmental Analysis Laboratory, Inc.

SampType: LCS

WO#: **1908E64** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: LCS-47083

Sample ID: MB-47083	SampT	SampType: MBLK TestCode: EPA Method 80				8015M/D: Die	esel Range	e Organics		
Client ID: PBS	Batch	n ID: <b>47</b> 0	083	R	unNo: 62	2455				
Prep Date: 8/27/2019	Analysis D	ate: <b>8/</b>	28/2019	SeqNo: 2124830			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	9.5		10.00		94.9	70	130			

Client ID: LCSS	Batch	ID: <b>47</b> 0	083	F	RunNo: 6	2455				
Prep Date: 8/27/2019	Analysis Date: <b>8/28/2019</b> SeqNo: <b>2124832</b>				Units: mg/Kg					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	47	10	50.00	0	93.6	63.9	124			
Surr: DNOP	4.6		5.000		91.9	70	130			

TestCode: EPA Method 8015M/D: Diesel Range Organics

Sample ID: 1908E64-001AMS	SampT	ype: <b>MS</b>	6	TestCode: EPA Method 8015M/D: Diesel Range Organics								
Client ID: MW01@10-11'	Batch	ID: <b>47</b> 0	083	RunNo: <b>62455</b>								
Prep Date: 8/27/2019	Analysis D	ate: <b>8/</b>	28/2019	2019 SeqNo: 2126430				Units: mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Diesel Range Organics (DRO)	58	10	49.90	11.01	93.8	57	142					
Surr: DNOP	5.1		4.990		103	70	130					

Sample ID: 1908E64-001AMSD	TestCode: EPA Method 8015M/D: Diesel Range Organics									
Client ID: MW01@10-11'	RunNo: <b>62455</b>									
Prep Date: 8/27/2019 Analysis Date: 8/28/2019				SeqNo: <b>2126433</b>			Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	56	9.6	48.08	11.01	93.0	57	142	3.67	20	
Surr: DNOP	5.1		4.808		107	70	130	0	0	

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

### Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E64** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: MB-47066 SampType: MBLK TestCode: EPA Method 8015D: Gasoline Range

Client ID: PBS Batch ID: 47066 RunNo: 62443

Prep Date: 8/26/2019 Analysis Date: 8/27/2019 SeqNo: 2123881 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 890 1000 89.3 77.4 118

Sample ID: LCS-47066 SampType: LCS TestCode: EPA Method 8015D: Gasoline Range

Client ID: LCSS Batch ID: 47066 RunNo: 62443

1100

Prep Date: 8/26/2019 Analysis Date: 8/27/2019 SeqNo: 2123882 Units: mg/Kg

1000

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD **RPDLimit** Qual Gasoline Range Organics (GRO) 80 21 5.0 25.00 0 83.1 120

105

77.4

118

#### Qualifiers:

Surr: BFB

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

Page 13 of 16

### Hall Environmental Analysis Laboratory, Inc.

0.90

WO#: **1908E64** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Surr: 4-Bromofluorobenzene

Sample ID: MB-47066 SampType: MBLK TestCode: EPA Method 8021B: Volatiles Client ID: PBS Batch ID: 47066 RunNo: 62443 Prep Date: 8/26/2019 Analysis Date: 8/27/2019 SeqNo: 2123918 Units: mg/Kg Analyte PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD **RPDLimit** Qual Result Benzene ND 0.025 Toluene ND 0.050 Ethylbenzene ND 0.050 Xylenes, Total ND 0.10

90.1

80

120

Sample ID: LCS-47066	SampT	ype: <b>LC</b>	s	TestCode: EPA Method 8021B: Volatiles						
Client ID: LCSS	Batch	n ID: <b>47</b> 0	066	F	RunNo: 6					
Prep Date: 8/26/2019	Analysis Date: 8/27/2019			SeqNo: 2123919			Units: mg/K			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.94	0.025	1.000	0	94.0	80	120			
Toluene	0.97	0.050	1.000	0	96.8	80	120			
Ethylbenzene	0.97	0.050	1.000	0	96.6	80	120			
Xylenes, Total	3.0	0.10	3.000	0	98.4	80	120			
Surr: 4-Bromofluorobenzene	0.92		1.000		91.6	80	120			

1.000

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

### Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E64** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: mb-47067 SampType: MBLK TestCode: EPA Method 8260B: Volatiles Short List Client ID: PBS Batch ID: 47067 RunNo: 62460 Prep Date: 8/26/2019 Analysis Date: 8/27/2019 SeqNo: 2124394 Units: mg/Kg PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD **RPDLimit** Qual Analyte Result Benzene ND 0.025 Toluene ND 0.050 Ethylbenzene ND 0.050 Xylenes, Total ND 0.10 70 Surr: 1,2-Dichloroethane-d4 0.59 0.5000 118 130 Surr: 4-Bromofluorobenzene 0.44 0.5000 87.5 70 130 Surr: Dibromofluoromethane 0.60 0.5000 120 70 130 0.48 Surr: Toluene-d8 0.5000 96.4 70 130

Sample ID: Ics-47067	SampT	ype: <b>LC</b>	s	TestCode: EPA Method 8260B: Volatiles Short List							
Client ID: LCSS	Batcl	h ID: <b>47</b> 0	067	F							
Prep Date: 8/26/2019	Analysis Date: 8/27/2019			SeqNo: 2124395 Units: mg/K				(g			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Benzene	1.1	0.025	1.000	0	109	68	135				
Toluene	0.91	0.050	1.000	0	90.5	70	130				
Surr: 1,2-Dichloroethane-d4	0.57		0.5000		114	70	130				
Surr: 4-Bromofluorobenzene	0.42		0.5000		83.2	70	130				
Surr: Dibromofluoromethane	0.55		0.5000		111	70	130				
Surr: Toluene-d8	0.49		0.5000		97.3	70	130				

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

#### Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E64** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: mb-47067 SampType: MBLK TestCode: EPA Method 8015D Mod: Gasoline Range

Client ID: PBS Batch ID: 47067 RunNo: 62460

Prep Date: 8/26/2019 Analysis Date: 8/27/2019 SeqNo: 2124604 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 430 500.0 86.6 70 130

Sample ID: Ics-47067 SampType: LCS TestCode: EPA Method 8015D Mod: Gasoline Range

Client ID: LCSS Batch ID: 47067 RunNo: 62460

Prep Date: 8/26/2019 Analysis Date: 8/27/2019 SeqNo: 2124605 Units: mg/Kg

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD **RPDLimit** Qual 70 Gasoline Range Organics (GRO) 18 5.0 25.00 0 72.7 130 Surr: BFB 450 500.0 89.0 70 130

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

Page 16 of 16



Hall Environmental Analysis Laboratory 4901 Hawkins NE Albuquerque, NM 87109 TEL: 505-345-3975 FAX: 505-345-4107

# Sample Log-In Check List

Website: www.hallenvironmental.com HILCORP ENERGY FAR Client Name: Work Order Number: 1908E64 RcptNo: 1 Received By: **Anne Thorne** 8/24/2019 10:00:00 AM Alamin litholati Completed By: Yazmine Garduno 8/26/2019 9:54:41 AM 08/26/19 Reviewed By: Chain of Custody 1. Is Chain of Custody complete? Yes 🗹 No 🗆 Not Present 2. How was the sample delivered? Client Loa In 3. Was an attempt made to cool the samples? No 🗀 NA 🗀 Yes 🗹 No 🗆 4. Were all samples received at a temperature of >0° C to 6.0°C Yes 🗸 NA 🗔 5. Sample(s) in proper container(s)? Yes 🗸 Yes 🔽 6. Sufficient sample volume for indicated test(s)? No 🗌 7. Are samples (except VOA and ONG) properly preserved? No 🗌 Yes 🗸 No 🗸 NA 🗌 8. Was preservative added to bottles? Yes 🗌 9. VOA vials have zero headspace? Yes 🗍 No VOA Vials Yes  $\square$ 10. Were any sample containers received broken? No 🗸 # of preserved bottles checked 11. Does paperwork match bottle labels? Yes 🗹 No 🗌 for pH: (Note discrepancies on chain of custody) (<2 or >12 unless noted) Adjusted? 12. Are matrices correctly identified on Chain of Custody? Yes 🗹 No 🔲 Yes 🗸 No 🗌 13. Is it clear what analyses were requested? Checked by: DAD 8/26/19 14. Were all holding times able to be met? Yes 🗸 No 🗌 (if no, notify customer for authorization.) Special Handling (if applicable) NA 🔽 15. Was client notified of all discrepancies with this order? Yes  $\square$ No 🗀 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 4.6 Good

Page	1	of	1

3

2.9

1.0

0.8

Good

Good

Good

ANALY   ANAL	Custody Record	Turn-Around Time:	Lime:				I	AL		$\geq$	RO	Z	ENVIRONMENT	E	_
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1935 MWO1 @ 33-35' -001 XX	1230		cool	100-	$\hat{\mathbf{x}}$			<u> </u>	X						
1535 MWO3@11.  1540 MWO3@23-35  1540 MWO3@23-35  1050 MWO3@23-37  1045 MWO3@23-37  1045 MWO3@23-37  1045 MWO3@2-37  1050 MWO4@25-37  1050 MWO4@25-37  1050 MWO5@24-32  1050 MWO5				-000-	ナス		<u></u> .		X						
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Date Reported:

## Hall Environmental Analysis Laboratory, Inc.

**CLIENT: HILCORP ENERGY Client Sample ID:** EXFS01

**Project:** Mansfield 11 Collection Date: 9/10/2019 12:43:00 PM Lab ID: 1909528-001 Matrix: SOIL **Received Date:** 9/11/2019 9:50:00 AM

Analyses	Result	RL Qu	al Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE OI	RGANICS				Analyst: <b>BRM</b>
Diesel Range Organics (DRO)	ND	9.9	mg/Kg	1	9/11/2019 12:11:14 PM
Motor Oil Range Organics (MRO)	ND	49	mg/Kg	1	9/11/2019 12:11:14 PM
Surr: DNOP	101	70-130	%Rec	1	9/11/2019 12:11:14 PM
EPA METHOD 8015D: GASOLINE RANGE					Analyst: NSB
Gasoline Range Organics (GRO)	ND	21	mg/Kg	5	9/11/2019 11:11:29 AM
Surr: BFB	96.6	77.4-118	%Rec	5	9/11/2019 11:11:29 AM
EPA METHOD 8021B: VOLATILES					Analyst: NSB
Benzene	ND	0.11	mg/Kg	5	9/11/2019 11:11:29 AM
Toluene	ND	0.21	mg/Kg	5	9/11/2019 11:11:29 AM
Ethylbenzene	ND	0.21	mg/Kg	5	9/11/2019 11:11:29 AM
Xylenes, Total	ND	0.43	mg/Kg	5	9/11/2019 11:11:29 AM
Surr: 4-Bromofluorobenzene	86.3	80-120	%Rec	5	9/11/2019 11:11:29 AM
EPA METHOD 300.0: ANIONS					Analyst: MRA
Chloride	ND	60	mg/Kg	20	9/11/2019 12:00:00 PM

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

- Value exceeds Maximum Contam
- D Sample Diluted Due to Matrix Н Holding times for preparation or analysis exce
- ND Not Detected at the Reporting Limit Practical Quanitative Limit
- % Recovery outside of range due to dilution or matrix

- E Value above quantitation range Analyte detected below quantitation limits
  - Sample pH Not In Range
  - Reporting Limit

## Hall Environmental Analysis Laboratory, Inc.

Date Reported:

**CLIENT: HILCORP ENERGY Client Sample ID:** EXFS02

**Project:** Mansfield 11 Collection Date: 9/10/2019 12:45:00 PM Lab ID: 1909528-002 Matrix: SOIL **Received Date:** 9/11/2019 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE OI	RGANICS					Analyst: <b>BRM</b>
Diesel Range Organics (DRO)	220	9.4		mg/Kg	1	9/11/2019 12:35:22 PM
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	9/11/2019 12:35:22 PM
Surr: DNOP	113	70-130		%Rec	1	9/11/2019 12:35:22 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	20		mg/Kg	5	9/11/2019 11:34:26 AM
Surr: BFB	132	77.4-118	S	%Rec	5	9/11/2019 11:34:26 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Benzene	ND	0.099		mg/Kg	5	9/11/2019 11:34:26 AM
Toluene	ND	0.20		mg/Kg	5	9/11/2019 11:34:26 AM
Ethylbenzene	ND	0.20		mg/Kg	5	9/11/2019 11:34:26 AM
Xylenes, Total	0.54	0.39		mg/Kg	5	9/11/2019 11:34:26 AM
Surr: 4-Bromofluorobenzene	92.7	80-120		%Rec	5	9/11/2019 11:34:26 AM
EPA METHOD 300.0: ANIONS						Analyst: MRA
Chloride	ND	60		mg/Kg	20	9/11/2019 12:00:00 PM

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

- Value exceeds Maximum Contam
- D Sample Diluted Due to Matrix Н Holding times for preparation or analysis exce
- ND Not Detected at the Reporting Limit Practical Quanitative Limit
- % Recovery outside of range due to dilution or matrix

- E Value above quantitation range Analyte detected below quantitation limits
  - Sample pH Not In Range
- Reporting Limit

## Hall Environmental Analysis Laboratory, Inc.

Date Reported:

**CLIENT: HILCORP ENERGY Client Sample ID:** EXFS03

**Project:** Mansfield 11 Collection Date: 9/10/2019 12:46:00 PM Lab ID: 1909528-003 Matrix: SOIL **Received Date:** 9/11/2019 9:50:00 AM

Analyses	Result	RL (	Qual Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORG	ANICS				Analyst: <b>BRM</b>
Diesel Range Organics (DRO)	15	9.8	mg/Kg	1	9/11/2019 12:59:43 PM
Motor Oil Range Organics (MRO)	ND	49	mg/Kg	1	9/11/2019 12:59:43 PM
Surr: DNOP	104	70-130	%Rec	1	9/11/2019 12:59:43 PM
EPA METHOD 8015D: GASOLINE RANGE					Analyst: NSB
Gasoline Range Organics (GRO)	ND	19	mg/Kg	5	9/11/2019 11:57:16 AM
Surr: BFB	114	77.4-118	%Rec	5	9/11/2019 11:57:16 AM
EPA METHOD 8021B: VOLATILES					Analyst: NSB
Benzene	ND	0.097	mg/Kg	5	9/11/2019 11:57:16 AM
Toluene	ND	0.19	mg/Kg	5	9/11/2019 11:57:16 AM
Ethylbenzene	ND	0.19	mg/Kg	5	9/11/2019 11:57:16 AM
Xylenes, Total	ND	0.39	mg/Kg	5	9/11/2019 11:57:16 AM
Surr: 4-Bromofluorobenzene	90.3	80-120	%Rec	5	9/11/2019 11:57:16 AM
EPA METHOD 300.0: ANIONS					Analyst: MRA
Chloride	ND	60	mg/Kg	20	9/11/2019 12:00:00 PM

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

- Value exceeds Maximum Contam
- Sample Diluted Due to Matrix
- D Н Holding times for preparation or analysis exce
- ND Not Detected at the Reporting Limit
- Practical Quanitative Limit % Recovery outside of range due to dilution or matrix

- E Value above quantitation range Analyte detected below quantitation limits
  - Sample pH Not In Range
  - Reporting Limit



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

September 05, 2019

Josh Adams HILCORP ENERGY PO Box 4700 Farmington, NM 87499

TEL: (505) 564-0733

FAX

RE: Mansfield 11 OrderNo.: 1908E96

#### Dear Josh Adams:

Hall Environmental Analysis Laboratory received 4 sample(s) on 8/27/2019 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

andyl

4901 Hawkins NE

Albuquerque, NM 87109

#### Lab Order 1908E96

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-01

**Project:** Mansfield 11
 Collection Date: 8/26/2019 1:00:00 PM

 **Lab ID:** 1908E96-001
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst	CAS
Fluoride	1.3	0.10		mg/L	1	8/27/2019 7:39:28 PM	A62462
Chloride	28	10		mg/L	20	8/27/2019 7:51:53 PM	A62462
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	8/27/2019 7:39:28 PM	A62462
Bromide	0.13	0.10		mg/L	1	8/30/2019 8:04:34 AM	R62590
Nitrogen, Nitrate (As N)	ND	0.10		mg/L	1	8/27/2019 7:39:28 PM	A62462
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	8/27/2019 7:39:28 PM	A62462
Sulfate	2100	50	*	mg/L	100	8/30/2019 8:16:55 AM	R62590
SM2510B: SPECIFIC CONDUCTANCE						Analyst	: JRR
Conductivity	3600	5.0		µmhos/c	1	8/28/2019 3:46:00 PM	R62496
SM2320B: ALKALINITY						Analyst	: JRR
Bicarbonate (As CaCO3)	297.1	20.00		mg/L Ca	1	8/28/2019 3:46:00 PM	R62496
Carbonate (As CaCO3)	ND	2.000		mg/L Ca	1	8/28/2019 3:46:00 PM	R62496
Total Alkalinity (as CaCO3)	297.1	20.00		mg/L Ca	1	8/28/2019 3:46:00 PM	R62496
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst	: KS
Total Dissolved Solids	3400	100	*D	mg/L	1	8/29/2019 8:49:00 PM	47138
EPA METHOD 200.7: METALS						Analyst	bcv
Calcium	580	10		mg/L	10	8/30/2019 1:26:18 PM	47145
Magnesium	130	10		mg/L	10	8/30/2019 1:26:18 PM	47145
Potassium	10	1.0		mg/L	1	8/30/2019 1:24:19 PM	47145
Sodium	230	10		mg/L	10	8/30/2019 1:26:18 PM	47145
EPA METHOD 8260B: VOLATILES						Analyst	DJF
Benzene	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Toluene	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Ethylbenzene	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Methyl tert-butyl ether (MTBE)	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2,4-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
1,3,5-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2-Dichloroethane (EDC)	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2-Dibromoethane (EDB)	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Naphthalene	ND	2.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
1-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
2-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Acetone	ND	10		μg/L	1	8/29/2019 1:54:25 AM	A62491
Bromobenzene	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Bromodichloromethane	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Bromoform	ND	1.0		μg/L	1	8/29/2019 1:54:25 AM	A62491
Bromomethane	ND	3.0		μg/L	1	8/29/2019 1:54:25 AM	A62491

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

#### Qualifiers:

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

Page 1 of 21

#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-01

**Project:** Mansfield 11
 Collection Date: 8/26/2019 1:00:00 PM

 **Lab ID:** 1908E96-001
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL (	Qual Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					Analyst	DJF
2-Butanone	ND	10	μg/L	1	8/29/2019 1:54:25 AM	A62491
Carbon disulfide	ND	10	μg/L	1	8/29/2019 1:54:25 AM	A62491
Carbon Tetrachloride	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Chlorobenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Chloroethane	ND	2.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Chloroform	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Chloromethane	ND	3.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
2-Chlorotoluene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
4-Chlorotoluene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
cis-1,2-DCE	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
cis-1,3-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2-Dibromo-3-chloropropane	ND	2.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Dibromochloromethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Dibromomethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,3-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,4-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Dichlorodifluoromethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,1-Dichloroethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,1-Dichloroethene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2-Dichloropropane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,3-Dichloropropane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
2,2-Dichloropropane	ND	2.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,1-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Hexachlorobutadiene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
2-Hexanone	ND	10	μg/L	1	8/29/2019 1:54:25 AM	A62491
Isopropylbenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
4-Isopropyltoluene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
4-Methyl-2-pentanone	ND	10	μg/L	1	8/29/2019 1:54:25 AM	A62491
Methylene Chloride	ND	3.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
n-Butylbenzene	ND	3.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
n-Propylbenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
sec-Butylbenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Styrene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
tert-Butylbenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,1,1,2-Tetrachloroethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,1,2,2-Tetrachloroethane	ND	2.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Tetrachloroethene (PCE)	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
trans-1,2-DCE	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491

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

#### Qualifiers:

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order 1908E96 Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

**CLIENT: HILCORP ENERGY** 

Client Sample ID: MW-01

**Collection Date:** 8/26/2019 1:00:00 PM Mansfield 11 **Project:** 

1908E96-001 Matrix: AQUEOUS Received Date: 8/27/2019 8:00:00 AM Lab ID:

Analyses	Result	RL Qu	ıal Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					Analyst	: DJF
trans-1,3-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2,3-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2,4-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,1,1-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,1,2-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Trichloroethene (TCE)	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Trichlorofluoromethane	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
1,2,3-Trichloropropane	ND	2.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Vinyl chloride	ND	1.0	μg/L	1	8/29/2019 1:54:25 AM	A62491
Xylenes, Total	ND	1.5	μg/L	1	8/29/2019 1:54:25 AM	A62491
Surr: 1,2-Dichloroethane-d4	106	70-130	%Rec	1	8/29/2019 1:54:25 AM	A62491
Surr: 4-Bromofluorobenzene	90.4	70-130	%Rec	1	8/29/2019 1:54:25 AM	A62491
Surr: Dibromofluoromethane	108	70-130	%Rec	1	8/29/2019 1:54:25 AM	A62491
Surr: Toluene-d8	99.9	70-130	%Rec	1	8/29/2019 1:54:25 AM	A62491

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- % Recovery outside of range due to dilution or matrix

- Analyte detected in the associated Method Blank
- Е Value above quantitation range
- Analyte detected below quantitation limits
- Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-02

**Project:** Mansfield 11
 Collection Date: 8/26/2019 11:55:00 AM

 **Lab ID:** 1908E96-002
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst	CAS
Fluoride	1.3	0.10		mg/L	1	8/27/2019 8:29:05 PM	A62462
Chloride	22	10		mg/L	20	8/27/2019 8:41:29 PM	A62462
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	8/27/2019 8:29:05 PM	A62462
Bromide	0.13	0.10		mg/L	1	8/30/2019 8:29:15 AM	R62590
Nitrogen, Nitrate (As N)	0.29	0.10		mg/L	1	8/27/2019 8:29:05 PM	A62462
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	8/27/2019 8:29:05 PM	A62462
Sulfate	2200	50	*	mg/L	100	8/30/2019 8:41:36 AM	R62590
SM2510B: SPECIFIC CONDUCTANCE						Analyst	: JRR
Conductivity	3600	5.0		µmhos/c	1	8/28/2019 4:00:50 PM	R62496
SM2320B: ALKALINITY						Analyst	: JRR
Bicarbonate (As CaCO3)	294.3	20.00		mg/L Ca	1	8/28/2019 4:00:50 PM	R62496
Carbonate (As CaCO3)	ND	2.000		mg/L Ca	1	8/28/2019 4:00:50 PM	R62496
Total Alkalinity (as CaCO3)	294.3	20.00		mg/L Ca	1	8/28/2019 4:00:50 PM	R62496
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst	: KS
Total Dissolved Solids	4160	200	*D	mg/L	1	8/29/2019 8:49:00 PM	47138
EPA METHOD 200.7: METALS						Analyst	bcv
Calcium	650	10		mg/L	10	8/30/2019 1:36:58 PM	47145
Magnesium	150	10		mg/L	10	8/30/2019 1:36:58 PM	47145
Potassium	16	1.0		mg/L	1	8/30/2019 1:34:52 PM	47145
Sodium	210	10		mg/L	10	8/30/2019 1:36:58 PM	47145
EPA METHOD 8260B: VOLATILES						Analyst	DJF
Benzene	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Toluene	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Ethylbenzene	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Methyl tert-butyl ether (MTBE)	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2,4-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
1,3,5-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2-Dichloroethane (EDC)	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2-Dibromoethane (EDB)	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Naphthalene	ND	2.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
1-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
2-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Acetone	ND	10		μg/L	1	8/29/2019 2:24:17 AM	A62491
Bromobenzene	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Bromodichloromethane	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Bromoform	ND	1.0		μg/L	1	8/29/2019 2:24:17 AM	A62491
Bromomethane	ND	3.0		μg/L	1	8/29/2019 2:24:17 AM	A62491

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-02

 Project:
 Mansfield 11
 Collection Date: 8/26/2019 11:55:00 AM

 Lab ID:
 1908E96-002
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL (	Qual Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					Analyst	: DJF
2-Butanone	ND	10	μg/L	1	8/29/2019 2:24:17 AM	A62491
Carbon disulfide	ND	10	μg/L	1	8/29/2019 2:24:17 AM	A62491
Carbon Tetrachloride	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Chlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Chloroethane	ND	2.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Chloroform	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Chloromethane	ND	3.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
2-Chlorotoluene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
4-Chlorotoluene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
cis-1,2-DCE	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
cis-1,3-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2-Dibromo-3-chloropropane	ND	2.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Dibromochloromethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Dibromomethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,3-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,4-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Dichlorodifluoromethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,1-Dichloroethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,1-Dichloroethene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2-Dichloropropane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,3-Dichloropropane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
2,2-Dichloropropane	ND	2.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,1-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Hexachlorobutadiene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
2-Hexanone	ND	10	μg/L	1	8/29/2019 2:24:17 AM	A62491
Isopropylbenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
4-Isopropyltoluene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
4-Methyl-2-pentanone	ND	10	μg/L	1	8/29/2019 2:24:17 AM	A62491
Methylene Chloride	ND	3.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
n-Butylbenzene	ND	3.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
n-Propylbenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
sec-Butylbenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Styrene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
tert-Butylbenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,1,1,2-Tetrachloroethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,1,2,2-Tetrachloroethane	ND	2.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Tetrachloroethene (PCE)	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
trans-1,2-DCE	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order **1908E96**

Hall Environmental Analysis Laboratory, Inc.

Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW-02

**Project:** Mansfield 11
 Collection Date: 8/26/2019 11:55:00 AM

 **Lab ID:** 1908E96-002
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL Q	Qual Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					Analyst	: DJF
trans-1,3-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2,3-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2,4-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,1,1-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,1,2-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Trichloroethene (TCE)	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Trichlorofluoromethane	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
1,2,3-Trichloropropane	ND	2.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Vinyl chloride	ND	1.0	μg/L	1	8/29/2019 2:24:17 AM	A62491
Xylenes, Total	ND	1.5	μg/L	1	8/29/2019 2:24:17 AM	A62491
Surr: 1,2-Dichloroethane-d4	110	70-130	%Rec	1	8/29/2019 2:24:17 AM	A62491
Surr: 4-Bromofluorobenzene	91.2	70-130	%Rec	1	8/29/2019 2:24:17 AM	A62491
Surr: Dibromofluoromethane	109	70-130	%Rec	1	8/29/2019 2:24:17 AM	A62491
Surr: Toluene-d8	95.8	70-130	%Rec	1	8/29/2019 2:24:17 AM	A62491

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-03

 Project:
 Mansfield 11
 Collection Date: 8/26/2019 2:00:00 PM

 Lab ID:
 1908E96-003
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst	CAS
Fluoride	1.4	0.10		mg/L	1	8/27/2019 8:53:53 PM	A62462
Chloride	88	10		mg/L	20	8/27/2019 9:06:17 PM	A62462
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	8/27/2019 8:53:53 PM	A62462
Bromide	0.32	0.10		mg/L	1	8/30/2019 8:53:56 AM	R62590
Nitrogen, Nitrate (As N)	0.27	0.10		mg/L	1	8/27/2019 8:53:53 PM	A62462
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	8/27/2019 8:53:53 PM	A62462
Sulfate	2000	50	*	mg/L	100	8/30/2019 9:06:16 AM	R62590
SM2510B: SPECIFIC CONDUCTANCE						Analyst	: JRR
Conductivity	3700	5.0		µmhos/c	1	8/28/2019 4:15:34 PM	R62496
SM2320B: ALKALINITY						Analyst	: JRR
Bicarbonate (As CaCO3)	297.2	20.00		mg/L Ca	1	8/28/2019 4:15:34 PM	R62496
Carbonate (As CaCO3)	ND	2.000		mg/L Ca	1	8/28/2019 4:15:34 PM	R62496
Total Alkalinity (as CaCO3)	297.2	20.00		mg/L Ca	1	8/28/2019 4:15:34 PM	R62496
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst	: KS
Total Dissolved Solids	3250	100	*D	mg/L	1	8/29/2019 8:49:00 PM	47138
EPA METHOD 200.7: METALS						Analyst	bcv
Calcium	620	10		mg/L	10	8/30/2019 2:14:59 PM	A62563
Magnesium	83	1.0		mg/L	1	8/30/2019 1:39:05 PM	A62563
Potassium	13	1.0		mg/L	1	8/30/2019 1:39:05 PM	A62563
Sodium	260	5.0		mg/L	5	8/30/2019 1:41:20 PM	A62563
EPA METHOD 8260B: VOLATILES						Analyst	DJF
Benzene	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Toluene	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Ethylbenzene	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Methyl tert-butyl ether (MTBE)	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
1,2,4-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
1,3,5-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
1,2-Dichloroethane (EDC)	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
1,2-Dibromoethane (EDB)	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Naphthalene	ND	2.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
1-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
2-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Acetone	ND	10		μg/L	1	8/29/2019 2:53:55 AM	A62491
Bromobenzene	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Bromodichloromethane	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Bromoform	ND	1.0		μg/L	1	8/29/2019 2:53:55 AM	A62491
Bromomethane	ND	3.0		μg/L	1	8/29/2019 2:53:55 AM	A62491

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

#### Qualifiers:

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-03

 Project:
 Mansfield 11
 Collection Date: 8/26/2019 2:00:00 PM

 Lab ID:
 1908E96-003
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL Q	ual Units	DF	Date Analyzed	Batch	
EPA METHOD 8260B: VOLATILES					Analyst	: DJF	
2-Butanone	ND	10	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Carbon disulfide	ND	10	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Carbon Tetrachloride	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Chlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Chloroethane	ND	2.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Chloroform	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Chloromethane	ND	3.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
2-Chlorotoluene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
4-Chlorotoluene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
cis-1,2-DCE	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
cis-1,3-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,2-Dibromo-3-chloropropane	ND	2.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Dibromochloromethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Dibromomethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,2-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,3-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,4-Dichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Dichlorodifluoromethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,1-Dichloroethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,1-Dichloroethene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,2-Dichloropropane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,3-Dichloropropane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
2,2-Dichloropropane	ND	2.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,1-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Hexachlorobutadiene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
2-Hexanone	ND	10	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Isopropylbenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
4-Isopropyltoluene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
4-Methyl-2-pentanone	ND	10	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Methylene Chloride	ND	3.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
n-Butylbenzene	ND	3.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
n-Propylbenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
sec-Butylbenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Styrene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
tert-Butylbenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,1,1,2-Tetrachloroethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
1,1,2,2-Tetrachloroethane	ND	2.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
Tetrachloroethene (PCE)	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	
trans-1,2-DCE	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491	

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
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- B Analyte detected in the associated Method Blank
- E Value above quantitation range
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#### Lab Order **1908E96**

## Hall Environmental Analysis Laboratory, Inc.

Date Reported: 9/5/2019

CLIENT: HILCORP ENERGY Client Sample ID: MW-03

 Project:
 Mansfield 11
 Collection Date: 8/26/2019 2:00:00 PM

 Lab ID:
 1908E96-003
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL Qu	ual Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					Analyst	DJF
trans-1,3-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
1,2,3-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
1,2,4-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
1,1,1-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
1,1,2-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
Trichloroethene (TCE)	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
Trichlorofluoromethane	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
1,2,3-Trichloropropane	ND	2.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
Vinyl chloride	ND	1.0	μg/L	1	8/29/2019 2:53:55 AM	A62491
Xylenes, Total	ND	1.5	μg/L	1	8/29/2019 2:53:55 AM	A62491
Surr: 1,2-Dichloroethane-d4	107	70-130	%Rec	1	8/29/2019 2:53:55 AM	A62491
Surr: 4-Bromofluorobenzene	88.9	70-130	%Rec	1	8/29/2019 2:53:55 AM	A62491
Surr: Dibromofluoromethane	108	70-130	%Rec	1	8/29/2019 2:53:55 AM	A62491
Surr: Toluene-d8	98.2	70-130	%Rec	1	8/29/2019 2:53:55 AM	A62491

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
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- S % Recovery outside of range due to dilution or matrix

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- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-04

**Project:** Mansfield 11
 Collection Date: 8/26/2019 2:35:00 PM

 **Lab ID:** 1908E96-004
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst	CAS
Fluoride	1.6	0.10		mg/L	1	8/27/2019 9:18:42 PM	A62462
Chloride	28	10		mg/L	20	8/27/2019 9:31:07 PM	A62462
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	8/27/2019 9:18:42 PM	A62462
Bromide	0.15	0.10		mg/L	1	8/30/2019 9:43:18 AM	R62590
Nitrogen, Nitrate (As N)	0.12	0.10		mg/L	1	8/27/2019 9:18:42 PM	A62462
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	8/27/2019 9:18:42 PM	A62462
Sulfate	2300	50	*	mg/L	100	8/30/2019 9:55:37 AM	R62590
SM2510B: SPECIFIC CONDUCTANCE						Analyst	: JRR
Conductivity	3700	5.0		µmhos/c	1	8/28/2019 4:29:43 PM	R62496
SM2320B: ALKALINITY						Analyst	: JRR
Bicarbonate (As CaCO3)	270.9	20.00		mg/L Ca	1	8/28/2019 4:29:43 PM	R62496
Carbonate (As CaCO3)	ND	2.000		mg/L Ca	1	8/28/2019 4:29:43 PM	R62496
Total Alkalinity (as CaCO3)	270.9	20.00		mg/L Ca	1	8/28/2019 4:29:43 PM	R62496
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst	: KS
Total Dissolved Solids	3400	100	*D	mg/L	1	8/29/2019 8:49:00 PM	47138
EPA METHOD 200.7: METALS						Analyst	: bcv
Calcium	570	10		mg/L	10	8/30/2019 1:45:35 PM	47145
Magnesium	140	10		mg/L	10	8/30/2019 1:45:35 PM	47145
Potassium	11	1.0		mg/L	1	8/30/2019 1:43:36 PM	47145
Sodium	220	10		mg/L	10	8/30/2019 1:45:35 PM	47145
EPA METHOD 8260B: VOLATILES						Analyst	: DJF
Benzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Toluene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Ethylbenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Methyl tert-butyl ether (MTBE)	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2,4-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,3,5-Trimethylbenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2-Dichloroethane (EDC)	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2-Dibromoethane (EDB)	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Naphthalene	ND	2.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
2-Methylnaphthalene	ND	4.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Acetone	ND	10		μg/L	1	8/29/2019 3:23:10 AM	A62491
Bromobenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Bromodichloromethane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Bromoform	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Bromomethane	ND	3.0		μg/L	1	8/29/2019 3:23:10 AM	A62491

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

#### Qualifiers:

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- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

**CLIENT: HILCORP ENERGY** 

Client Sample ID: MW-04

 Project:
 Mansfield 11
 Collection Date: 8/26/2019 2:35:00 PM

 Lab ID:
 1908E96-004
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	DJF
2-Butanone	ND	10		μg/L	1	8/29/2019 3:23:10 AM	A62491
Carbon disulfide	ND	10		μg/L	1	8/29/2019 3:23:10 AM	A62491
Carbon Tetrachloride	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Chlorobenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Chloroethane	ND	2.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Chloroform	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Chloromethane	ND	3.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
2-Chlorotoluene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
4-Chlorotoluene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
cis-1,2-DCE	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
cis-1,3-Dichloropropene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2-Dibromo-3-chloropropane	ND	2.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Dibromochloromethane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Dibromomethane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2-Dichlorobenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,3-Dichlorobenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,4-Dichlorobenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Dichlorodifluoromethane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,1-Dichloroethane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,1-Dichloroethene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2-Dichloropropane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,3-Dichloropropane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
2,2-Dichloropropane	ND	2.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,1-Dichloropropene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Hexachlorobutadiene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
2-Hexanone	ND	10		μg/L	1	8/29/2019 3:23:10 AM	A62491
Isopropylbenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
4-Isopropyltoluene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
4-Methyl-2-pentanone	ND	10		μg/L	1	8/29/2019 3:23:10 AM	A62491
Methylene Chloride	ND	3.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
n-Butylbenzene	ND	3.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
n-Propylbenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
sec-Butylbenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Styrene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
tert-Butylbenzene	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,1,1,2-Tetrachloroethane	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
1,1,2,2-Tetrachloroethane	ND	2.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
Tetrachloroethene (PCE)	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491
trans-1,2-DCE	ND	1.0		μg/L	1	8/29/2019 3:23:10 AM	A62491

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

Page 11 of 21

#### Lab Order **1908E96**

Date Reported: 9/5/2019

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY Client Sample ID: MW-04

**Project:** Mansfield 11
 Collection Date: 8/26/2019 2:35:00 PM

 **Lab ID:** 1908E96-004
 Matrix: AQUEOUS
 Received Date: 8/27/2019 8:00:00 AM

Analyses	Result	RL Q	ual Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					Analyst	: DJF
trans-1,3-Dichloropropene	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2,3-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2,4-Trichlorobenzene	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
1,1,1-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
1,1,2-Trichloroethane	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
Trichloroethene (TCE)	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
Trichlorofluoromethane	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
1,2,3-Trichloropropane	ND	2.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
Vinyl chloride	ND	1.0	μg/L	1	8/29/2019 3:23:10 AM	A62491
Xylenes, Total	ND	1.5	μg/L	1	8/29/2019 3:23:10 AM	A62491
Surr: 1,2-Dichloroethane-d4	108	70-130	%Rec	1	8/29/2019 3:23:10 AM	A62491
Surr: 4-Bromofluorobenzene	91.7	70-130	%Rec	1	8/29/2019 3:23:10 AM	A62491
Surr: Dibromofluoromethane	111	70-130	%Rec	1	8/29/2019 3:23:10 AM	A62491
Surr: Toluene-d8	96.7	70-130	%Rec	1	8/29/2019 3:23:10 AM	A62491

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

#### Qualifiers:

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit

- B Analyte detected in the associated Method Blank
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- P Sample pH Not In Range
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# Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

Client:	HILCORP ENERGY
Project:	Mansfield 11

Sample ID: MB-A	SampT	ype: ME	BLK	Tes	tCode: E	PA Method	200.7: Metals			
Client ID: PBW	Batch	1D: <b>A6</b>	2563	F	RunNo: 6	2563				
Prep Date:	Analysis D	ate: 8/	30/2019	9	SeqNo: 2	128811	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								
Sample ID: LLLCS-A	SampT	ype: <b>LC</b>	SLL	Tes	tCode: E	PA Method	200.7: Metals			
Client ID: BatchQC	Batch	1D: <b>A6</b>	2563	F	RunNo: 6	2563				
Pren Date:	Analysis D	ate· 8/	30/2019	ç	SeaNo: 2	128812	Units: ma/I			

Campio ID. ELLOG A	Campi	mprypo. 20022 rostoodo. El A motifica 2007. Inctaio									
Client ID: BatchQC	Batch	ID: <b>A6</b>	2563	F	RunNo: 6	2563					
Prep Date:	Analysis D	ate: <b>8/</b> 3	30/2019	8	128812	Units: mg/L	Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Calcium	ND	1.0	0.5000	0	107	50	150				
Magnesium	ND	1.0	0.5000	0	106	50	150				
Potassium	ND	1.0	0.5000	0	92.4	50	150				
Sodium	ND	1.0	0.5000	0	79.8	50	150				

Sample ID: LCS-A	SampType: LCS TestCode: EPA Method 200.7: Metals									
Client ID: LCSW	Batch	ID: <b>A6</b>	2563	F	tunNo: 6	2563				
Prep Date:	Analysis D	ate: <b>8/</b> 3	30/2019	S	SeqNo: 2	128813	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	52	1.0	50.00	0	104	85	115			
Magnesium	52	1.0	50.00	0	104	85	115			
Potassium	51	1.0	50.00	0	103	85	115			
Sodium	52	1.0	50.00	0	103	85	115			

Sample ID: <b>MB-47145</b>	SampT	ype: ME	BLK	Test	tCode: El	PA Method	200.7: Metals			
Client ID: PBW	Batch	ID: <b>47</b>	145	R	tunNo: 6	2563				
Prep Date: 8/28/2019	Analysis D	ate: <b>8/</b>	30/2019	S	SeqNo: 2	128814	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID: LLLCS-47145	SampType: LCSLL	TestCode: EPA Method 200.7: Metals	
Client ID: BatchQC	Batch ID: 47145	RunNo: <b>62563</b>	
Prep Date: 8/28/2019	Analysis Date: 8/30/2019	SeqNo: <b>2128815</b> Units: <b>mg/L</b>	
Analyte	Result PQL SPK value	SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit	Qual

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

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# Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: LLLCS-47145	SampType: LCSLL TestCode: EPA Me						200.7: Metals	<b>i</b>		
Client ID: BatchQC	Batch	1D: <b>47</b>	145	F	RunNo: 6	2563				
Prep Date: 8/28/2019	Analysis D	ate: 8/	30/2019	8	SeqNo: 2	128815	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0	0.5000	0	104	50	150			
Magnesium	ND	1.0	0.5000	0	105	50	150			
Potassium	ND	1.0	0.5000	0	88.5	50	150			
Sodium	ND	1.0	0.5000	0	69.0	50	150			

Sample ID: LCS-47145	SampT	ype: <b>LC</b>	S	Tes						
Client ID: LCSW	Batch	n ID: <b>47</b>	145	F	RunNo: 6	2563				
Prep Date: 8/28/2019	Analysis D	ate: 8/	30/2019	S	SeqNo: 2	128816	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	50	1.0	50.00	0	100	85	115			
Magnesium	50	1.0	50.00	0	101	85	115			
Potassium	50	1.0	50.00	0	99.2	85	115			
Sodium	50	1.0	50.00	0	99.1	85	115			

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

# Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

**Client:** HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: MB	SampType: MBLK TestCode: EPA Method 300.0: Anions									
Client ID: PBW	Batch	n ID: <b>A6</b>	2462	F	RunNo: 6	2462				
Prep Date:	Analysis D	ate: <b>8/</b>	27/2019	S	SeqNo: 2	124445	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Nitrogen, Nitrite (As N)	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Phosphorus, Orthophosphate (As P	ND	0.50								
Sample ID: LCS	SampT	ype: <b>LC</b>	:S	Tes	tCode: El	PA Method	300.0: Anions	<u> </u>		
Sample ID: LCS Client ID: LCSW	·	ype: LC			tCode: El		300.0: Anions	3		
	·	n ID: <b>A6</b>	2462	F		2462	300.0: Anions Units: mg/L	5		
Client ID: LCSW	Batch	n ID: <b>A6</b>	2462 27/2019	F	RunNo: 6	2462		%RPD	RPDLimit	Qual
Client ID: LCSW Prep Date:	Batch Analysis D	n ID: A6.	2462 27/2019	F	RunNo: 6: SeqNo: 2:	2462 124446	Units: mg/L		RPDLimit	Qual
Client ID: LCSW Prep Date: Analyte	Batch Analysis D Result	n ID: <b>A6</b> Pate: <b>8/</b>	<b>2462</b> <b>27/2019</b> SPK value	SPK Ref Val	RunNo: 6 SeqNo: 2 %REC	2462 124446 LowLimit	Units: <b>mg/L</b> HighLimit		RPDLimit	Qual
Client ID: LCSW Prep Date: Analyte Fluoride	Batch Analysis D Result 0.54	PQL 0.10	2462 27/2019 SPK value 0.5000	SPK Ref Val	RunNo: 6: SeqNo: 2: %REC 109	2462 124446 LowLimit 90	Units: mg/L HighLimit		RPDLimit	Qual
Client ID: LCSW Prep Date: Analyte Fluoride Chloride	Batch Analysis D Result 0.54 4.8	PQL 0.10 0.50	2462 27/2019 SPK value 0.5000 5.000	SPK Ref Val 0 0	RunNo: 6: SeqNo: 2 %REC 109 96.7	2462 124446 LowLimit 90 90	Units: mg/L HighLimit 110 110		RPDLimit	Qual

Sample ID: MB	mple ID: MB SampType: mblk TestCode: EPA Method 30							3		
Client ID: PBW	ID: <b>PBW</b> Batch ID: <b>R62590</b> RunNo: <b>62590</b>									
Prep Date:	Analysis Da	ate: <b>8/</b>	30/2019	8	SeqNo: 2	130019	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bromide	ND	0.10								
Sulfate	ND	0.50								

Sample ID: LCS-b	SampT	ype: <b>Ics</b>	,	TestCode: EPA Method 300.0: Anions							
Client ID: LCSW	Batch	ID: <b>R6</b>	2590	R	RunNo: 6	2590					
Prep Date:	Analysis D	ate: <b>8/</b> 3	30/2019	S	SeqNo: 2	130022	Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Bromide	2.5	0.10	2.500	0	98.0	90	110				
Sulfate	9.6	0.50	10.00	0	96.4	90	110				

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

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#### Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

TestCode: EPA Method 8260B: VOLATILES Sample ID: rb SampType: MBLK Client ID: PBW Batch ID: A62491 RunNo: 62491 Prep Date: Analysis Date: 8/28/2019 SeqNo: 2125758 Units: µg/L PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD **RPDLimit** Qual Analyte Benzene ND 1.0 Toluene ND 1.0 ND Ethylbenzene 1.0 Methyl tert-butyl ether (MTBE) ND 1.0 1,2,4-Trimethylbenzene ND 1.0 1,3,5-Trimethylbenzene ND 1.0 1,2-Dichloroethane (EDC) ND 1.0 1,2-Dibromoethane (EDB) ND 1.0 Naphthalene ND 2.0 1-Methylnaphthalene ND 4.0 2-Methylnaphthalene ND 4.0 ND 10 Acetone ND Bromobenzene 1.0 Bromodichloromethane ND 1.0 Bromoform ND 1.0 Bromomethane ND 3.0 2-Butanone ND 10 Carbon disulfide ND 10 Carbon Tetrachloride ND 1.0 Chlorobenzene ND 1.0 ND Chloroethane 2.0 Chloroform ND 1.0 Chloromethane ND 3.0 2-Chlorotoluene ND 1.0 4-Chlorotoluene ND 1.0 cis-1,2-DCE ND 1.0 cis-1,3-Dichloropropene ND 1.0 ND 2.0 1,2-Dibromo-3-chloropropane Dibromochloromethane ND 1.0 Dibromomethane ND 1.0 1,2-Dichlorobenzene ND 1.0 ND 1,3-Dichlorobenzene 1.0 1,4-Dichlorobenzene ND 1.0 ND Dichlorodifluoromethane 1.0 1,1-Dichloroethane ND 1.0 1,1-Dichloroethene ND 1.0 1,2-Dichloropropane ND 1.0 1,3-Dichloropropane ND 1.0 2,2-Dichloropropane ND 2.0

#### Qualifiers:

- \* Value exceeds Maximum Contaminant Level
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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## Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: rb	SampT	mpType: MBLK TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW	Batch	n ID: <b>A6</b>	j2491	ı	RunNo: 62	2491				ŀ
Prep Date:	Analysis D	ate: <b>8</b> /	/28/2019	!	SeqNo: 2	125758	Units: µg/L			!
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	11		10.00		106	70	130			
Surr: 4-Bromofluorobenzene	9.1		10.00		91.1	70	130			
Surr: Dibromofluoromethane	10		10.00		104	70	130			
Surr: Toluene-d8	10		10.00		101	70	130			
Sample ID: 100ng lcs	SampT	ype: <b>LC</b>	 :s	Tes	stCode: <b>E</b>	PA Method	1 8260B: VOL	ATILES		
Client ID: LCSW	Batch	n ID: A6	2491	RunNo: <b>62491</b>						

Chlorobenzer	e

Prep Date:

Analyte

Benzene

Toluene

Qualifiers:

\* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

Analysis Date: 8/28/2019

Result

22

18

18

PQL

1.0

1.0

1.0

20.00

20.00

20.00

ND Not Detected at the Reporting Limit

PQL Practical Quantitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

SeqNo: 2125769

109

90.8

91.6

Units: µg/L

HighLimit

130

130

130

70

70

70

%RPD

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

SPK value SPK Ref Val %REC LowLimit

0

0

0

RL Reporting Limit

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**RPDLimit** 

Qual

# Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: 100ng Ics	SampT	ype: <b>LC</b>	s	TestCode: EPA Method 8260B: VOLATILES							
Client ID: LCSW	Batch	n ID: <b>A6</b>	2491	F	RunNo: 6	2491					
Prep Date:	Analysis D	Date: 8/	28/2019	9	SeqNo: 2	125769	Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
1,1-Dichloroethene	18	1.0	20.00	0	87.6	70	130				
Trichloroethene (TCE)	18	1.0	20.00	0	88.1	70	130				
Surr: 1,2-Dichloroethane-d4	11		10.00		109	70	130				
Surr: 4-Bromofluorobenzene	9.1		10.00		91.4	70	130				
Surr: Dibromofluoromethane	10		10.00		104	70	130				
Surr: Toluene-d8	9.9		10.00		98.5	70	130				

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

### Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: Ics-1 99.8uS eC SampType: Ics TestCode: SM2510B: Specific Conductance

Client ID: LCSW Batch ID: R62496 RunNo: 62496

Prep Date: Analysis Date: 8/28/2019 SeqNo: 2126130 Units: µmhos/cm

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Conductivity 100 5.0 99.80 0 100 85 115

Sample ID: Ics-2 99.8uS eC SampType: Ics TestCode: SM2510B: Specific Conductance

Client ID: LCSW Batch ID: R62496 RunNo: 62496

Prep Date: Analysis Date: 8/28/2019 SeqNo: 2126193 Units: µmhos/cm

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Conductivity 100 5.0 99.80 0 104 85 115

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

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#### Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

**Client:** HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: mb-1 alk SampType: mblk TestCode: SM2320B: Alkalinity

Client ID: PBW Batch ID: R62496 RunNo: 62496

Prep Date: Analysis Date: 8/28/2019 SeqNo: 2126078 Units: mg/L CaCO3

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Total Alkalinity (as CaCO3) ND 20.00

Sample ID: Ics-1 alk SampType: Ics TestCode: SM2320B: Alkalinity

Client ID: LCSW Batch ID: R62496 RunNo: 62496

Prep Date: Analysis Date: 8/28/2019 SeqNo: 2126079 Units: mg/L CaCO3

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Total Alkalinity (as CaCO3) 78.96 20.00 80.00 0 98.7 90 110

Sample ID: mb-2 alk SampType: mblk TestCode: SM2320B: Alkalinity

Client ID: PBW Batch ID: R62496 RunNo: 62496

Prep Date: Analysis Date: 8/28/2019 SeqNo: 2126101 Units: mg/L CaCO3

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Total Alkalinity (as CaCO3) ND 20.00

Sample ID: Ics-2 alk SampType: Ics TestCode: SM2320B: Alkalinity

Client ID: LCSW Batch ID: R62496 RunNo: 62496

Prep Date: Analysis Date: 8/28/2019 SeqNo: 2126102 Units: mg/L CaCO3

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Total Alkalinity (as CaCO3) 80.56 20.00 80.00 0 101 90 110

#### Qualifiers:

\* Value exceeds Maximum Contaminant Level

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

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# Hall Environmental Analysis Laboratory, Inc.

WO#: **1908E96** 

05-Sep-19

Client: HILCORP ENERGY

**Project:** Mansfield 11

Sample ID: MB-47138 SampType: MBLK TestCode: SM2540C MOD: Total Dissolved Solids

Client ID: PBW Batch ID: 47138 RunNo: 62532

Prep Date: 8/28/2019 Analysis Date: 8/29/2019 SeqNo: 2127275 Units: mg/L

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Total Dissolved Solids ND 20.0

Sample ID: LCS-47138 SampType: LCS TestCode: SM2540C MOD: Total Dissolved Solids

Client ID: LCSW Batch ID: 47138 RunNo: 62532

Prep Date: 8/28/2019 Analysis Date: 8/29/2019 SeqNo: 2127276 Units: mg/L

Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

Total Dissolved Solids 1030 20.0 1000 0 103 80 120

#### Qualifiers:

Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

PQL Practical Quanitative Limit

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Limit

Page 21 of 21



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:	1908	3E96			RcptNo: 1	-
Received By: Completed By: Reviewed By:	Daniel M. Michelle Garcia Lb	8/27/2019 8:00:00 AM 8/27/2019 9:03:35 AM \$\\Z}\\\			Min	u G	onum)	
Chain of Cu	stody							
1. Is Chain of 0	Custody complete?		Yes	<b>V</b>	No		Not Present	
2. How was the	e sample delivered?		Cour	<u>ier</u>				
<u>Log In</u> 3. Was an atte	mpt made to cool the sample	s?	Yes	<b>✓</b>	No		na 🗔	ř
4. Were all sam	nples received at a temperatu	re of >0° C to 6.0°C	Yes	<b>&gt;</b>	No l		na 🗆	
5. Sample(s) in	proper container(s)?		Yes	<b>&gt;</b>	No [			
	mple volume for indicated tes			<b>V</b>	No [		.a4/19	
	(except VOA and ONG) prop		Yes		No L	_  (	DAD 8/24/19 NA [	
8. Was preserve	ative added to bottles?		Yes	M	. <u>Not</u>	<b>√</b> ₽' \	NA L	
9. VOA vials ha	ve zero headspace?		Yes	<b>✓</b>	No [		No VOA Vials	
10. Were any sa	imple containers received bro	ken?	Yes		No (	<b>Y</b> [	# of preserved	
	ork match bottle labels? pancies on chain of custody)		Yes i	<b>✓</b>	No [	$\supset \Big $	bottles checked for pH: (20r >12 unless noted)	27/19
12. Are matrices	correctly identified on Chain	of Custody?	Yes	<b>✓</b>	No [	<b>]</b>	Adjusted? AO YES DAD &	
13, is it clear wha	at analyses were requested?		Yes	<b>~</b>	No [		2 (27)	
	ling times able to be met? customer for authorization.)		Yes	✓	No [		Checked by: DAD 8/27/19	
Special Hand	ling (if applicable)							
15, Was client ne	otified of all discrepancies wi	th this order?	Yes		No [		na 🗹	
By Wh Regard Client I 16. Additional re	Instructions:  Instructions:  Instructions:  Instructions:  Instructions:  Instructions:  Instruction  Instruction  Instruction  Instruction  Instruction  Instruction  Instruction  Instruction  Instruction  Instruction	Date: Via:  Via:  ML. HNO_7 to So  Seal Intact   Seal No   Se	eMa	Dle	hone ☐ I		□ In Person	
1		lot Present						

	HALL ENVIRONMENTAL ANALYSIS LABORATORY	www hallenvironmental com	4901 Hawkins NE - Albuqueraue, NM 87109		Anal	*O:	PO₄, S PO₄, S PO₄, S	NO <sub>2</sub> ,	799 3 bo 10 c 10 c 10 c 10 c	orspicestic Methors of Semi-semi-semi-semi-semi-semi-semi-semi-s	98:H9 9081 P PAHs P 9CRA 1, F, I 1, F, I	8 × × × × × × × × × × × × × × × × × × ×	X	X	XXX	**************************************				Remarks:	Jadam SQ CHENV. OM	f 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.
Turn-Around Time:	□ Standard X Rush 3 dαy	Project Name:	Wanspield #	Project #:	1104/8/10		Josh Adoms	Sampler: TY&VÌS Short- On Ice: Xi Yes □ No		(Including OF): 2 0 0 3 = 7 2	Container Preservative HEAL No.	WHICKES OOL	1 002	( 600	1 HOO	Ī				Via: Date Time	\	ontracted to other accredited laboratories. This serves as notice of this p
Chain-of-Custody Record	Client: Hillorp	Jennifer Deal	2		324	email or Fax#: 5 deal@hilcorp, com	QA/QC Package:  X Standard   Level 4 (Full Validation)	n: ☐ Az Compliance ☐ Other	ype)		Date Time Matrix Sample Name	5 1300 Hz MW-Ol	1155 MW -02	1400 \ MV - 03	1435 MV -04	V / MM-05 75	1			Date: Time: Relinquished by:  \$\int \text{ZK} \text{ is 3}  \text{T(aV is short}	Time: Relinquished by:	If necessary samples submitted to Hall Environmental may be subco





#### **Excavation Extent**

	Mansfield #11 Hilcorp Energy Company	LTZ
September 10, 2019	Photographic Log	Advancing Opportunity



#### Northeast excavation sidewall

	Mansfield #11 Hilcorp Energy Company	LE
September 10, 2019	Photographic Log	Advancing Opportunity