Environmental Consulting & Technology, Inc.
3399 Veterans Drive, Traverse City, Michigan 49684

QUARTERLY PROJECT UPDATE REPORT
4th QUARTER 2019

HARLTAND 36 GAS PLANT
PORTION OF E½ of NW ¼ of SECTION 36, T03N-R06E,
HARTLAND TWP, LIVINGSTON COUNTY, MICHIGAN

LAMBDA ENERGY RESOURCES, LLC
1510 THOMAS ROAD
KALKASKA, MICHIGAN 49646

May 5, 2020

ECT No. 130685-2000

DOCUMENT REVIEW

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy No. 9.03. All ECT documents undergo technical/peer review prior to dispatching these documents to any outside entity.

This document has been authored and reviewed by the following employees:

Jeremy S. Lewandowski	Lisa M. Harriger-Jones
Author	Peer Review
	
Signature	Signature
May 5, 2020	May 5, 2020
Date	Date

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1.0 INTRODUCTION

This Quarterly Project Update Report was compiled by Environmental Consulting & Technology, Inc. (ECT), on behalf of Lambda Energy Resources, LLC (LER) and details remediation system operations and performance monitoring through the 4th Quarter 2019 (October 1, 2019 through December 31, 2019) for the Hartland 36 Gas Plant location, herein referenced as the "Site".

2.0 PROJECT LOCATION

The Site is a former natural gas processing plant which operated from 1999 to 2015. The property is located in a portion of the East ½ of the Northeast ¼ of Section 36, T03N-R06E, on the south side of Lone Tree Road between North Pleasant Valley Road and South Tipsico Lake Road in Hartland Township, Livingston County, Michigan. A Site Location Map and Site and Surrounding Properties Map are included as Figure 1 and Figure 2, respectively, in Appendix A.

3.0 PROJECT SUBMITTALS

The following presents a chronological summary of previous documents submitted to the Michigan Department of Environment, Great Lakes, and Energy – Oil, Gas, and Minerals Division (EGLE-OGMD) by ECT for the Site:

- Soil Closure Report dated February 15, 2016
- Groundwater Characterization Work Plan dated February 23, 2016
- Groundwater Characterization Work Plan 2 dated July 8, 2016
- Project Update Report dated September 26, 2016
- Groundwater Characterization Work Plan 3 dated October 14, 2016
- Additional Groundwater Characterization Work Plan dated December 29, 2016
- Groundwater Characterization Work Plan 5 dated March 2, 2017
- Biosparging Pilot Study Work Plan dated April 5, 2017
- Groundwater Characterization Report dated July 3, 2017
- Technical Memorandum – Biosparging Pilot Study dated July 28, 2017
- Remediation System Design Plan dated August 11, 2017
- Quarterly Project Update Report – 1st Quarter 2018 dated April 24, 2018
- Quarterly Project Update Report – 2nd Quarter 2018 dated August 8, 2018
- Quarterly Project Update Report – 3rd Quarter 2018 dated October 26, 2018
- Quarterly Project Update Report – 4th Quarter 2018 dated April 8, 2019
- Quarterly Project Update Report – 1st Quarter 2019 dated April 10, 2019
- Quarterly Project Update Report – 2nd Quarter 2019 dated August 19, 2019
- Quarterly Project Update Report – 3rd Quarter 2019 dated November 25, 2019

Due to unique Site features, most notably the contour of the lower clay confining layer and its effect on the migration of sulfolane within groundwater, activities completed at the Site were often modified in the field compared to the scope of work presented in the referenced work plans.

4.0 PROJECT OVERVIEW

KCS Michigan Resources developed the Site in 1999 and operated the natural gas processing plant into 2006. Merit Energy Company acquired the Site in 2006 and operated the plant until August 2015, when facility decommissioning commenced. LER acquired the Site from Merit Energy Company in July 2018.

In general, operations at the Site included crude oil and brine separation and storage, natural gas compression, dehydration, sweetening (hydrogen sulfide [H_2S] removal), carbon dioxide (CO_2) removal (amine process), and refrigeration for natural gas liquid (NGL) extraction and storage.

Contaminated soil was discovered in September 2015 during facility decommissioning activities at the former sweetening plant/refrigeration building; sulfolane impacts are from the gas treatment chemical Sulfinol®. Remediation activities (excavation and off-Site disposal) completed from September 2015 through December 2016 resulted in disposal of 13,481.4 tons of soil at the Venice Park Landfill in Lennon, Michigan. Verification of soil remediation (VSR) samples collected from the excavations confirmed remediation of impacted soils. Refer to the Soil Closure Report dated February 15, 2016 for a detailed summary of soil remediation and sampling activities.

Groundwater investigation activities commenced on October 29, 2015 and were completed on March 7, 2017. Seven soil borings, 13 temporary monitor wells, including two vertical aquifer profile (VAP) locations, and 37 permanent monitor wells, including 20 shallow screened monitor wells and 17 deep screened monitor wells, have been installed at the Site. The lateral and vertical extents of groundwater impacted with sulfolane have been delineated to non-detectable concentrations (laboratory reporting limit of 10 micrograms per liter, µg/L). The maximum sulfolane concentration reported from a monitor well at the Site was 11,000 micrograms per liter (µg/L) from MW-20D on the June 19-21, 2017 sampling event. Refer to the Groundwater Characterization Report dated July 3, 2017 for a detailed summary of groundwater characterization and assessment activities.

A biosparging pilot study was conducted at the Site from May 1, 2017 through June 16, 2017. The pilot study included three tests to evaluate the effectiveness of biosparging to enhance bioremediation of sulfolane dissolved in groundwater at the Site. Data obtained from the pilot study indicates biosparging is an effective remedial alternative for the Site. Concentrations of sulfolane were reduced by 100% within five feet of the biosparge point and 97% to 99% at a distance of 20 feet from the biosparge point. Dissolved oxygen (DO) influence of 4.2-10 milligrams per liter (mg/L) was observed at monitoring locations situated 40 feet from the biosparge point. Refer to the Technical Memorandum – Biosparging Pilot Study dated July 28, 2017 for a summary of pilot study activities and results.

Information obtained from the pilot study was utilized to compile the Remediation System Design Plan dated August 11, 2017. The Remediation System Design Plan presented the biosparge point (BSP) array, remediation system equipment, anticipated remediation system operation and maintenance (O&M), and performance monitoring activities. Biosparge system installation activities commenced at the Site on August 21, 2017 and concluded with startup of the remediation system on November 16, 2017. Remediation system equipment and components were generally consistent with

details and specifications provided in the Remediation System Design Plan and included 41 biosparge points (BSPs). Refer to the Quarterly Project Update Report – 1st Quarter 2018 dated April 24, 2018 for a summary of remediation system installation activities, O&M, and results of performance monitoring events completed through the 1st Quarter 2018.

Performance monitoring results from the 3rd Quarter 2019 indicate the remediation system continues to mitigate concentrations of sulfolane in groundwater with eight of the ten monitor wells that reported a concentration of sulfolane above the cleanup goal from the pre-startup sampling event reported non-detect. The two remaining monitor wells achieved 96.6% (MW-7D) and 99.1% (MW-14D) reduction in the concentration of sulfolane. Refer to the Quarterly Project Update Report – 3rd Quarter 2019 dated November 25, 2019 for a summary of remediation system O&M and results of performance monitoring events completed through the 3rd Quarter 2019.

5.0 REMEDIATION SYSTEM OPERATION AND MAINTENANCE

Personnel from ECT generally completed weekly O&M Site visits during the 4th Quarter 2019. Site visits are completed to assure optimal operating conditions and to monitor remediation system equipment and perform regularly scheduled maintenance. Site visits generally include the following:

- Equipment readings – temperature, flow rate, pressure, operation hours, etc.
- Flow rate adjustments
- BSP array changes
- Scheduled equipment maintenance
- Alarm condition assessment (as necessary)

The above information is logged on field forms to assess operating conditions as well as for completing system adjustments with respect to performance monitoring data. The primary performance monitoring parameters utilized to assess remediation system performance are as follows:

- BSP pressure and flow rate
- Sulfolane and sulfate concentrations
- Dissolved oxygen (DO) levels

Remediation system O&M data obtained from site visits is included on Table 1 in Appendix B. Groundwater sampling data is summarized on Table 2 in Appendix B and is further discussed in Section 6.0.

In general, remediation system operations during the 4th Quarter 2019 proceeded consistent with 3rd Quarter 2019. Remediation system operations during the 4th Quarter 2019 were conducted as recommended in the Quarterly Project Update Report – 3rd Quarter 2019, as follows:

In order to target residual sulfolane concentrations at MW-7D and MW-14D, and mitigate the potential for a rebound of sulfolane concentrations MW-13D and MW-19D, the following BSP array was operated continuously:

- BSP-1, BSP-2, BSP-3, BSP-4, BSP-5, BSP-8, BSP-9, BSP-10, BSP-14, BSP-15, BSP-17, BSP-18, BSP-22, BSP-23, BSP-45, and BSP-46.

Target BSP flow rates were 20 to 25 standard cubic feet per minute (scfm), pending pressure associated with the operating array.

Remediation system operational performance (i.e. percent runtime) increased for the 4th Quarter 2019 compared to the 3rd Quarter 2019. System shutdowns occurred as a result of 'Heat Exchanger High Temp' alarm conditions that were observed on the October 3, 2019 and October 31, 2019 site visits. Based on hour meter readings and not accounting for system downtime associated with planned O&M and performance monitoring activities (i.e. system shutdown for performance monitoring activities), the remediation system operated at 95.5% efficiency (i.e. runtime) during the 4th Quarter 2019.

6.0 PERFORMANCE MONITORING SUMMARY

The following sections detail performance monitoring activities completed at the Site in the 4th Quarter 2019.

6.1 PERFORMANCE MONITORING EVENTS

Personnel from ECT completed the following performance monitoring event at the Site in the 4th Quarter 2019:

- December 3-4, 2019 – Quarterly groundwater sampling event of 14 monitor wells (MW-7, MW-7D, MW-13, MW-13D, MW-14S, MW-14D, MW-15D, MW-17S, MW-17D, MW-18, MW-19S, MW-19D, MW-20S, and MW-20D)

Per recommendations presented in the Quarterly Project Update Report – 3rd Quarter 2018 dated October 26, 2018, and correspondence with EGLE-OGMD staff, three performance monitoring events per year will include the 14 monitor wells with current/previous detections of sulfolane and one performance monitoring event per year will include all (37) monitor wells.

6.2 LABORATORY ANALYSIS

Groundwater samples were collected via low-stress sampling methods in general accordance with USEPA Region 1 Low-Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, Revision Date September 19, 2017. Groundwater samples, including QA/QC samples, were collected and analyzed in general accordance with currently applicable EGLE-RRD guidance. The samples were collected into laboratory supplied containers, placed on ice, and shipped under chain-of-custody protocols to the ALS Environmental laboratory facility located in Holland, Michigan for analysis of the following:

- Sulfolane by USEPA Method 8270D
- Sulfate by Method A4500-SO4 E-11

Copies of laboratory analytical reports are included in Appendix C. Copies of low-flow sampling field forms are included in Appendix D.

6.3 CLEANUP GOALS

The following cleanup goal for sulfolane dissolved in groundwater at the Site was established in previous project submittals:

- EGLE-OGMD Interim Drinking Water Criteria for Sulfolane – 90 µg/L

The following cleanup goal for sulfate resulting from the biodegradation of sulfolane at the Site was established in previous project submittals:

- EGLE Part 201 Residential GCCSL Drinking Water Criteria for Sulfate – 250 mg/L

6.4 GROUNDWATER ANALYTICAL SUMMARY & CLEANUP CRITERIA COMPARISON

The following presents a summary and comparison of groundwater analytical results to the cleanup goal for sulfolane through the quarterly groundwater sampling event completed on June 24-26, 2019:

<u>Monitor wells located west beyond the extent of the lower clay confining layer</u>

- Monitor well clusters MW-6/6D and MW-12S/12D reported sulfolane non-detect from all associated sampling events.

<u>Monitor wells screened below the lower clay confining layer</u>

- Monitor wells MW-19DD and MW-21D reported sulfolane non-detect from all associated sampling events.
- Concentrations of sulfolane were reported below applicable cleanup criteria from MW-15DD from the pre-remediation system startup sampling event (September 11-13, 2017) and a confirmation sampling event (September 21, 2018). The concentration of sulfolane detected in MW-15DD is suspected to be the result of drilling activities completed on August 28, 2017. Sulfolane was reported non-detect from MW-15DD from all subsequent sampling events.

<u>Monitor wells screened within the limits of the clay confining layer (area of sulfolane impact)</u>

- The following monitor wells reported sulfolane non-detect from all associated sampling events:
  - MW-1, MW-2, MW-2D, MW-3, MW-3D, MW-4, MW-5, MW-8, MW-9, MW-10, MW-11, MW-15, MW-16, MW-16D, MW-22D, and MW-23D

- The following monitor wells previously reported sulfolane above the cleanup goal prior to the pre-remediation system startup event, below the cleanup goal at the pre-remediation system startup event, and currently report sulfolane non-detect:
  - MW-19S and MW-20S
- The following monitor wells previously reported sulfolane above the cleanup goal prior to the pre-remediation system startup event and non-detect at and subsequent to the pre-remediation system startup event:
  - MW-7 and MW-13
- The following presents percent reductions to the concentration of sulfolane (relative to the highest concentration from/after the pre-remediation system startup sampling event) for monitor wells that reported sulfolane above the cleanup goal from the pre-remediation system startup sampling event:
  - MW-14S, MW-15D, MW-17S, MW-17D, MW-18, and MW-20D: 100%
  - MW-14D: 99.1% (7,700 to 71 µg/L)
  - MW-19D: 98.4% (5,900 to 92 µg/L)
  - MW-13D: 94.9% (730 to 37 µg/L)
  - MW-7D: 70.7% (4,100 to 1,200 µg/L)
- MW-13D was the only monitor well at the Site with a concentration of sulfate (660 µg/L) reported above the cleanup goal (250 µg/L). As noted in the Technical Memorandum – Biosparging Pilot Study dated July 28, 2017, natural attenuation/biodegradation (i.e sulfate reduction) of sulfate in the vicinity of MW-13D is expected once biosparging has ceased to that area.

Please refer to Table 2 and Table 3 in Appendix B for a summary of groundwater monitoring data for the Site. Monitor well locations are illustrated on Figure 3 in Appendix A.

7.0 CONCLUSIONS AND RECOMMENDATIONS

As supported by the data presented herein, the remediation system has been effective at reducing concentrations of sulfolane after approximately 25 months of operation. Six of the ten monitor wells that reported a concentration of sulfolane above the cleanup goal from the pre-startup sampling event were reported non-detect at the December 3-4, 2019 sampling event. Three of the four remaining monitor wells, MW-13D, MW-14D, and MW-19D, that reported a concentration of sulfolane above the cleanup goal from the pre-startup sampling event achieved 94.9%, 99.1%, and 98.4% reduction in the concentration of sulfolane, respectively. MW-7D reported a rebound to the concentration of sulfolane, increasing from 140 µg/L for the 3rd Quarter 2019 sampling event to 1,200 µg/L for the 4th Quarter 2019 sampling event.

In order to target residual sulfolane concentrations at MW-7D, MW-13D, MW-14D, and MW-19D, the following BSP array will be operated during the 1st Quarter 2020:

- BSP-1, BSP-2, BSP-4, BSP-5, BSP-8, BSP-9, BSP-10, BSP-15, BSP-17, BSP-18, BSP-22, BSP-23, and BSP-45.

In order to more closely monitor the concentration of sulfolane at MW-7D, groundwater samples are proposed to be collected from MW-7D in January 2020 and February 2020. The concentrations of sulfolane reported from MW-7D will be evaluated for potential augmentation of the remediation system.

8.0 SCHEDULE

The following schedule of activities is proposed/anticipated for the 1st Quarter 2020:

- Remediation system operations will continue with a minimum of weekly Site visits and adjustments to maximize system operations.
- The next performance/quarterly monitoring event is proposed to be completed during March 2020 and will include the 14 monitor wells with current/previous detections of sulfolane. As described above, performance monitoring will include collecting groundwater samples from MW-7D in January and February 2020.
- A quarterly project update report will be submitted subsequent to receipt of analytical data from the March 2020 sampling event.

APPENDIX A

FIGURES

FIGURE 1.

SITE LOCATION MAP

Sources: USGS Quad: Kent Lake, 2015; West Highland, 2015; ECT, 2016.

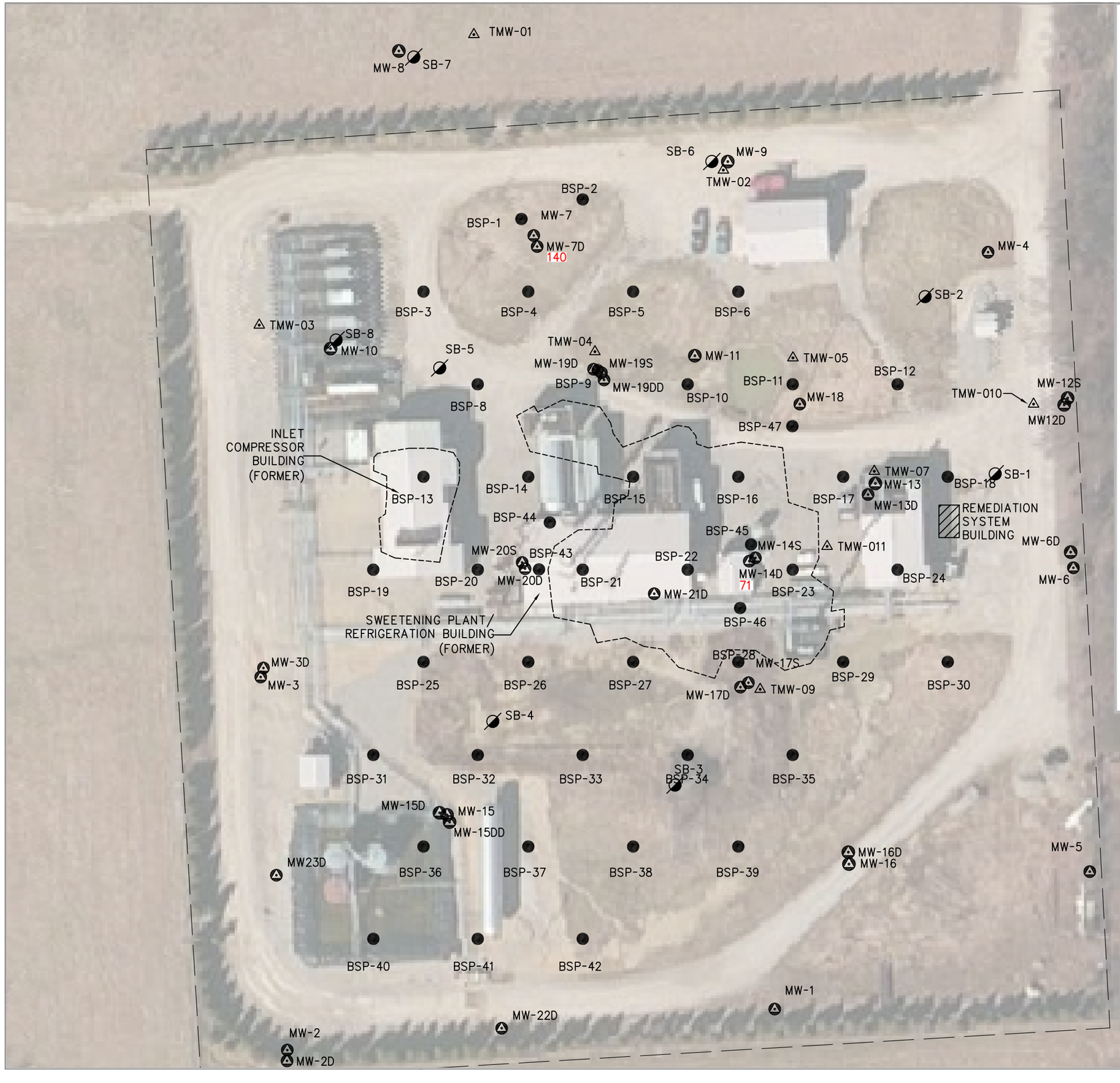
ECT Environmental Consulting & Technology, Inc.

FIGURE 2.

SITE AND SURROUNDING PROPERTIES MAP

Source: Google Earth, 2016.

ECT Environmental Consulting & Technology, Inc.



Legend

Monitor Well

Temporary Monitor Well

Soil Boring

Excavation Boundary

Fenceline (former)

BSP Location

350

September 2019 Sulfolane Results (ug/L)
Monitor wells with no results shown indicate results were "Not Detected at the Reporting Limit" or samples were not collected.

FIGURE ADAPTED FROM SURVEY PERFORMED BY:

Gourdie-Fraser
Municipal | Development | Transportation

NOTES:

1) DRAWING BASED UPON FIELD OBSERVATIONS TAKEN 11/18/15 (FOR MW DESIGNATED WELLS), 06/06/16 (FOR TMW DESIGNATED WELLS/BORINGS) AND 08/02/16 (FOR MONITORING WELLS 8-13 & 15-16, MW-14 NOT INSTALLED).
2) ADDITIONAL FIELD OBSERVATIONS TAKEN 11/01/16 FOR LOCATIONS AND ELEVATIONS OF MW-13D, MW-14S & D, MW-17S & D, MW-18, AND MW-19S & D. NEW ELEVATIONS WERE ESTABLISHED FOR MW-9, MW-10, MW-11, MW-13, MW-15 AND MW-16. SOIL BORINGS SB-1 & SB-2 WERE ALSO LOCATED ON 11/01/16

ECT Environmental Consulting & Technology, Inc.

HARTLAND 36 GAS PLANT

130685 - 2000
ECT PROJECT NUMBER

DESIGNED BY	CHECKED BY
-	-

DRAWN BY	APPROVED BY
BJB	JSL

SHEET TITLE

SITE PLAN

SCALE: 1" = 50 @ 11x17

0 25' 50'

NORTH

FIGURE
3

APPENDIX B

TABLES

TABLE 1
REMEDIATION SYSTEM O&M DATA
Hartland 36 Gas Plant
SE/NE/NW Section 36, T03N-R06E, Hartland Township, Livingston County, Michigan
ECT Project #13-0685-2000

	10/3/2019				10/10/2019				10/17/2019				10/24/2019				10/31/2019			
	Arrival		Departure		Arrival		Departure		Arrival		Departure		Arrival		Departure		Arrival		Departure	
BSP #	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
1			18.5		13	20	13.5	20	13	19	13.5	19	13	20	13	20			15.5	11
2			19.5		13	11	13	11	13	11	14	11	12.5	12	13	12			16	5
3			17.5		13	17	13	17	12.5	19	12.5	19	12	19	13	20			14.5	10
4			18.5		12	20	12.5	20	12.5	20	13	20	11	20	11	20			15.5	12
5			18.5		12	23	10.5	20	11	19	12	20	10.5	20	11	21			15.5	15
6																				
8			16.5		11	25	9	20	9	19	9.5	20	9	20	9	20			15	20
9			19		12.5	14	12.5	14	14	13	14.5	13	13	12	14	15			15.5	4
10			21		14	14.5	14	12	14	11	15	11	13	11	14	12			16.5	13
11																				
12																				
13																				
14			19.5		13	8	13	7	4	6	14.5	6	13.5	6	15	6			15.5	6
15			14.5		9	20	9	20	9.5	19	10.5	22	10	22	9.5	20			14.5	20
16																				
17			18.5		13	5	13	6	13	5	13	5	12.5	5	13	5			15	4
18			17.5		9.5	14	6.5	20	9.5	19	9.5	20	7	20	7	20			14	17
19																				
20																				
21																				
22			17		10	18	10	18	11	17	12	17	10.5	16	11	18			13.5	6
23			19.5		12.5	7	13	8	13	8	13.5	8	12	8	13	9			16	4
24																				
25																				
26																				
27																				
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40																				
41																				
42																				
43																				
44																				
45			17.5		12	20	12	20	11.5	20	13.5	22	11.5	22	10.5	20			16.5	20
46			12		5	5	5	5	6	4	6.5	4	5	9	5.5	12			7	4
47																				
Elapsed Time, hrs	54577.82		54578.48		54747.00		54737.36		54914.70		54915.83		55082.52		55082.98		55148.79		55149.79	
Blower Temp., °F			245		225		225		230		215		230		230				237	
Blower Pressure, psi			21		15		15		16		16.5		15.5		16				17.5	
Manifold Pressure, psi			19.5		14.5		14.5		14		14		13.5		14.5				16.5	
Heat Exr Temp., °F			101		110		110		100		98		108		110				82	
Comments	System Down on Arrival - Heat Exchanger High Temp.																System Down on Arrival - Heat Exchanger High Temp.			

BSP's with closed valves.
BSPs installed 5/2-3/2018.
BSP-42 permanently removed from manifold 5/2/2018.

TABLE 1
REMEDIATION SYSTEM O&M DATA
Hartland 36 Gas Plant
SE/NE/NW Section 36, T03N-R06E, Hartland Township, Livingston County, Michigan
ECT Project #13-0685-2000

	11/7/2019				11/8/2019				11/14/2019				11/21/2019				11/27/2019			
	Arrival		Departure		Arrival		Departure		Arrival		Departure		Arrival		Departure		Arrival		Departure	
BSP #	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
1	12	13	14	18	13	16			12	14	12.5	16	13	17	13	17	13	16		
2	12.5	8	15	12	13	14			12.5	13	12.5	18	15	19	14	19	14	18		
3	11	15	13	19	12.5	18			12	19	12	19	12	19	12	19	12	17		
4	12	15	15	20	13	19			13	17	13	17	15	19	14	19	14	18		
5	12	19	14	20	12.5	22			12.5	21	12.5	21	14	22	13	22	13.5	21		
6																				
8	11.5	24	11	24	10	22			9.5	21	9.5	20	10	21	10	20	9	19		
9	13	0	15.5	15	14	11			13	9	13	10	15	12	14	11	13	11		
10	13.5	12	17	13	15	15			14.5	13	15	14	17	13	15.5	14	14.5	12		
11																				
12																				
13																				
14	13	6	16	8	14	10			13	10	13	11	14.5	11	14	11	12.5	11		
15	11	23	11	22	10.5	22			9.5	21	9.5	21	10.5	21	10	21	9.5	20		
16																				
17	12	4	14.5	6	13.5	6			13	5	13	6	14	6	14	6	13.5	5		
18	11	25	8	24	7	23			7.5	21	8	20	11	20	8.5	20	9.5	20		
19																				
20																				
21																				
22	11.5	5	14	9	12	10			11.5	10	12	14	13	14	12.5	15	12.5	15		
23	13	5	16	8	14.5	8			16	8	14.5	9	15.5	10	15	10	14	10		
24																				
25																				
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41																				
42																				
43																				
44																				
45	13	20	14	20	13	19			13	20	13	20	16	20	14.5	20				
46	4	6	8	17	5	10			4.5	10	5	10	8	10	7	10				
47																				
Elapsed Time, hrs	55324.94		55325.83		55342.05		55342.15		55487.73		55488.66		55654.61		55655.00		55802.44		55802.56	
Blower Temp., °F	210		215		220				215		215		205		210		210			
Blower Pressure, psi	14		17		16				15.5		15.5		16.5		16		15			
Manifold Pressure, psi	13		15		14.5				14		14		15		15		14.5			
Heat Exr Temp., °F	75		85		85				84		86		88		90		92			
Comments																	System shut down for groundwater sampling event 12/3-4/19.			

BSP's with closed valves.
BSPs installed 5/2-3/2018.
BSP-42 permanently removed from manifold 5/2/2018.

TABLE 1
REMEDIATION SYSTEM O&M DATA
Hartland 36 Gas Plant
SE/NE/NW Section 36, T03N-R06E, Hartland Township, Livingston County, Michigan
ECT Project #13-0685-2000

	12/5/2019				12/12/2019				12/19/2019				12/26/2019			
	Arrival		Departure		Arrival		Departure		Arrival		Departure		Arrival		Departure	
BSP #	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)	Pressure (psi)	Flow Rate (scfm)
1	15	20	15	20	13.5	17	13	17	13	18	12	18	11.5	17	12	18
2	16.5	10	17	10	13	16	13	16	13	16	11.5	17	10.5	15	11.5	16
3	14.5	14	14.5	14	13	17	13	17	12.5	19	12.5	20	12.5	15		
4	17	19	17	20	16.5	19	16.5	20	15.5	21	14	20	13	19	13.5	22
5	15	23	14	20	13	18	12	21	11	21	14	20	10	20	10	20.5
6																
8	12	17	13	20	11	22	10	21	9.5	22	8	20	8	19	8	20
9	16.5	11	16.5	12	15	14	15	14	13.5	15	12	14	11	12.5	11.5	14
10	19	19	19	20	18	18	17.5	18	17	19	15.5	20	14	18	14.5	19
11																
12																
13																
14	16	8	16	7	15	7	14.5	7	13.5	7	12	7	11	6		
15	11	13	12	20	10.5	20	10	20	9.5	21	8.5	20	8	19	8	20
16																
17	16	7	16.5	7	15	6	15	6	14	10	14	9	13	8.5	14	11
18	18.5	22	12	20	11	19	11	20	10	21	9	20	7	19	7	19
19																
20																
21																
22	15	16	15.5	20	15	18	15	19	13.5	18	12.5	17	10.5	17	11	20
23	18	6	18	6	17	6	16.5	8	15.5	7	14.5	7	12.5	7	13	12
24																
25																
26																
27																
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35																
36																
37																
38																
39																
40																
41																
42																
43																
44																
45	18.5	25	16.5	20	16	19	15.5	19	15	19	14	20	12	20	12.5	21
46	11	7	11	7	9	7	9	7	8	8	7	7	5	6		
47																
Elapsed Time, hrs	55823.55		55823.76		55992.45		55993.33		56162.78		56163.30		56328.74		56329.49	
Blower Temp., °F	205		205		185		190		185		200		211		220	
Blower Pressure, psi	16		16		15		15		15		15		12		13	
Manifold Pressure, psi	17		17.5		16		16		16		15		14.5		15	
Heat Exr Temp., °F	75		78		68		72		75		80		100		104	
Comments	System restarted at 12:45 on 12/4/19 after groundwater sampling event completed.															

BSP's with closed valves.
BSPs installed 5/2-3/2018.
BSP-42 permanently removed from manifold 5/2/2018.

TABLE 2
GROUNDWATER ANALYTICAL SUMMARY & CLEANUP CRITERIA COMPARISON
Hartland 36 Gas Plant
SE/NE/NW Section 36, T03N-R06E, Hartland Township, Livingston County, Michigan
ECT Project #13-0685-2000

	MW-1			MW-2			MW-2D			MW-3			MW-3D			MW-4			MW-5			MW-6			MW-6D			MW-7		
Date	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**
9/11-13/17	ND	8.08	---	ND	4.14	---	ND	5.36	---	ND	6.96	---	ND	1.03	---	ND	7.75	---	ND	7.31	---	ND	2.77	---	ND	5.90	---	ND	1.55	---
9/21/17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12/19-20/17	ND	8.83	6.4	ND	8.76	16	ND	5.02	21	ND	9.81	41	ND	1.90	27	ND	7.10	24	ND	6.85	24	ND	2.99	42	ND	9.26	19	ND	10.07	46
1/25/18	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--
2/27/18	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--
3/28-29/18	ND	7.87	5.0	ND	7.79	14	ND	4.05	17	ND	11.53	26	ND	1.31	30	ND	9.77	29	ND	6.31	24	ND	3.22	41	ND	6.92	20	ND	9.75	31
6/19-21/18	ND	15.96	9.3	ND	10.66	15	ND	7.87	18	ND	8.43	11	ND	1.06	28	ND	9.86	21	ND	12.49	28	ND	10.58	56	ND	10.91	10	ND	10.49	17
9/18-20/18	ND	9.98	8.5	ND	12.08	15	ND	10.21	21	ND	9.56	16	ND	1.87	34	ND	11.86	23	ND	11.26	25	ND	5.56	57	ND	8.27	22	ND	13.67	24
12/17-18/18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	10.03	41
3/25-26/19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	15.99	44
6/24-26/19	ND	11.22	6.8	ND	7.00	17	ND	3.79	20	ND	11.36	15	ND	4.99	32	ND	11.47	27	ND	9.78	36	ND	6.25	61	ND	7.11	23	ND	12.22	20
9/23-24/19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	12.78	25
12/3-4/19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	9.65	29
% Decrease	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sulfolane Criterion	**90**																													
Sulfate Criterion	**250**																													

	MW-7D			MW-8			MW-9			MW-10			MW-11			MW-12S			MW-12D			MW-13			MW-13D		
Date	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**
9/11-13/17	**1,900**	0.79	---	ND	9.09	---	ND	0.73	---	ND	7.42	---	ND	3.69	---	ND	2.65	---	ND	1.36	---	ND	0.94	---	**660 (730)**	0.52	**330**
9/21/17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12/19-20/17	**4,100**	0.89	46	ND	6.34	8	ND	0.57	21	ND	7.95	36	ND	5.04	20	ND	3.98	19	ND	4.00	32	ND	13.79	80	**480**	0.51	240
1/25/18	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	**400**	2.13	240
2/27/18	**1,200**	1.47	96	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	ND	9.90	210
3/28-29/18	**820**	0.61	81	ND	9.65	12	ND	1.32	26	ND	10.34	48	ND	5.17	16	ND	7.70	18	ND	3.45	33	ND	10.12	63	ND	8.41	220
6/19-21/18	**180 (170)**	1.09	61 (57)	ND	8.58	30	ND	3.36	21	ND	9.98	39	ND	10.94	18	ND	9.09	22	ND	5.26	36	ND	8.08	93	**180**	2.42	**480**
9/18-20/18	**170**	1.32	58	ND	7.88	9.4	ND	1.66	29	ND	11.83	18	ND	11.00	45	ND	3.52	55	ND	4.27	34	ND	9.36	69	ND	5.06	**650**
12/17-18/18	**270 (300)**	12.68	37	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	10.41	94	ND	0.38	**740**
3/25-26/19	**1,700**	0.19	53	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	11.46	110	16	1.95	**740**
6/24-26/19	**510**	0.81	84	ND	12.70	17	ND	1.20	26	ND	8.50	61	ND	11.21	40	ND	5.84	27	ND	2.96	37	ND	8.54	140	19	2.61	**740**
9/23-24/19	**140**	2.58	57	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	8.93	140	ND	5.07	**750**
12/3-4/19	**1,200**	4.02	48	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	10.09	120	37	0.82	**660**
% Decrease	70.7%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	94.9%	---	---
Sulfolane Criterion	**90**																										
Sulfate Criterion	**250**																										

	MW-14S			MW-14D			MW-15			MW-15D			MW-15DD			MW-16			MW-16D			MW-17S			MW-17D		
Date	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**
9/11-13/17	**120**	0.85	---	**7,700**	0.22	---	ND	4.39	---	**230**	0.22	---	33	0.23	---	ND	3.31	---	ND	0.28	---	**3,100**	0.25	---	**380**	0.36	---
9/21/17	---	---	---	---	---	---	---	---	---	---	---	---	48	0.64	---	---	---	---	---	---	---	---	---	---	---	---	---
12/19-20/17	**100**	2.05	91	**7,100**	0.45	39	ND	11.02	14	ND	4.22	46	ND	0.56	37	ND	8.42	16	ND	5.99	24	**2,400**	0.88	49	51	8.10	33
1/25/18	85	3.35	56	**5,400**	0.43	44	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	**510**	0.95	53	ND	10.07	38
2/27/18	ND	9.63	110	**4,000**	0.50	48	---	---	--	---	---	--	---	---	--	---	---	--	---	---	--	**460**	0.96	53	ND	11.02	38
3/28-29/18	ND	8.61	120	**3,000 (5,100)**	0.22	50 (51)	ND	7.96	16	ND	6.86	29	ND	0.54	37	ND	8.73	19	ND	3.88	25	52 (52)	3.28	64	ND	9.68	36
6/19-21/18	52	0.28	67	**2,600 (2,800)**	0.09	77 (77)	ND	7.98	39	ND	3.80	27	ND	0.53	42	ND	16.43	43	ND	8.12	24	55	8.61	68	ND (ND)	10.63	42 (41)
9/18-20/18	ND	4.90	140	**680**	2.89	110	ND	8.25	32	ND	7.45	20	ND	0.60	41	ND	8.12	21	ND	2.08	22	32	3.07	65	ND	3.83	49
12/17-18/18	ND	9.20	220	**290**	3.49	120	---	---	---	ND	6.77	22	---	---	---	---	---	---	---	---	---	ND	9.30	61	ND	9.75	47
3/25-26/19	ND	11.08	180	ND	5.71	120	---	---	---	ND	7.53	23	---	---	---	---	---	---	---	---	---	ND	5.77	80	ND	9.68	45
6/24-26/19	ND	9.88	160	**110**	5.82	120	ND	8.58	55	ND	5.65	28	ND	0.53	65	ND	11.24	23	ND	6.78	33	ND	1.43	69	ND	10.93	65
9/23-24/19	ND	5.96	100	71	2.83	150	---	---	---	ND	22.96	26	---	---	---	---	---	---	---	---	---	ND	4.78	73	ND	7.19	96
12/3-4/19	ND	8.66	93	71	10.21	150	---	---	---	ND	6.29	21	---	---	---	---	---	---	---	---	---	ND	7.98	61	ND	8.87	80
% Decrease	100%	---	---	99.1%	---	---	---	---	---	100%	---	---	100%	---	---	---	---	---	---	---	---	100%	---	---	100%	---	---
Sulfolane Criterion	**90**																										
Sulfate Criterion	**250**																										

	MW-18			MW-19S			MW-19D			MW-19DD			MW-20S			MW-20D			MW-21D			MW-22D			MW-23D		
Date	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**	**Sulfolane**	**DO**	**Sulfate**
9/11-13/17	**2,200**	1.16	---	29	1.64	---	**5,900**	0.60	---	ND	3.82	---	63	1.50	---	**12,000**	0.45	---	ND	6.08	---	ND	7.76	---	ND	2.87	---
9/21/17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12/19-20/17	**660**	0.67	37	ND	10.32	44	**3,200**	0.38	73	ND	7.16	22	49	4.04	45	**12,000**	0.52	43	ND	7.58	22	ND	5.74	12	ND	2.48	20
1/25/18	**2,300**	0.74	34	---	---	--	ND	0.77	74	---	---	--	ND	3.76	45	**10,000**	1.61	41	---	---	--	---	---	--	---	---	--
2/27/18	**2,000**	0.39	33	---	---	--	ND	0.57	51	---	---	--	ND	---	52	**9,300**	0.61	46	---	---	--	---	---	--	---	---	--
3/28-29/18	**980**	0.71	34	ND	9.45	43	**290**	0.47	54	ND	6.27	26		2.03	57 (58)	**10,000**	2.00	51	ND	4.13	22	ND	5.32	9.4	ND	3.03	19
6/19-21/18	14	3.13	39	ND	11.14	36	**750**	1.08	63	ND	5.25	23	ND	4.80	56	**6,600**	3.99	58	ND	4.22	21	ND	12.97	8.0	ND	5.72	20
9/18-20/18	ND (ND)	0.67	49 (49)	ND	12.84	44	**170 (150)**	0.86	77 (77)	ND	6.89	20	ND	9.28	63	22 (34)	5.37	80 (81)	ND	5.77	21	ND	7.65	6.8	ND	3.12	21
12/17-18/18	ND	2.28	53	ND	8.95	47	**440**	3.02	83	---	---	---	ND	9.77	48	19	5.32	90	---	---	---	---	---	---	---	---	---
3/25-26/19	ND	1.09	47	ND	14.18	47	**350**	0.24	88	---	---	---	ND	12.20	62	ND (ND)	10.35	89 (84)	---	---	---	---	---	---	---	---	---
6/24-26/19	ND (ND)	0.97	45 (44)	ND	10.42	62	**98 (73)**	0.17	100 (94)	ND	7.27	23	ND	20.73	72	ND (ND)	10.86	94 (94)	ND	5.66	24	ND	9.20	8.3	ND	6.39	30
9/23-24/19	ND	1.60	43	ND	9.79	58	ND	8.39	110	---	---	---	ND	6.06	66	ND (ND)	6.26	84 (79)	---	---	---	---	---	---	---	---	---
12/3-4/19	ND	0.93	49	ND	11.40	62	**92**	0.57	92	---	---	---	ND	7.23	64	ND (ND)	6.15	84 (80)	---	---	---	---	---	---	---	---	---
% Decrease	100%	---	---	100%	---	---	98.4%	---	---	---	---	---	100%	---	---	100%	---	---	---	---	---	---	---	---	---	---	---
Sulfolane Criterion	**90**																										
Sulfate Criterion	**250**																										

Notes

1) Concentrations of sulfolane reported in micrograms per liter (µg/L), equivalent to parts per billion (ppb).
2) DO - dissolved oxygen.
3) Concentrations of dissolved oxygen and sulfate reported in milligrams per liter (mg/L), equivalent to parts per million (ppm).
4) (---) - Not sampled.
5) ND - Concentration not detected above reporting limit.
6) Concentrations shown in parenthesis are from duplicate sample.
7) % Decrease of sulfolane is the most recent sampling event relative to highest reported concentration since the pre-system startup event (9/11-13/17).
8) Sulfolane criterion established by EGLE-Oil, Gas, and Minerals Division (EGLE-OGMD).
9) Sulfate criterion - Part 201 Residential Generic Cleanup Criteria and Screening Levels (Part 201 Residential GCCSLs), dated January 10, 2018, per R299.44 (Table 1) of the Michigan Administrative Code.
10) Concentrations that are shaded and bold exceed cleanup criteria.

ECT Environmental Consulting & Technology, Inc.

TABLE 3
SULFOLANE GROUNDWATER ANALYTICAL SUMMARY & CLEANUP CRITERIA COMPARISON
Hartland 36 Gas Plant
SE/NE/NW Section 36, T03N-R06E,
Hartland Township, Livingston County, Michigan
ECT Project #13-0685-2000

Sample Location	Screened Interval (ft bgs)	11/4-5/15	1/27/16	6/3/2016	8/3-4/16	9/21-22/16	10/12/16	11/3/16	12/8/16	12/21-23/16	2/14/17	3/14-16/2017	4/27/17; 5/1/17	5/11/2017	5/30-31/17	6/19-21/17	9/11-13/17	9/21/2017	12/19-20/2017	1/25/2018	2/27/2018	3/28-29/2018	6/19-21/2018	9/18-20/2018	12/17-18/2018	3/25-26/19	6/24-26/2019	9/23-24/2019	12/3-4/19
MW-1	20.1 - 25.1	ND	ND	ND	---	ND	---	---	---	---	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-2	19.1 - 24.1	ND	ND	ND	---	ND	---	---	---	---	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-2D	27.7 - 29.7	---	---	---	---	---	---	---	---	---	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-3	22.0 - 27.0	ND	---	ND	---	ND	---	---	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-3D	30.0 - 32.0	---	---	---	---	---	---	---	---	---	ND	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-4	23.1 - 28.1	ND	ND	ND	ND	ND	ND	ND	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-5	18.0 - 23.0	ND	ND	ND	---	ND	ND	---	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-6	25.4 - 30.4	ND	ND	ND	ND	ND	ND	ND	---	ND	---	ND	---	---	ND	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-6D	39.4 - 44.4	---	---	---	ND	ND	ND	ND	---	ND	---	ND	---	---	ND	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-7	25.2 - 30.2	**880**	44	**510**	ND	**210**	---	---	---	ND	---	ND	---	---	---	12	ND	---	ND	---	---	ND	ND	ND	ND	ND	ND	ND	ND
MW-7D	39.2 - 44.2	---	---	---	---	---	---	---	**3,100**	---	---	**3,000**	---	---	---	**2,600**	**1,900**	---	**4,100**	---	**1,200**	**820**	**180**	**170**	**300**	**1,700**	**510**	**140**	**1,200**
MW-8	24.6 - 29.6	---	---	---	ND	ND	---	---	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-9	23.6 - 28.6	---	---	---	ND	ND	---	---	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-10	21.2 - 26.2	---	---	---	ND	ND	---	---	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-11	21.7 - 26.7	---	---	---	ND	ND	---	---	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-12S	20.5 - 25.5	---	---	---	ND	ND	ND	ND	---	ND	---	ND	---	---	ND	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-12D	39.7 - 44.7	---	---	---	ND	ND	ND	ND	---	ND	---	ND	---	---	ND	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-13	19.1 - 24.1	---	---	---	**6,600**	**8,800**	---	---	---	**3,500**	---	**5,100**	**7,000**	**3,700**	**97**	ND	ND	---	ND	---	---	ND	ND	ND	ND	ND	ND	ND	ND
MW-13D	27.7 - 29.7	---	---	---	---	---	---	**7,800**	---	**8,300**	---	**5,400**	**6,900**	**1,100**	**420**	**290**	**730**	---	**480**	**400**	ND	ND	**180**	ND	ND	16	19	ND	37
MW-14S	18.6 - 23.6	---	---	---	---	---	---	46	---	**460**	---	**540**	**490**	**160**	**520**	**94**	**120**	---	**100**	85	ND	ND	52	ND	ND	ND	ND	ND	ND
MW-14D	36.7 - 41.7	---	---	---	---	---	---	**7,900**	---	**10,000**	---	**7,600**	**9,800**	**8,600**	**8,200**	**7,800**	**7,700**	---	**7,100**	**5,400**	**4,000**	**5,100**	**2,800**	**680**	**290**	ND	**110**	71	71
MW-15	19.3 - 24.3	---	---	---	ND	ND	---	---	---	ND	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-15D	37.9 - 42.9	---	---	---	---	---	---	---	---	---	**4,600**	**3,200**	---	---	---	**670**	**230**	---	ND	---	---	ND	ND	ND	ND	ND	ND	ND	ND
MW-15DD	50 - 55	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	33	48	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-16	19.5 - 24.5	---	---	---	ND	ND	---	---	---	ND	---	ND	ND	ND	ND	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-16D	31.4 - 33.4	---	---	---	---	---	---	---	---	---	ND	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-17S	19.9 - 24.9	---	---	---	---	---	---	**3,900**	---	**5,100**	---	**3,000**	---	---	---	**5,300**	**3,100**	---	**2,400**	**510**	**460**	52	55	32	ND	ND	ND	ND	ND
MW-17D	35.4 - 37.4	---	---	---	---	---	---	**440**	---	**510**	---	**400**	---	---	---	**390**	**400**	---	51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-18	19.9 - 24.9	---	---	---	---	---	---	**6,800**	---	**6,800**	---	**4,300**	---	**2,100**	**4,800**	**3,800**	**2,200**	---	**660**	**2,300**	**2,000**	**980**	14	ND	ND	ND	ND	ND	ND
MW-19S	22.6 - 27.6	---	---	---	---	---	---	**2,700**	---	**1,500**	---	**1,300**	---	---	---	24	33	---	ND	---	---	ND	ND	ND	ND	ND	ND	ND	ND
MW-19D	43.0 - 48.0	---	---	---	---	---	---	**7,000**	---	**7,600**	---	**4,300**	---	---	---	**7,000**	**5,900**	---	**3,200**	ND	ND	**290**	**750**	**170**	**440**	**350**	**98**	ND	**92**
MW-19DD	57 - 62	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-20S	17.8 - 22.8	---	---	---	---	---	---	---	25	---	---	**97**	---	---	---	**160**	63	---	49	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-20D	31.0 - 33.0	---	---	---	---	---	---	---	**8,700**	---	---	**8,300**	---	---	---	**11,000**	**12,000**	---	**12,000**	**10,000**	**9,300**	**10,000**	**6,600**	34	19	ND	ND	ND	ND
MW-21D	52.3 - 57.3	---	---	---	---	---	---	---	ND	---	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-22D	36.4 - 41.4	---	---	---	---	---	---	---	---	---	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
MW-23D	28.1 - 30.1	---	---	---	---	---	---	---	---	---	---	ND	---	---	---	ND	ND	---	ND	---	---	ND	ND	ND	---	---	ND	---	---
EGLE-OGMD Cleanup Criteria		**90**																											
Collection Method		LF		Bailer/PP	LF																								

Notes

1) ft bgs - Feet below ground surface.
2) Collection method - Grab, peristaltic pump (PP), low flow (LF), Bailer.
3) µg/L - Micrograms per liter, equivalent to parts per billion (ppb).
4) (---) - Not sampled.
5) ND - Concentration not detected above reporting limit.
6) Sulfolane concentrations included on the table are for the higher concentration from samples submitted for duplicate analysis.
7) Cleanup criteria for sulfolane established by EGLE-Oil, Gas, and Minerals Division (EGLE-OGMD).
8) Concentrations that are shaded and bold exceed cleanup criteria.
9) MW-7 sampled on 8/11/2016 for the 8/3-4/2016 sample event.

APPENDIX C

LABORATORY ANALYTICAL REPORTS

16-Dec-2019

Nick Summerland
Lambda Energy Resources
1510 Thomas Rd
Kalkaska, MI 49646

Re: **Lambda (Hartland 36)** Work Order: **19120221**

Dear Nick,

ALS Environmental received 12 samples on 04-Dec-2019 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 23.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Gary Byar

Electronically approved by: Gary Byar

Gary Byar
Project Manager

Report of Laboratory Analysis

Certificate No: MI: 0022

ALS Group, USA

Date: 16-Dec-19

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
Work Order: **19120221**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
19120221-01	MW-19-S	Groundwater		12/3/2019 10:20	12/4/2019 10:00	☐
19120221-02	MW-17S	Groundwater		12/3/2019 10:44	12/4/2019 10:00	☐
19120221-03	MW-19d	Groundwater		12/3/2019 11:20	12/4/2019 10:00	☐
19120221-04	MW-17D	Groundwater		12/3/2019 11:45	12/4/2019 10:00	☐
19120221-05	MW-18	Groundwater		12/3/2019 12:05	12/4/2019 10:00	☐
19120221-06	MW-20D	Groundwater		12/3/2019 13:17	12/4/2019 10:00	☐
19120221-07	MW-20D Duplicate	Groundwater		12/3/2019 13:17	12/4/2019 10:00	☐
19120221-08	MW-13s	Groundwater		12/3/2019 13:35	12/4/2019 10:00	☐
19120221-09	MW-20S	Groundwater		12/3/2019 14:04	12/4/2019 10:00	☐
19120221-10	MW-13d	Groundwater		12/3/2019 14:30	12/4/2019 10:00	☐
19120221-11	MW-14s	Groundwater		12/3/2019 15:15	12/4/2019 10:00	☐
19120221-12	MW-15D	Groundwater		12/3/2019 15:25	12/4/2019 10:00	☐

ALS Group, USA

Date: *16-Dec-19*

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
Work Order: 19120221
Sample ID: MW-19-S
Lab ID: 19120221-01
Collection Date: 12/3/2019 10:20 AM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 07:59 PM
Surr: 2-Fluorobiphenyl	*62.7*		*26-79*	*%REC*	1	12/11/2019 07:59 PM
Surr: 4-Terphenyl-d14	*69.2*		*43-106*	*%REC*	1	12/11/2019 07:59 PM
Surr: Nitrobenzene-d5	*54.1*		*29-80*	*%REC*	1	12/11/2019 07:59 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**62**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-17S **Lab ID:** 19120221-02
Collection Date: 12/3/2019 10:44 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 08:20 PM
Surr: 2-Fluorobiphenyl	*60.9*		*26-79*	*%REC*	1	12/11/2019 08:20 PM
Surr: 4-Terphenyl-d14	*70.9*		*43-106*	*%REC*	1	12/11/2019 08:20 PM
Surr: Nitrobenzene-d5	*54.3*		*29-80*	*%REC*	1	12/11/2019 08:20 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**61**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-19d **Lab ID:** 19120221-03
Collection Date: 12/3/2019 11:20 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	**92**		**10**	**µg/L**	1	12/11/2019 08:41 PM
Surr: 2-Fluorobiphenyl	*62.7*		*26-79*	*%REC*	1	12/11/2019 08:41 PM
Surr: 4-Terphenyl-d14	*73.8*		*43-106*	*%REC*	1	12/11/2019 08:41 PM
Surr: Nitrobenzene-d5	*54.4*		*29-80*	*%REC*	1	12/11/2019 08:41 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**92**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-17D **Lab ID:** 19120221-04
Collection Date: 12/3/2019 11:45 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 09:02 PM
Surr: 2-Fluorobiphenyl	*63.9*		*26-79*	*%REC*	1	12/11/2019 09:02 PM
Surr: 4-Terphenyl-d14	*72.3*		*43-106*	*%REC*	1	12/11/2019 09:02 PM
Surr: Nitrobenzene-d5	*56.2*		*29-80*	*%REC*	1	12/11/2019 09:02 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**80**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-18 **Lab ID:** 19120221-05
Collection Date: 12/3/2019 12:05 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 07:38 PM
Surr: 2-Fluorobiphenyl	*57.0*		*26-79*	*%REC*	1	12/11/2019 07:38 PM
Surr: 4-Terphenyl-d14	*59.5*		*43-106*	*%REC*	1	12/11/2019 07:38 PM
Surr: Nitrobenzene-d5	*48.9*		*29-80*	*%REC*	1	12/11/2019 07:38 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**49**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-20D **Lab ID:** 19120221-06
Collection Date: 12/3/2019 01:17 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 09:23 PM
Surr: 2-Fluorobiphenyl	*59.7*		*26-79*	*%REC*	1	12/11/2019 09:23 PM
Surr: 4-Terphenyl-d14	*68.8*		*43-106*	*%REC*	1	12/11/2019 09:23 PM
Surr: Nitrobenzene-d5	*53.4*		*29-80*	*%REC*	1	12/11/2019 09:23 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**84**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-20D Duplicate **Lab ID:** 19120221-07
Collection Date: 12/3/2019 01:17 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 09:44 PM
Surr: 2-Fluorobiphenyl	*60.6*		*26-79*	*%REC*	1	12/11/2019 09:44 PM
Surr: 4-Terphenyl-d14	*72.9*		*43-106*	*%REC*	1	12/11/2019 09:44 PM
Surr: Nitrobenzene-d5	*53.2*		*29-80*	*%REC*	1	12/11/2019 09:44 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**80**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-13s **Lab ID:** 19120221-08
Collection Date: 12/3/2019 01:35 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 10:05 PM
Surr: 2-Fluorobiphenyl	*53.5*		*26-79*	*%REC*	1	12/11/2019 10:05 PM
Surr: 4-Terphenyl-d14	*68.6*		*43-106*	*%REC*	1	12/11/2019 10:05 PM
Surr: Nitrobenzene-d5	*45.3*		*29-80*	*%REC*	1	12/11/2019 10:05 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**120**		**4.0**	**mg/L**	4	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-20S **Lab ID:** 19120221-09
Collection Date: 12/3/2019 02:04 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 10:27 PM
Surr: 2-Fluorobiphenyl	*59.6*		*26-79*	*%REC*	1	12/11/2019 10:27 PM
Surr: 4-Terphenyl-d14	*69.1*		*43-106*	*%REC*	1	12/11/2019 10:27 PM
Surr: Nitrobenzene-d5	*51.9*		*29-80*	*%REC*	1	12/11/2019 10:27 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**64**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-13d **Lab ID:** 19120221-10
Collection Date: 12/3/2019 02:30 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	**37**		**10**	**µg/L**	1	12/11/2019 10:48 PM
Surr: 2-Fluorobiphenyl	*58.9*		*26-79*	*%REC*	1	12/11/2019 10:48 PM
Surr: 4-Terphenyl-d14	*68.0*		*43-106*	*%REC*	1	12/11/2019 10:48 PM
Surr: Nitrobenzene-d5	*51.0*		*29-80*	*%REC*	1	12/11/2019 10:48 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**660**		**10**	**mg/L**	10	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-14s **Lab ID:** 19120221-11
Collection Date: 12/3/2019 03:15 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 11:09 PM
Surr: 2-Fluorobiphenyl	*54.6*		*26-79*	*%REC*	1	12/11/2019 11:09 PM
Surr: 4-Terphenyl-d14	*67.1*		*43-106*	*%REC*	1	12/11/2019 11:09 PM
Surr: Nitrobenzene-d5	*47.7*		*29-80*	*%REC*	1	12/11/2019 11:09 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**93**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Lambda Energy Resources
Project: Lambda (Hartland 36) **Work Order:** 19120221
Sample ID: MW-15D **Lab ID:** 19120221-12
Collection Date: 12/3/2019 03:25 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/10/19 21:23	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/11/2019 11:30 PM
Surr: 2-Fluorobiphenyl	*58.6*		*26-79*	*%REC*	1	12/11/2019 11:30 PM
Surr: 4-Terphenyl-d14	*70.2*		*43-106*	*%REC*	1	12/11/2019 11:30 PM
Surr: Nitrobenzene-d5	*50.0*		*29-80*	*%REC*	1	12/11/2019 11:30 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**21**		**1.0**	**mg/L**	1	12/7/2019 03:51 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: 16-Dec-19

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
Work Order: 19120221

Case Narrative

Batch R277107, Method SO4_4500E_DISC_W, Sample 19120221-05B The MS/MSD recovery for sulfate was below the lower control limit. The corresponding result in the parent sample may be biased low for this analyte. Client Sample ID: MW-18

ALS Group, USA

Date: 16-Dec-19

Client: Lambda Energy Resources

Work Order: 19120221

Project: Lambda (Hartland 36)

QC BATCH REPORT

Batch ID: **146838** Instrument ID **SVMS8** Method: **SW846 8270D**

MBLK Sample ID: **SBLKW1-146838-146838** Units: **µg/L** Analysis Date: **12/11/2019 05:10 PM**

Client ID: Run ID: **SVMS8_191211A** SeqNo: **6121619** Prep Date: **12/10/2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfolane	ND	10								
Surr: 2-Fluorobiphenyl	*36.98*	0	*50*	0	*74*	*26-79*	0			
Surr: 4-Terphenyl-d14	*36.02*	0	*50*	0	*72*	*43-106*	0			
Surr: Nitrobenzene-d5	*31.75*	0	*50*	0	*63.5*	*29-80*	0			

LCS Sample ID: **SLCSW1-146838-146838** Units: **µg/L** Analysis Date: **12/11/2019 05:31 PM**

Client ID: Run ID: **SVMS8_191211A** SeqNo: **6121620** Prep Date: **12/10/2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfolane	46.39	10	100	0	46.4	30-100	0			
Surr: 2-Fluorobiphenyl	*33.78*	0	*50*	0	*67.6*	*26-79*	0			
Surr: 4-Terphenyl-d14	*34.52*	0	*50*	0	*69*	*43-106*	0			
Surr: Nitrobenzene-d5	*30.21*	0	*50*	0	*60.4*	*29-80*	0			

MS Sample ID: **19120221-05A MS** Units: **µg/L** Analysis Date: **12/11/2019 06:55 PM**

Client ID: **MW-18** Run ID: **SVMS8_191211A** SeqNo: **6121624** Prep Date: **12/10/2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfolane	53.69	10	100	0	53.7	30-100	0			
Surr: 2-Fluorobiphenyl	*30.79*	0	*50*	0	*61.6*	*26-79*	0			
Surr: 4-Terphenyl-d14	*32.35*	0	*50*	0	*64.7*	*43-106*	0			
Surr: Nitrobenzene-d5	*26.92*	0	*50*	0	*53.8*	*29-80*	0			

MSD Sample ID: **19120221-05A MSD** Units: **µg/L** Analysis Date: **12/11/2019 07:17 PM**

Client ID: **MW-18** Run ID: **SVMS8_191211A** SeqNo: **6121625** Prep Date: **12/10/2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfolane	48.4	10	100	0	48.4	30-100	53.69	10.4	30	
Surr: 2-Fluorobiphenyl	*29.55*	0	*50*	0	*59.1*	*26-79*	30.79	*4.11*	*40*	
Surr: 4-Terphenyl-d14	*36.28*	0	*50*	0	*72.6*	*43-106*	32.35	*11.5*	*40*	
Surr: Nitrobenzene-d5	*26.22*	0	*50*	0	*52.4*	*29-80*	26.92	*2.63*	*40*	

The following samples were analyzed in this batch:

19120221-01A	19120221-02A	19120221-03A
19120221-04A	19120221-05A	19120221-06A
19120221-07A	19120221-08A	19120221-09A
19120221-10A	19120221-11A	19120221-12A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Lambda Energy Resources
Work Order: 19120221
Project: Lambda (Hartland 36)

QC BATCH REPORT

Batch ID: **R277107** Instrument ID **GALLERY** Method: **A4500-SO4 E-11**

MBLK Sample ID: **MB-R277107-R277107** Units: **mg/L** Analysis Date: **12/7/2019 03:51 PM**
Client ID: Run ID: **GALLERY_191207A** SeqNo: **6112601** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	ND	1.0								

MS Sample ID: **19120221-05BMS** Units: **mg/L** Analysis Date: **12/7/2019 03:51 PM**
Client ID: **MW-18** Run ID: **GALLERY_191207A** SeqNo: **6112610** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	93.02	1.0	50	48.52	89	95-118	0			S

MSD Sample ID: **19120221-05BMSD** Units: **mg/L** Analysis Date: **12/7/2019 03:51 PM**
Client ID: **MW-18** Run ID: **GALLERY_191207A** SeqNo: **6112611** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	92.8	1.0	50	48.52	88.6	95-118	93.02	0.237	10	S

LCS1 Sample ID: **LCS1-R277107** Units: **mg/L** Analysis Date: **12/7/2019 03:51 PM**
Client ID: Run ID: **GALLERY_191207A** SeqNo: **6112602** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	10.27	1.0	10	0	103	90-119	0			

LCS2 Sample ID: **LCS2-R277107** Units: **mg/L** Analysis Date: **12/7/2019 03:51 PM**
Client ID: Run ID: **GALLERY_191207A** SeqNo: **6112619** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	50.93	1.0	50	0	102	95-118	0			

The following samples were analyzed in this batch:

19120221-01B	19120221-02B	19120221-03B
19120221-04B	19120221-05B	19120221-06B
19120221-07B	19120221-08B	19120221-09B
19120221-10B	19120221-11B	19120221-12B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Group, USA

Date: 16-Dec-19

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
WorkOrder: **19120221**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group, USA

Sample Receipt Checklist

Client Name: **LAMBDA-KAL** Date/Time Received: **04-Dec-19 10:00**

Work Order: **19120221** Received by: **DS**

Checklist completed by Diane Shaw (eSignature) 04-Dec-19 (Date) Reviewed by: Gary Byar (eSignature) 05-Dec-19 (Date)

Matrices: Groundwater
Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.0/3.0, 2.6/2.6 c	SR2	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/4/2019 1:17:32 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	_		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070
Houston, TX +1 281 530 5656
Middletown, PA +1 717 944 5541
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Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

Page 1 of 2

COC ID: 47064

ALS Project Manager:

ALS Work Order #: 912022

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Hartland 36 Gas Plant	A	Sulfolane (1) Amber Liter
Work Order		Project Number		B	Sulfate (1) 125 p
Company Name	ECT, Inc.	Bill To Company	Lambda Energy	C	
Send Report To	Jeremy Lewandowski	Invoice Attn	Nick Summerlow	D	
Address	3399 Veterans Dr.	Address	1510 Thomes Rd.	E	
				F	
City/State/Zip	Traverse City, MI 49684	City/State/Zip	Kalkaska, MI 49646	G	
Phone	231-946-9200	Phone	231-258-6411	H	
Fax	231-946-9204	Fax		I	
e-Mail Address	jlewandowski@ectinc.com	e-Mail Address	michigan.invoices@lambdaenergyllc.com		

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-19-S	12/3/19	10:20	GW		2	X	X									
2	MW-17S	12/3/19	10:44	GW		2	X	X									
3	MW-19d	12/3/19	11:20	GW		2	X	X									
4	MW-17D	12/3/19	11:45	GW		2	X	X									
5	MW-16	12/3/19	12:05	GW		2	X	X									
-5	MW-16 MS/MSD	12/3/19	12:05	GW		4	X	X									
-6/-7	MW-20D / Duplicate	12/3/19	13:17	GW		4 (6)	X	X									
8	MW-13S	12/3/19	13:35	GW		2	X	X									
9	MW-20S	12/3/19	1404	GW		2	X	X									
10	MW-13D	12/15/19	14:30	GW		2	X	X									

Sampler(s) Please Print & Sign: Joseph Kniss / Steven Mogford

Shipment Method:

Turnaround Time in Business Days (BD): ☐ 10 BD ☐ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD ☒ Other Standard

Results Due Date:

Relinquished by: Joseph Kniss EC	Date: 12/3/19	Time: 16:10	Received by: UPS		
Relinquished by: UPS	Date: 12/4/19	Time: 1000	Received by (Laboratory): 20201		
Logged by (Laboratory): DFS	Date: 12/4/19	Time: 1300	Checked by (Laboratory): GRB		

Notes:

Cooler ID	Cooler Temp
SR2	3.0°C
pH18	2.6°C

QC Package: (Check One Box Below)
☐ Level II Std QC ☐ TRRP Checklist
☐ Level III Std QC/Raw Date ☐ TRRP Level IV
☐ Level IV SW846/CLP
☐ Other

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

Cincinnati, OH +1 513 733 5336
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Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070
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Spring City, PA +1 610 948 4903
South Charleston, WV +1 304 356 3168
Middletown, PA +1 717 944 5541
Salt Lake City, UT +1 801 266 7700
York, PA +1 717 505 5280

Chain of Custody Form

Page 2 of 2

COC ID: 47065

ALS Project Manager: | ALS Work Order #: 1912021

Customer Information		Project Information		Parameter/Method Request for Analysis		
Purchase Order	Same as page #1	Project Name		A	Sulfolane	(1) Amber Liter
Work Order		Project Number		B	Sulfate	125p
Company Name		Bill To Company		C		
Send Report To		Invoice Attn		D		
Address		Address		E		
				F		
City/State/Zip		City/State/Zip		G		
Phone		Phone		H		
Fax		Fax		I		
e-Mail Address		e-Mail Address		J		

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-14I	12/3/19	15:15	GW	—	2	X	X									
2	MW-15D	12/3/19	1525	GW	—	2	X	X									
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Joseph Kniss Steven Moorhead

Shipment Method:

Turnaround Time in Business Days (BD): ☐ 10 BD ☐ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD ☐ Other _____ GRB

Results Due Date:

Relinquished by: Joseph Kniss ECT	Date: 12/3/19	Time: 16:10	Received by: UPS
Relinquished by: UPS	Date: 12/4/19	Time: 0900	Received by (Laboratory):
Logged by (Laboratory): DES	Date: 12/4/19	Time: 1300	Checked by (Laboratory): GRB

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Notes:

Cooler ID	Cooler Temp
SR2	3.0°C
pH<2	2.6°C

QC Package: (Check One Box Below)
☐ Level II Std QC ☐ TRRP Checklist
☐ Level III Std QC/Raw Date ☐ TRRP Level IV
☐ Level IV SW846/CLP
☐ Other _____

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

16-Dec-2019

Nick Summerland
Lambda Energy Resources
1510 Thomas Rd
Kalkaska, MI 49646

Re: **Lambda (Hartland 36)** Work Order: **19120372**

Dear Nick,

ALS Environmental received 3 samples on 05-Dec-2019 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 10.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Gary Byar

Electronically approved by: Gary Byar

Gary Byar
Project Manager

Report of Laboratory Analysis

ALS Group, USA

Date: 16-Dec-19

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
Work Order: **19120372**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
19120372-01	MW-14d	Water		12/4/2019 10:40	12/5/2019 10:00	☐
19120372-02	MW-7d	Water		12/4/2019 11:35	12/5/2019 10:00	☐
19120372-03	MW-7	Water		12/4/2019 12:25	12/5/2019 10:00	☐

ALS Group, USA

Date: *16-Dec-19*

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
Work Order: 19120372
Sample ID: MW-14d
Lab ID: 19120372-01
Collection Date: 12/4/2019 10:40 AM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/11/19 16:03	Analyst: **EE**
Sulfolane	**71**		**10**	**µg/L**	1	12/11/2019 11:51 PM
Surr: 2-Fluorobiphenyl	*55.7*		*26-79*	*%REC*	1	12/11/2019 11:51 PM
Surr: 4-Terphenyl-d14	*86.5*		*43-106*	*%REC*	1	12/11/2019 11:51 PM
Surr: Nitrobenzene-d5	*48.9*		*29-80*	*%REC*	1	12/11/2019 11:51 PM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**150**		**4.0**	**mg/L**	4	12/10/2019 12:16 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *16-Dec-19*

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
Work Order: 19120372
Sample ID: MW-7d
Lab ID: 19120372-02
Collection Date: 12/4/2019 11:35 AM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/11/19 16:03	Analyst: **EE**
Sulfolane	**1,200**		**50**	**µg/L**	5	12/12/2019 02:32 PM
Surr: 2-Fluorobiphenyl	*68.5*		*26-79*	*%REC*	1	12/12/2019 12:12 AM
Surr: 4-Terphenyl-d14	*88.1*		*43-106*	*%REC*	1	12/12/2019 12:12 AM
Surr: Nitrobenzene-d5	*60.2*		*29-80*	*%REC*	1	12/12/2019 12:12 AM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**48**		**1.0**	**mg/L**	1	12/10/2019 12:16 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *16-Dec-19*

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
Work Order: 19120372
Sample ID: MW-7
Lab ID: 19120372-03
Collection Date: 12/4/2019 12:25 PM
Matrix: WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 12/11/19 16:03	Analyst: **EE**
Sulfolane	ND		10	µg/L	1	12/12/2019 12:33 AM
Surr: 2-Fluorobiphenyl	*52.7*		*26-79*	*%REC*	1	12/12/2019 12:33 AM
Surr: 4-Terphenyl-d14	*89.1*		*43-106*	*%REC*	1	12/12/2019 12:33 AM
Surr: Nitrobenzene-d5	*46.5*		*29-80*	*%REC*	1	12/12/2019 12:33 AM
SULFATE			**A4500-SO4 E-11**			Analyst: **JDR**
Sulfate	**29**		**1.0**	**mg/L**	1	12/10/2019 12:16 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: 16-Dec-19

Client: Lambda Energy Resources

Work Order: 19120372

Project: Lambda (Hartland 36)

QC BATCH REPORT

Batch ID: **146909** Instrument ID **SVMS8** Method: **SW846 8270D**

MBLK Sample ID: **SBLKW1-146909-146909** Units: **µg/L** Analysis Date: **12/11/2019 05:52 PM**

Client ID: Run ID: **SVMS8_191211A** SeqNo: **6121621** Prep Date: **12/11/2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfolane	ND	10								
Surr: 2-Fluorobiphenyl	*30.45*	0	*50*	0	*60.9*	*26-79*	0			
Surr: 4-Terphenyl-d14	*44.71*	0	*50*	0	*89.4*	*43-106*	0			
Surr: Nitrobenzene-d5	*27.78*	0	*50*	0	*55.6*	*29-80*	0			

LCS Sample ID: **SLCSW1-146909-146909** Units: **µg/L** Analysis Date: **12/11/2019 06:13 PM**

Client ID: Run ID: **SVMS8_191211A** SeqNo: **6121622** Prep Date: **12/11/2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfolane	55.55	10	100	0	55.6	30-100	0			
Surr: 2-Fluorobiphenyl	*32.3*	0	*50*	0	*64.6*	*26-79*	0			
Surr: 4-Terphenyl-d14	*44.3*	0	*50*	0	*88.6*	*43-106*	0			
Surr: Nitrobenzene-d5	*30.67*	0	*50*	0	*61.3*	*29-80*	0			

LCSD Sample ID: **SLCSDW1-146909-146909** Units: **µg/L** Analysis Date: **12/11/2019 06:34 PM**

Client ID: Run ID: **SVMS8_191211A** SeqNo: **6121623** Prep Date: **12/11/2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfolane	52.05	10	100	0	52	30-100	55.55	6.51	30	
Surr: 2-Fluorobiphenyl	*33.82*	0	*50*	0	*67.6*	*26-79*	32.3	*4.6*	*40*	
Surr: 4-Terphenyl-d14	*47.39*	0	*50*	0	*94.8*	*43-106*	44.3	*6.74*	*40*	
Surr: Nitrobenzene-d5	*29.57*	0	*50*	0	*59.1*	*29-80*	30.67	*3.65*	*40*	

The following samples were analyzed in this batch: 19120372-01A 19120372-02A 19120372-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Lambda Energy Resources
Work Order: 19120372
Project: Lambda (Hartland 36)

QC BATCH REPORT

Batch ID: **R277341** Instrument ID **GALLERY** Method: **A4500-SO4 E-11**

MBLK Sample ID: **MB-R277341-R277341** Units: **mg/L** Analysis Date: **12/10/2019 12:16 PM**
Client ID: Run ID: **GALLERY_191210B** SeqNo: **6119565** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	ND	1.0								

MS Sample ID: **19120372-02BMS** Units: **mg/L** Analysis Date: **12/10/2019 12:16 PM**
Client ID: **MW-7d** Run ID: **GALLERY_191210B** SeqNo: **6119572** Prep Date: DF: **4**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	99.19	4.0	50	48.15	102	95-118	0			

MSD Sample ID: **19120372-02BMSD** Units: **mg/L** Analysis Date: **12/10/2019 12:16 PM**
Client ID: **MW-7d** Run ID: **GALLERY_191210B** SeqNo: **6119573** Prep Date: DF: **4**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	99.3	4.0	50	48.15	102	95-118	99.19	0.111	10	

LCS1 Sample ID: **LCS1-R277341** Units: **mg/L** Analysis Date: **12/10/2019 12:16 PM**
Client ID: Run ID: **GALLERY_191210B** SeqNo: **6119566** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	10.2	1.0	10	0	102	90-119	0			

LCS2 Sample ID: **LCS2-R277341** Units: **mg/L** Analysis Date: **12/10/2019 12:16 PM**
Client ID: Run ID: **GALLERY_191210B** SeqNo: **6119589** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	53.19	1.0	50	0	106	95-118	0			

The following samples were analyzed in this batch: 19120372-01B 19120372-02B 19120372-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Group, USA

Date: 16-Dec-19

Client: Lambda Energy Resources
Project: Lambda (Hartland 36)
WorkOrder: **19120372**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

ALS Group, USA

Sample Receipt Checklist

Client Name: **LAMBDA-KAL** Date/Time Received: **05-Dec-19 10:00**

Work Order: **19120372** Received by: **KRW**

Checklist completed by Keith Wierenga (eSignature) 05-Dec-19 (Date) Reviewed by: Nathan Williams (eSignature) 06-Dec-19 (Date)

Matrices: Water
Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.8/3.8 C	SR2	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/5/2019 4:31:07 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	_		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070
Houston, TX +1 281 530 5656
Middletown, PA +1 717 944 5541
Spring City, PA +1 610 948 4903
Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

Page 1 of 1

COC ID: 47066

ALS Project Manager: Gary Byar | ALS Work Order #: 19120372

Customer Information		Project Information		Parameter/Method Request for Analysis		
Purchase Order		Project Name	Hartland 36 Gas Plant	A	Sulfolane	(1) Amber liter
Work Order		Project Number		B	Sulfate	(1) 125 p
Company Name	ECT, Inc.	Bill To Company	Lambda Energy	C		
Send Report To	Jeremy Lewandowski	Invoice Attn	Nick Summerlow	D		
Address	3399 Veterans Dr.	Address	1510 Thomas Rd.	E		
				F		
City/State/Zip	Traverse City, MI 49684	City/State/Zip	Kalkaska, MI 49646	G		
Phone	231-946-8200	Phone	231-258-6411	H		
Fax	231-946-8208	Fax		I		
e-Mail Address	jlewandowski@ectinc.com	e-Mail Address	michigan.invoices@lambdaenergyllc.com			

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-14d	12/4/19	10:40	GW	—	2	X	X									
2	MW-7d	12/4/19	11:35	GW	—	2	X	X									
3	MW-7	12/4/19	12:25	GW	—	2	X	X									
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Joseph Kniss

Shipment Method: UPS Ground

Turnaround Time in Business Days (BD): ☐ 10 BD ☒ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD ☐ Other

Results Due Date:

Relinquished by: Joey Kniss ECT	Date: 12/4/19	Time: 13:30	Received by: UPS
Relinquished by: UPS	Date: 12/5/19	Time: 1000	Received by (Laboratory):
Logged by (Laboratory): KW	Date: 12/5/19	Time: 1630	Checked by (Laboratory): GRB

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Notes: ALS Project: MERITENERGY - Misc

Cooler ID	Cooler Temp
SR2	3.8°C
PH19	

QC Package: (Check One Box Below)
☒ Level II Std QC ☐ Level III Std QC/Raw Date ☐ Level IV SW846/CLP ☐ Other ☐ TRRP Checklist ☐ TRRP Level IV

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

APPENDIX D

LOW-FLOW SAMPLING FIELD FORMS

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-7
Well Type: 2" PVC

INSPECTION

Label on well?	YES (circled) NO REMEDIED
Is reference mark visible?	YES (circled) NO REMEDIED
Standing water present?	YES NO (circled) REMEDIED
Indication of surface runoff in well?	YES NO (circled) REMEDIED
Repair Notes:	
Is cement pad in good repair?	YES (circled) NO REMEDIED
Is protective casing locked and in good repair?	YES (circled) NO REMEDIED
Is inner cap in place and properly sealing well?	YES (circled) NO REMEDIED
Is well casing in visibly good repair?	YES (circled) NO REMEDIED

STATIC WATER LEVEL

Date: 12/4/19 Time: 11:44

Top of Casing Elevation:
Depth to Water: 23.45
Elevation of Water:

Measured with: ELECTRONIC TAPE (circled) CHALKED TAPE OTHER
Well depth verified? YES NO (circled)

WELL PURGING

Purge Method: PERISTALTIC (circled) BLADDER OTHER
Date: 12/4/19 Start Time: 11:48

Measured Well Depth: 37.00 Screen Length: 5' Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
12:10	23.54	0.09	250	7.54	497	9.82	7.12	70.7	1.80
12:15	23.54	0.09	250	7.58	497	9.67	7.13	71.7	1.51
12:20	23.54	0.09	250	7.57	497	9.65	7.12	71.9	1.42
Final	23.54								

Total Volume Purged (gal): 2 gal

Stabilization Criteria: +/- 3% | +/- 3% | +/- 10% (if > 0.5 mg/l) | +/- 0.1 Units | +/- 10 mV | +/- 10% (if > 5 NTU)

Stabilization Criteria Reference Doc. USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 12:20
Temperature: 7.57 deg C
Specific Conductance: 497 umhos/cm
Dissolved Oxygen: 9.65 mg/L
pH: 7.12 S.U.
ORP: 71.9 mV
Turbidity: 1.42 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 12:25
Appearance of Sample: Clear, no odor
Sample Duplicate ?: No
Sample Method: Low Flow

NO. BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	glass	no	None	Sulfolane
1	125 ml	plastic	no	None	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-7d
Well Type: 2" PVC

INSPECTION

Label on well?	YES (circled) NO	REMEDIED
Is reference mark visible?	YES (circled) NO	REMEDIED
Standing water present?	YES NO (circled)	REMEDIED
Indication of surface runoff in well?	YES NO (circled)	REMEDIED
Is cement pad in good repair?	YES (circled) NO	REMEDIED
Is protective casing locked and in good repair?	YES (circled) NO	REMEDIED
Is inner cap in place and properly sealing well?	YES (circled) NO	REMEDIED
Is well casing in visibly good repair?	YES (circled) NO	REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/4/19 Time: 10:53

Top of Casing Elevation:
Depth to Water: 24.12
Elevation of Water:

Measured with: ELECTRONIC TAPE (circled) CHALKED TAPE OTHER
Well depth verified? YES NO (circled)

WELL PURGING

Purge Method: PERISTALTIC (circled) BLADDER OTHER
Date: 12/4/19 Start Time: 10:57

Measured Well Depth: 48.50 Screen Length: 5' Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
11:20	24.15	0.03	250	7.42	830	3.92	6.42	68.2	4.94
11:25	24.15	0.03	250	7.50	827	3.86	6.42	65.9	4.77
11:30	24.15	0.03	250	7.46	825	4.02	6.42	64.3	2.25
Final	24.15								

Total Volume Purged (gal): 2 gal

Stabilization Criteria: Temp +/- 3%; Spec Cond +/- 3%; Diss Oxy +/- 10% (if > 0.5 mg/l); pH +/- 0.1 Units; ORP +/- 10 mV; Turbidity +/- 10% (if > 5 NTU)

Stabilization Criteria Reference Doc: USEPA EQASOP-GW-001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 11:30
Temperature: 7.46 deg. C
Specific Conductance: 825 umhos/cm
Dissolved Oxygen: 4.02 mg/L
pH: 6.42 S.U.
ORP: 64.3 mV
Turbidity: 2.25 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.			umhos/cm	
Dissolved Oxygen			mg/L	
pH			S.U.	
Eh			mV	
Turbidity			NTU	

SAMPLE COLLECTION

Time: 11:35
Appearance of Sample: Clear, no odor
Sample Duplicate ?: NO
Sample Method: Low Flow

NO./BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	glass (circled) plastic	yes no (circled)	None (circled), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass plastic (circled)	yes no (circled)	None (circled), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-134
Well Type: 2" PVC

INSPECTION

Label on well? (YES) NO REMEDIED
Is reference mark visible? (YES) NO REMEDIED
Standing water present? YES (NO) REMEDIED
Indication of surface runoff in well? YES (NO) REMEDIED
Repair Notes:

Is cement pad in good repair? (YES) NO REMEDIED
Is protective casing locked and in good repair? (YES) NO REMEDIED
Is inner cap in place and properly sealing well? (YES) NO REMEDIED
Is well casing in visibly good repair? (YES) NO REMEDIED

STATIC WATER LEVEL

Date: 12/3/19 Time: 12:56

Top of Casing Elevation:
Depth to Water: 20.68
Elevation of Water:

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? YES (NO)

WELL PURGING

Purge Method: (PERISTALTIC) BLADDER OTHER
Date: 12/3/19 Start Time: 13:03

Measured Well Depth: 30.30 Screen Length: 5' Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
13:20	20.79	0.11	210	11.7	690	10.19	8.19	68.9	1.62
13:25	20.79	0.11	210	11.6	690	10.04	8.16	64.6	1.65
13:30	20.79	0.11	210	11.9	690	10.09	8.15	63.2	1.49
Final	20.79								

Total Volume Purged (gal): 1.75 gal

Stabilization Criteria: +/- 3% | +/- 3% | +/- 10% (if > 0.5 mg/l) | +/- 0.1 Units | +/- 10 mV | +/- 10 % (if > 5 NTU)

Stabilization Criteria Reference Doc USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 13:30
Temperature: 11.9 deg. C
Specific Conductance: 690 umhos/cm
Dissolved Oxygen: 10.09 mg/L
pH: 8.15 S.U.
ORP: 63.2 mV
Turbidity: 1.49 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 13:35
Appearance of Sample: Clear, no odor, no sheen
Sample Duplicate ?: No
Sample Method: Low Flow

NO./BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	[glass] plastic	yes [no]	[None], HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass [plastic]	yes [no]	[None], HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.:
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-13d
Well Type: 2" PVC

INSPECTION

Label on well?	(YES) NO REMEDIED
Is reference mark visible?	(YES) NO REMEDIED
Standing water present?	YES (NO) REMEDIED
Indication of surface runoff in well?	YES (NO) REMEDIED
Is cement pad in good repair?	(YES) NO REMEDIED
Is protective casing locked and in good repair?	(YES) NO REMEDIED
Is inner cap in place and properly sealing well?	(YES) NO REMEDIED
Is well casing in visibly good repair?	(YES) NO REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/3/19 Time: 13:44

Top of Casing Elevation:
Depth to Water: 19.92
Elevation of Water:

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? YES (NO)

WELL PURGING

Purge Method: (PERISTALTIC) BLADDER OTHER

Date: 12/8/19 Start Time: 13:49

Measured Well Depth: 32.20 Screen Length: 5' Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
14:05	20.12	0.20	220	11.2	1560	1.05	7.22	49.3	10.7
14:10	20.12	0.20	220	11.3	1560	1.04	7.21	42.4	5.07
14:15	20.12	0.20	220	11.4	1560	0.96	7.20	35.6	3.44
14:20	20.12	0.20	220	11.2	1560	0.89	7.21	30.6	1.95
14:25	20.12	0.20	220	11.2	1550	0.82	7.20	25.6	2.23
Final	20.14								

Total Volume Purged (gal): 2.5 gal

Stabilization Criteria: Temp +/- 3% ; Spec Cond +/- 3% ; Diss Oxy +/- 10% (if > 0.5 mg/l) ; pH +/- 0.1 units ; ORP +/- 10 mV ; Turbidity +/- 10 % (if > 5 NTU)

Stabilization Criteria Reference Doc: USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time:	14:25	
Temperature:	11.2	deg C
Specific Conductance:	1550	umhos/cm
Dissolved Oxygen:	0.82	mg/L
pH:	7.20	S.U.
ORP:	25.6	mV
Turbidity:	2.23	NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 14:30
Appearance of Sample: Clear, no odor
Sample Duplicate ?: NO
Sample Method: Low Flow

NO./BOTTLES:	SIZE:	TYPE:	FILTERED:	PRESERVATIVE:	PARAMETER:
1	1000 ml	[glass] plastic	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass [plastic]	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.:
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-14S
Well Type: 2" PVC

INSPECTION

Label on well?	(YES) NO REMEDIED	
Is reference mark visible?	(YES) NO REMEDIED	
Standing water present?	YES (NO) REMEDIED	
Indication of surface runoff in well?	YES (NO) REMEDIED	
Repair Notes		

Is cement pad in good repair?	(YES) NO REMEDIED
Is protective casing locked and in good repair?	(YES) NO REMEDIED
Is inner cap in place and properly sealing well?	(YES) NO REMEDIED
Is well casing in visibly good repair?	(YES) NO REMEDIED

STATIC WATER LEVEL

Date: 12/3/19 Time: 14:40

Top of Casing Elevation:
Depth to Water: 19.42
Elevation of Water:

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? (YES) NO

WELL PURGING

Purge Method: (PERISTALTIC) BLADDER OTHER
Date: 12/8/19 Start Time: 14:47

Measured Well Depth: 26.52 Screen Length: 5' Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
15:00	19.45	0.03	220	11.9	840	8.64	7.72	33.0	7.17
15:05	19.85	0.03	220	11.9	930	8.73	7.75	33.6	6.48
15:10	19.85	0.03	220	11.6	840	8.66	7.75	33.8	6.27
Final	19.85								

Total Volume Purged (gal): 2 gal

Stabilization Criteria: +/-3% | +/-3% | +/-10% (if > 0.5 mg/l) | +/- 0.1 Units | +/-10 mV | +/- 10 % (if > 5 NTU)

Stabilization Criteria Reference Doc. USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 15:10
Temperature: 11.6 deg. C
Specific Conductance: 840 umhos/cm
Dissolved Oxygen: 8.66 mg/L
pH: 7.75 S.U
ORP: 33.8 mV
Turbidity: 6.27 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.			umhos/cm	
Dissolved Oxygen:			mg/L	
pH.			S.U	
Eh:			mV	
Turbidity			NTU	

SAMPLE COLLECTION

Time: 15:15
Appearance of Sample: Clear, no odor
Sample Duplicate ?: No
Sample Method: Low Flow

NO./BOTTLES	SIZE:	TYPE.	FILTERED:	PRESERVATIVE	PARAMETER
1	1000 ml	[glass] plastic	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass [plastic]	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-14d
Well Type: 2" PVC

INSPECTION

Label on well?	(YES) NO REMEDIED
Is reference mark visible?	(YES) NO REMEDIED
Standing water present?	YES (NO) REMEDIED
Indication of surface runoff in well?	YES (NO) REMEDIED
Is cement pad in good repair?	(YES) NO REMEDIED
Is protective casing locked and in good repair?	(YES) NO REMEDIED
Is inner cap in place and properly sealing well?	(YES) NO REMEDIED
Is well casing in visibly good repair?	(YES) NO REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/4/19 Time: 9:45

Top of Casing Elevation:
Depth to Water: 19.55
Elevation of Water:

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? YES (NO)

WELL PURGING

Purge Method: (PERISTALTIC) BLADDER OTHER

Date: 12/4/19 Start Time: 9:50

Measured Well Depth: 45.11 Screen Length: 5' Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
16:10	19.55	0.02	180	7.82	800	20.66	6.37	95.1	17.9
10:15	19.55	0.02	180	7.91	794	19.20	6.38	91.4	14.4
10:20	19.55	0.02	180	7.91	795	15.75	6.40	88.5	5.04
10:25	19.55	0.02	180	7.82	794	12.65	6.41	85.7	4.75
10:30	19.55	0.02	180	7.78	792	11.38	6.42	83.3	4.67
10:35	19.55	0.02	180	7.71	790	10.21	6.42	81.6	4.27
Final	19.55								

Total Volume Purged (gal): 2.5 gal

Stabilization Criteria: Temp +/- 3%; Spec Cond +/- 3%; Diss Oxy +/- 10% (if > 0.5 mg/l); pH +/- 0.1 Units; ORP +/- 10 mV; Turbidity +/- 10 % (if > 5 NTU)

Stabilization Criteria Reference Doc USEPA EQASOP GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 10:35
Temperature: 7.71 deg C
Specific Conductance: 790 umhos/cm
Dissolved Oxygen: 10.21 mg/L
pH: 6.42 S.U.
ORP: 81.6 mV
Turbidity: 4.27 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.			umhos/cm	
Dissolved Oxygen			mg/L	
pH			S.U.	
Eh			mV	
Turbidity			NTU	

SAMPLE COLLECTION

Time: 10:40
Appearance of Sample: Clear, no odor
Sample Duplicate ?: NO
Sample Method: Low Flow

NO./BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	(glass) plastic	yes (no)	(None) HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass (plastic)	yes (no)	(None) HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-15D
Well Type: 2" PVC

INSPECTION

Label on well?	(YES) NO REMEDIED	Is cement pad in good repair?	YES NO REMEDIED NA
Is reference mark visible?	(YES) NO REMEDIED	Is protective casing locked and in good repair?	(YES) NO REMEDIED
Standing water present?	YES (NO) REMEDIED	Is inner cap in place and properly sealing well?	(YES) NO REMEDIED
Indication of surface runoff in well?	YES (NO) REMEDIED	Is well casing in visibly good repair?	(YES) NO REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/3/19 Time:

Top of Casing Elevation:
Depth to Water: 18.77'
Elevation of Water:

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? YES (NO)

WELL PURGING

Purge Method: (PERISTALTIC) BLADDER OTHER
Date: 12/3/19 Start Time: 1444

Measured Well Depth: 46.00 Screen Length: Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
Initial	18.77	—							
1500	18.77	0.0	200	7.77	492	6.14	6.82	83.0	1.86
1505	18.77	0.0	200	~~692.85~~ 7.58	491	6.32	6.81	85.4	1.18
1510	18.78	0.01	200	7.64	489	6.31	6.81	86.9	0.94
1515	18.78	0.01	200	7.67	490	6.29	~~6.876~~ 6.84	87.3	1.00
Stabilization Criteria:				+/- 3% ✓	+/- 3% ✓	+/- 10% (if > 0.5 mg/l) ✓	+/- 0.1 Units ✓	+/- 10 mV ✓	+/- 10 % (if > 5 NTU) ✓

Total Volume Purged (gal):

Stabilization Criteria Reference Doc: USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 1515
Temperature: 7.67 deg C
Specific Conductance: 490 umhos/cm
Dissolved Oxygen: 6.29 mg/L
pH: 6.84 S.U.
ORP: 87.3 mV
Turbidity: 1.00 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 1525
Appearance of Sample: clear odorless
Sample Duplicate ?: No
Sample Method: Peristaltic Low Flow

NO./BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	[glass] plastic	yes [no]	[None], HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass [plastic]	yes [no]	[None], HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.
Name (SIGNATURE):

CLIENT:	Lambda Energy	Monitoring Location:	Hartland #36
LOCATION:	13390 Lone Tree Road Hartland Township, Michigan	Sample ID:	MW-17S
PROJECT:	130685.2000	Well Type:	2" PVC

INSPECTION

Label on well?	(YES) NO REMEDIED	Is cement pad in good repair?	YES NO REMEDIED NA
Is reference mark visible?	(YES) NO REMEDIED	Is protective casing locked and in good repair?	(YES) NO REMEDIED
Standing water present?	YES (NO) REMEDIED	Is inner cap in place and properly sealing well?	(YES) NO REMEDIED
Indication of surface runoff in well?	YES (NO) REMEDIED	Is well casing in visibly good repair?	(YES) NO REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/3/19 Time: ____

Top of Casing Elevation:

Depth to Water: 18.53'

Elevation of Water: 37.09'

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER

Well depth verified? (YES) NO

WELL PURGING

Purge Method: (PERISTALTIC) BLADDER OTHER____ Date: ____ Start Time: 0956

Measured Well Depth: ____ Screen Length: ____ Depth to Screen Midpoint: ____

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
Initial	18.53	—	0						
1010	18.58	0.05	250	7.30	615	11.45	6.46	103.5	8.68
1015	18.58	0.05	225	7.42	612	10.12	6.54	98.1	4.93
1020	18.58	0.05	225	7.47	612	9.24	6.54	99.5	4.44
1025	18.58	0.05	225	7.29	612	8.05	6.52	98.8	4.33
1030	18.58	0.05	225	7.70	610	~~6.85~~ 7.98	6.51	98.7	~~4.25~~ 4.31

Groundwater clear no odor

Stabilization Criteria:	+/- 3% ✓	+/- 3% ✓	+/- 10% ✓ (if > 0.5 mg/l)	+/- 0.1 Units ✓	+/- 10 mV ✓	+/- 10 % ✓ (if > 5 NTU)

Total Volume Purged (gal): 1 1/4

Stabilization Criteria Reference Doc. USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time:	1030	
Temperature:	7.70	deg. C
Specific Conductance:	610	umhos/cm
Dissolved Oxygen:	7.98	mg/L
pH:	6.51	SU
ORP:	98.7	mV
Turbidity:	4.31	NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			SU	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 1044

Appearance of Sample: Clear odorless

Sample Duplicate ?: NO

Sample Method: Peristaltic Low Flow

NO./BOTTLES:	SIZE:	TYPE:	FILTERED:	PRESERVATIVE:	PARAMETER:
1	1000 ml	[glass] plastic	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass [plastic]	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]

Chain of Custody No.: ____

Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW- 17 D
Well Type: 2" PVC

INSPECTION

Label on well? (YES) NO REMEDIED
Is reference mark visible? (YES) NO REMEDIED
Standing water present? YES (NO) REMEDIED
Indication of surface runoff in well? YES (NO) REMEDIED
Repair Notes:

Is cement pad in good repair? YES NO REMEDIED N/A
Is protective casing locked and in good repair? (YES) NO REMEDIED
Is inner cap in place and properly sealing well? (YES) NO REMEDIED
Is well casing in visibly good repair? (YES) NO REMEDIED

STATIC WATER LEVEL

Date: 12/3/19 Time: ______

Top of Casing Elevation: 19.20'
Depth to Water: ~~19.02'~~ ~~19.02~~
Elevation of Water: ~~19.02~~ (84) (84)

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? YES (NO)

WELL PURGING

Purge Method: (PERISTALTIC) BLADDER OTHER ______ Date: 12/3/19 Start Time: 1101

Measured Well Depth: 40.78 Screen Length: ______ Depth to Screen Midpoint: ______

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
initial	~~19.02~~ 19.20								
1115	19.18	0.02	250	7.17	619	9.30	6.87	86.2	7.30
1120	19.18	0.02	250	7.25	622	9.45	6.87	86.5	6.43
1125	19.18	0.02	250	7.37	622	9.09	6.86	86.8	4.59
1130	19.18	0.02	250	7.28	624	9.16	6.84	87.7	4.11
1135	19.17	0.03	250	7.15	623	8.87	6.85	87.6	2.72

Groundwater clear no odor

Stabilization Criteria:	+/- 3% ✓	+/- 3% ✓	+/- 10% (if > 0.5 mg/l) ✓	+/- 0.1 Units ✓	+/- 10 mV ✓	+/- 10 % (if > 5 NTU) ✓

Total Volume Purged (gal): 2

Stabilization Criteria Reference Doc: USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 1135
Temperature: 7.15 deg. C
Specific Conductance: 623 umhos/cm
Dissolved Oxygen: 8.87 mg/L
pH: 6.85 S.U.
ORP: 87.6 mV
Turbidity: 2.72 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 1145
Appearance of Sample: Clear Odorless
Sample Duplicate ?: No
Sample Method: Peristaltic Low Flow

NO./BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	[glass] plastic	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass [plastic]	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No. ______
Name (SIGNATURE): ______

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-18
Well Type: 2" PVC

INSPECTION

Label on well?	YES (circled)	NO REMEDIED
Is reference mark visible?	YES (circled)	NO REMEDIED
Standing water present?	YES	NO (circled) REMEDIED
Indication of surface runoff in well?	YES	NO (circled) REMEDIED
Is cement pad in good repair?	YES (circled)	NO REMEDIED
Is protective casing locked and in good repair?	YES (circled)	NO REMEDIED
Is inner cap in place and properly sealing well?	YES (circled)	NO REMEDIED
Is well casing in visibly good repair?	YES (circled)	NO REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/3/19 Time: 11:30

Top of Casing Elevation:
Depth to Water: 20.78
Elevation of Water:

Measured with: ELECTRONIC TAPE (circled) CHALKED TAPE OTHER
Well depth verified? YES NO (circled)

WELL PURGING

Purge Method: PERISTALTIC (circled) BLADDER OTHER

Date: 12/3/19 Start Time: 11:54

Measured Well Depth: 27.50 Screen Length: Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
11:56	20.82	0.04	200	10.9	930	0.92	7.25	69.8	2.96
11:58	20.82	0.04	200	11.0	970	0.97	7.24	66.5	2.54
12:00	20.82	0.04	200	10.9	900	0.93	7.24	59.4	2.01
Final	20.82								
Stabilization Criteria:				+/- 3%	+/- 3%	+/- 10% (if > 0.5 mg/l)	+/- 0.1 Units	+/- 10 mV	+/- 10 % (if > 5 NTU)

Total Volume Purged (gal): 1.5 gal

Stabilization Criteria Reference Doc. USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time:	12:00	
Temperature:	10.9	deg. C
Specific Conductance:	900	umhos/cm
Dissolved Oxygen:	0.93	mg/L
pH:	7.24	S.U.
ORP:	59.4	mV
Turbidity:	2.01	NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 12:05
Appearance of Sample: Clear, no odor
Sample Duplicate ?: MS/MSD
Sample Method: Low Flow

NO./BOTTLES:	SIZE:	TYPE:	FILTERED:	PRESERVATIVE	PARAMETER
1	1000 ml	glass (boxed) plastic	yes no (boxed)	None (boxed), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass plastic (boxed)	yes no (boxed)	None (boxed), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
2	1000 ml	glass (circled) plastic	yes no (circled)	None (circled), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	MS/MSD
2	125 ml	glass plastic (circled)	yes no (circled)	None (circled), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]

Chain of Custody No.
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-19S
Well Type: 2" PVC

INSPECTION

Label on well?	YES (circled) NO REMEDIED		Is cement pad in good repair?	YES (circled) NO REMEDIED
Is reference mark visible?	YES (circled) NO REMEDIED		Is protective casing locked and in good repair?	YES (circled) NO REMEDIED
Standing water present?	YES NO (circled) REMEDIED		Is inner cap in place and properly sealing well?	YES (circled) NO REMEDIED
Indication of surface runoff in well?	YES NO (circled) REMEDIED		Is well casing in visibly good repair?	YES (circled) NO REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/3/19 Time: 9:40

Top of Casing Elevation:
Depth to Water: 22.06
Elevation of Water:

Measured with: ELECTRONIC TAPE (circled) CHALKED TAPE OTHER
Well depth verified? YES NO (circled)

WELL PURGING

Purge Method: PERISTALTIC (circled) BLADDER OTHER
Date: 12/3/19 Start Time: 9:47

Measured Well Depth: 30.27 Screen Length: 5' Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
10:05	22.25	0.19	200	10.3	405	11.35	8.04	100.3	4.84
10:10	22.25	0.19	200	10.3	405	11.40	8.05	95.9	2.57
10:15	22.25	0.19	200	10.4	404	11.40	8.05	90.1	3.11
Final	22.26								

Total Volume Purged (gal): 1.75 gal

Stabilization Criteria: +/- 3% (circled); +/- 3% (circled); +/- 10% (circled) (if > 0.5 mg/l); +/- 0.1 Units (circled); +/- 10 mV (circled); +/- 10% (circled) (if > 5 NTU)

Stabilization Criteria Reference Doc: USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time	10:15	
Temperature	10.4	deg. C
Specific Conductance	404	umhos/cm
Dissolved Oxygen	11.40	mg/L
pH	8.05	S.U.
ORP	90.1	mV
Turbidity	3.11	NTU

CALIBRATION CHECK (crossed out)

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond			umhos/cm	
Dissolved Oxygen			mg/L	
pH			S.U.	
Eh			mV	
Turbidity			NTU	

SAMPLE COLLECTION

Time: 10:20
Appearance of Sample: Clear, no odor
Sample Duplicate ?: NO
Sample Method: Low Flow

NO./BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	glass (boxed) plastic	yes no (boxed)	None (boxed), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass plastic (boxed)	yes no (boxed)	None (boxed), HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.:
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-19d
Well Type: 2" PVC

INSPECTION

Label on well?	YES (circled) NO REMEDIED	Is cement pad in good repair?	YES (circled) NO REMEDIED
Is reference mark visible?	YES (circled) NO REMEDIED	Is protective casing locked and in good repair?	YES (circled) NO REMEDIED
Standing water present?	YES NO (circled) REMEDIED	Is inner cap in place and properly sealing well?	YES (circled) NO REMEDIED
Indication of surface runoff in well?	YES NO (circled) REMEDIED	Is well casing in visibly good repair?	YES (circled) NO REMEDIED

Repair Notes:

STATIC WATER LEVEL

Date: 12/3/19 Time: 10:40

Top of Casing Elevation:
Depth to Water: 21.87
Elevation of Water:

Measured with: ELECTRONIC TAPE (circled) CHALKED TAPE OTHER
Well depth verified? YES (circled)

WELL PURGING

Purge Method: PERISTALTIC (circled) BLADDER OTHER

Date: 12/3/19 Start Time: 10:45

Measured Well Depth: 50.00 Screen Length: Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
11:00	21.93	0.06	200	14.3	860	1.17	7.14	102.8	7.17
11:05	21.93	0.06	200	9.8	850	0.56	7.18	92.6	6.51
11:10	21.93	0.06	200	9.7	850	0.54	7.18	84.9	6.02
11:15	21.93	0.06	200	9.9	840	0.57	7.18	85.8	7.27
Final	21.93								

Total Volume Purged (gal): 2 gal

Stabilization Criteria: +/- 3% (Temp, circled); +/- 3% (Spec Cond, circled); +/- 10% (if > 0.5 mg/l) (circled); +/- 0.1 Units (circled); +/- 10 mV (circled); +/- 10 % (if > 5 NTU) (circled)

Stabilization Criteria Reference Doc: USEPA EQASOP GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time:	11:15	
Temperature:	9.9	deg. C
Specific Conductance:	840	umhos/cm
Dissolved Oxygen:	0.57	mg/L
pH:	7.18	S.U.
ORP:	85.8	mV
Turbidity:	7.27	NTU

CALIBRATION CHECK (crossed out)

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 11:20
Appearance of Sample: Clear, no odor
Sample Duplicate ?: No
Sample Method: Low Flow

NO./BOTTLES:	SIZE:	TYPE:	FILTERED:	PRESERVATIVE:	PARAMETER:
1	1000 ml	glass (boxed)	no (boxed)	None (boxed)	Sulfolane
1	125 ml	plastic (boxed)	no (boxed)	None (boxed)	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-20S
Well Type: 2" PVC

INSPECTION

Label on well? (YES) NO REMEDIED
Is reference mark visible? (YES) NO REMEDIED
Standing water present? YES (NO) REMEDIED
Indication of surface runoff in well? YES (NO) REMEDIED
Repair Notes:

Is cement pad in good repair? YES NO REMEDIED NA
Is protective casing locked and in good repair? (YES) NO REMEDIED
Is inner cap in place and properly sealing well? (YES) NO REMEDIED
Is well casing in visibly good repair? (YES) NO REMEDIED

STATIC WATER LEVEL

Date: 12/3/19 Time:

Top of Casing Elevation:
Depth to Water: 21.65'
Elevation of Water:

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? YES NO

WELL PURGING

Purge Method: PERISTALTIC BLADDER OTHER
Date: 12/3/19 Start Time: 1330

Measured Well Depth: 25.10 Screen Length: Depth to Screen Midpoint:

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
initial	21.65								
1345	21.73	0.08	200	7.97	583	7.08	6.95	83.0	2.47
1350	21.73	0.08	200	7.92	582	7.12	6.92	85.8	1.27
1355	21.73	0.08	200	8.08	582	7.23	6.93	85.7	1.21
				✓	✓	✓	✓	✓	✓
			Stabilization Criteria:	+/- 3%	+/- 3%	+/- 10% (if > 0.5 mg/l)	+/- 0.1 Units	+/- 10 mV	+/- 10 % (if > 5 NTU)

Total Volume Purged (gal): 1

Stabilization Criteria Reference Doc: USEPA EQASOP-GW 001 Rev #3 January 19, 2010

FIELD ANALYSIS

Time: 1355
Temperature: 8.08 deg. C
Specific Conductance: 582 umhos/cm
Dissolved Oxygen: 7.23 mg/L
pH: 6.93 S.U.
ORP: 85.7 mV
Turbidity: 1.21 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 1404
Appearance of Sample: Clear odorless
Sample Duplicate ?: NO
Sample Method: Peristaltic Low Flow

NO./BOTTLES:	SIZE:	TYPE:	FILTERED:	PRESERVATIVE:	PARAMETER:
1	1000 ml	[glass] plastic	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass [plastic]	yes [no]	[None] HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No.
Name (SIGNATURE):

CLIENT: Lambda Energy
LOCATION: 13390 Lone Tree Road
Hartland Township, Michigan
PROJECT: 130685.2000

Monitoring Location: Hartland #36
Sample ID: MW-20D
Well Type: 2" PVC

INSPECTION

Label on well? YES NO REMEDIED
Is reference mark visible? YES NO REMEDIED
Standing water present? YES NO REMEDIED
Indication of surface runoff in well? YES NO REMEDIED
Repair Notes:

Is cement pad in good repair? YES NO REMEDIED
Is protective casing locked and in good repair? YES NO REMEDIED
Is inner cap in place and properly sealing well? YES NO REMEDIED
Is well casing in visibly good repair? YES NO REMEDIED

STATIC WATER LEVEL

Date: 12/3/19 Time: ______

Top of Casing Elevation:
Depth to Water: ~~21.48~~ 21.48'
Elevation of Water: ______

Measured with: (ELECTRONIC TAPE) CHALKED TAPE OTHER
Well depth verified? YES NO

WELL PURGING

Purge Method: PERISTALTIC BLADDER OTHER______ Date: 12/3/19 Start Time: 1122

Measured Well Depth: ______ Screen Length: ______ Depth to Screen Midpoint: ______

Time	Water Level (feet)	Drawdown (feet)	Pumping Rate (ml/min)	Temp (°C)	Spec Cond. (umho/cm)	Diss Oxy (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
initial	21.48			~~7.6~~					
1240	22.62	1.14	200	7.63	547	6.84	7.15	84.5	11.7
1245	22.55	1.07	150	7.33	558	6.40	7.09	85.5	8.43
1250	22.46	0.98	150	7.20	562	6.29	7.05	86.7	6.44
1255	22.43	0.95	150	7.21	562	6.25	7.02	87.0	5.89
1300	22.43	0.95	150	7.21	564	6.24	7.01	86.3	5.87
1305	22.44	0.96	150	7.28	564	6.15	7.01	85.4	5.49
			Stabilization Criteria:	✓ +/- 3%	✓ +/- 3%	✓ +/- 10% (if > 0.5 mg/l)	✓ +/- 0.1 Units	✓ +/- 10 mV	✓ +/- 10 % (if > 5 NTU)

Total Volume Purged (gal): 1 3/4

Stabilization Criteria Reference Doc: USEPA EQASOP-GW 001 Rev #3, January 19, 2010

FIELD ANALYSIS

Time: 1305
Temperature: 7.28 deg. C
Specific Conductance: 5.64 umhos/cm
Dissolved Oxygen: 6.15 mg/L
pH: 7.01 S.U.
ORP: 85.4 mV
Turbidity: 5.49 NTU

CALIBRATION CHECK

	Standard (conc.)	Reading		Mark if Recalibrated
Specific Cond.:			umhos/cm	
Dissolved Oxygen:			mg/L	
pH:			S.U.	
Eh:			mV	
Turbidity:			NTU	

SAMPLE COLLECTION

Time: 1317
Appearance of Sample: Clear odorless
Sample Duplicate ?: yes
Sample Method: Peristaltic Low Flow

NO./BOTTLES	SIZE	TYPE	FILTERED	PRESERVATIVE	PARAMETER
1	1000 ml	(glass) plastic	yes (no)	(None) HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass (plastic)	yes (no)	(None) HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
1	1000 ml	(glass) plastic	yes (no)	(None) HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfolane
1	125 ml	glass (plastic)	yes (no)	(None) HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	Sulfate
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	
	ml	glass plastic	yes no	None, HCl, HNO_3, NaOH, H_2SO_4, ZnAc, TSP, BAK	

SAMPLING PERSONNEL

Name (SIGNATURE): [signature]
Chain of Custody No. ______
Name (SIGNATURE):