



# ANALYTICAL SUMMARY REPORT

December 08, 2021

Hilcorp Energy Corporation  
1111 Travis St  
Houston, TX 77002-5924

Work Order: C21110744

Project Name: Hiawatha B.2 SWD

Energy Laboratories, Inc. Casper WY received the following 2 samples for Hilcorp Energy Corporation on 11/19/2021 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C21110744-001	Hiawatha B.2	11/18/21 9:15	11/19/21	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Conductivity Hydrocarbon Identification, Simulated Distillation Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite pH Metals Preparation by EPA 200.2 Digestion, Total P Phosphorus, Total Solids, Total Dissolved Solids, Total Suspended 8260-Volatile Organic Compounds-BTEX
C21110744-002	Trip Blank- 80352	11/18/21 9:15	11/19/21	Trip Blank	

The analyses presented in this report were performed by Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the report package. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

If you have any questions regarding these test results, please contact your Project Manager .

Report Approved By:



**CLIENT:** Hilcorp Energy Corporation  
**Project:** Hiawatha B.2 SWD  
**Work Order:** C21110744

**Report Date:** 12/08/21

## CASE NARRATIVE

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Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

PHOSPHOROUS, TOTAL AS P AND NITROGEN, NITRATE+NITRITE AS N:

The sample bottle received for analysis was preserved with nitric acid, which invalidates the results for these analytes by methods E365.1 and E353.2. A subsample was obtained from the unpreserved bottle and preserved with sulfuric acid, then analyzed. The results from the subsample are flagged as out of hold, since the subsample was done more than 48 hours past the collection time.



### LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation  
**Project:** Hiawatha B.2 SWD  
**Lab ID:** C21110744-001  
**Client Sample ID:** Hiawatha B.2

**Report Date:** 12/08/21  
**Collection Date:** 11/18/21 09:15  
**Date Received:** 11/19/21  
**Matrix:** Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
<b>MAJOR IONS</b>							
Alkalinity, Total as CaCO3	1540	mg/L		5		A2320 B	11/22/21 13:43 / kjp
Carbonate as CO3	ND	mg/L		5		A2320 B	11/22/21 13:43 / kjp
Bicarbonate as HCO3	1880	mg/L		5		A2320 B	11/22/21 13:43 / kjp
Bromide	0.1	mg/L		0.1		E300.0	11/24/21 17:08 / dmb
Chloride	188	mg/L		1		E300.0	11/24/21 17:08 / dmb
Fluoride	7.5	mg/L		0.1		E300.0	11/24/21 17:08 / dmb
Sulfate	4	mg/L		1		E300.0	11/24/21 17:08 / dmb
Calcium	3	mg/L		1		E200.8	12/05/21 16:31 / jcg
Magnesium	ND	mg/L		1		E200.7	12/02/21 20:26 / jcg
Potassium	3	mg/L		1		E200.7	12/01/21 23:50 / jcg
Sodium	781	mg/L	D	2		E200.7	12/01/21 23:50 / jcg
<b>PHYSICAL PROPERTIES</b>							
Conductivity @ 25 C	3190	umhos/cm		5		A2510 B	11/19/21 18:09 / kjp
pH	8.1	s.u.	H	0.1		A4500-H B	11/19/21 18:09 / kjp
pH Measurement Temp	17.2	°C				A4500-H B	11/19/21 18:09 / kjp
Solids, Total Dissolved TDS @ 180 C	2090	mg/L		20		A2540 C	11/22/21 10:48 / mnm
Solids, Total Suspended TSS @ 105 C	41	mg/L	D	2		A2540 D	11/23/21 07:38 / mnm
<b>NUTRIENTS</b>							
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L	H	0.05		E353.2	11/30/21 13:18 / nts
Phosphorus, Total as P	0.229	mg/L	H	0.005		E365.1	11/30/21 10:58 / dmb
-See Case Narrative							
<b>METALS, TOTAL</b>							
Barium	0.13	mg/L		0.05		E200.7	12/02/21 20:26 / jcg
Boron	2.5	mg/L	D	0.1		E200.7	12/01/21 23:50 / jcg
Iron	1.2	mg/L	D	0.6		E200.7	12/02/21 20:26 / jcg
Manganese	0.027	mg/L	D	0.007		E200.8	12/05/21 16:31 / jcg
Selenium	ND	mg/L	D	0.002		E200.8	12/05/21 16:31 / jcg
Strontium	0.17	mg/L	D	0.03		E200.7	12/02/21 20:26 / jcg
<b>VOLATILE ORGANIC COMPOUNDS</b>							
Benzene	4230	ug/L		250		SW8260B	12/02/21 19:34 / eli-b
Ethylbenzene	15200	ug/L	H	2500		SW8260B	12/03/21 22:01 / eli-b
m+p-Xylenes	113000	ug/L	H	2500		SW8260B	12/03/21 22:01 / eli-b
Naphthalene	2110	ug/L		250		SW8260B	12/02/21 19:34 / eli-b
o-Xylene	40100	ug/L	H	2500		SW8260B	12/03/21 22:01 / eli-b
Toluene	21300	ug/L	H	2500		SW8260B	12/03/21 22:01 / eli-b
Xylenes, Total	153000	ug/L	H	2500		SW8260B	12/03/21 22:01 / eli-b

- H = An additional dilution was required to quantitate Ethylbenzene, Toluene, and Xylenes in the calibrated range of the instrument. The dilution was done after the hold time had expired. The analysis from the dilution and the original analysis in hold time were consistent with each other indicating no degradation effects from the hold time variance.

<b>Report</b>	RL - Analyte Reporting Limit	MCL - Maximum Contaminant Level
<b>Definitions:</b>	QCL - Quality Control Limit	ND - Not detected at the Reporting Limit (RL)
	D - Reporting Limit (RL) increased due to sample matrix	H - Analysis performed past the method holding time



### LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation  
**Project:** Hiawatha B.2 SWD  
**Lab ID:** C21110744-001  
**Client Sample ID:** Hiawatha B.2

**Report Date:** 12/08/21  
**Collection Date:** 11/18/21 09:15  
**Date Received:** 11/19/21  
**Matrix:** Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
<b>HYDROCARBON ID, SIMULATED DISTILLATION</b>							
C1-C5	0.15	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C5-C6	0.27	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C6-C7	1.6	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C7-C8	5.9	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C8-C9	17	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C9-C10	8.6	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C10-C11	7.6	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C11-C12	5.7	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C12-C13	6.2	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C13-C14	6.5	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C14-C15	6.6	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C15-C16	5.2	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C16-C17	4.4	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C17-C18	4.4	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C18-C19	2.8	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C19-C20	2.2	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C20-C21	1.7	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C21-C22	1.4	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C22-C23	1.1	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C23-C24	1.0	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C24-C25	0.86	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C25-C26	0.83	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C26-C27	0.74	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C27-C28	0.74	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C28-C29	0.66	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C29-C30	0.68	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C30-C32	1.1	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C32-C34	0.89	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C34-C36	0.71	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C36-C38	0.64	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C38-C40	0.63	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b
C40+	0.99	Vol %		0.01		SimDist	12/01/21 10:16 / eli-b

- Calculated Average Molecular Weight: 202  
- The hydrocarbon profile resembles crude oil.

**Report** RL - Analyte Reporting Limit  
**Definitions:** QCL - Quality Control Limit

MCL - Maximum Contaminant Level  
ND - Not detected at the Reporting Limit (RL)



# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: A2320 B</b> Analytical Run: MANTECH_211122A										
<b>Lab ID: ICV</b>		Initial Calibration Verification Standard								11/22/21 10:50
pH		6.83	s.u.	0.010	100	98	102			
<b>Method: A2320 B</b> Batch: R277098										
<b>Lab ID: MBLK</b>		Method Blank								11/22/21 11:01
Alkalinity, Total as CaCO3		ND	mg/L	2						
<b>Lab ID: LCS</b> Run: MANTECH_211122A 11/22/21 11:09										
Alkalinity, Total as CaCO3		253	mg/L	5.0	101	90	110			
<b>Lab ID: C21110734-003ADUP</b> Run: MANTECH_211122A 11/22/21 12:53										
Alkalinity, Total as CaCO3		537	mg/L	5.0				0.4	10	

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



# QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Hilcorp Energy Corporation

Work Order: C21110744

Report Date: 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
<b>Method: A2510 B</b>								Analytical Run: PHSC_101-C_211119A			
<b>Lab ID: SC 100</b>		Initial Calibration Verification Standard								11/19/21 07:56	
Conductivity @ 25 C		105	umhos/cm	5.0	105	90	110				
<b>Lab ID: SC 5000</b>		Initial Calibration Verification Standard								11/19/21 07:59	
Conductivity @ 25 C		5000	umhos/cm	5.0	100	90	110				
<b>Lab ID: SC 20000</b>		Initial Calibration Verification Standard								11/19/21 08:02	
Conductivity @ 25 C		19600	umhos/cm	5.0	98	90	110				
<b>Method: A2510 B</b>								Batch: R277005			
<b>Lab ID: SC 50000</b>		Initial Calibration Verification Standard								11/19/21 08:05	
Conductivity @ 25 C		49500	umhos/cm	5.0	99	90	110				
<b>Lab ID: MBLK</b>		Method Blank								11/19/21 18:06	
Conductivity @ 25 C		3	umhos/cm	1							
<b>Lab ID: C21110744-001ADUP</b>		Sample Duplicate								11/19/21 18:12	
Conductivity @ 25 C		3190	umhos/cm	5.0				0.1	10		

**Qualifiers:**

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# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: A2540 C</b>										
Batch: TDS211122A										
<b>Lab ID: MB-1_211122A</b>		Method Blank								
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	10						
										Run: BAL-111_211122A 11/22/21 10:34
<b>Lab ID: LCS-2_211122A</b>		Laboratory Control Sample								
Solids, Total Dissolved TDS @ 180 C		1010	mg/L	20	100	90	110			11/22/21 10:34
<b>Lab ID: C21110734-003A DUP</b>		Sample Duplicate								
Solids, Total Dissolved TDS @ 180 C		774	mg/L	20				0.1	5	11/22/21 10:43

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: A2540 D</b>								Batch: TSS211123A		
<b>Lab ID: MB-1_211123A</b>		Method Blank				Run: BAL-111_211123A		11/23/21 07:38		
Solids, Total Suspended TSS @ 105 C		ND	mg/L	0.4						
<b>Lab ID: LCS-2_211123A</b>		Laboratory Control Sample				Run: BAL-111_211123A		11/23/21 07:38		
Solids, Total Suspended TSS @ 105 C		101	mg/L	10	101	80	120			
<b>Lab ID: C21110744-001B DUP</b>		Sample Duplicate				Run: BAL-111_211123A		11/23/21 07:38		
Solids, Total Suspended TSS @ 105 C		40.5	mg/L	1.7				2.3	5	

**Qualifiers:**

RL - Analyte Reporting Limit

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# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method:</b> A4500-H B		Analytical Run: PHSC_101-C_211119A								
<b>Lab ID:</b> 6.86	2 Initial Calibration Verification Standard		11/19/21 07:52							
pH		6.8	s.u.	0.1	100	98	102			
pH Measurement Temp		18.6	°C			0	0			
<b>Method:</b> A4500-H B		Batch: R277005								
<b>Lab ID:</b> C21110744-001ADUP	Sample Duplicate		Run: PHSC_101-C_211119A 11/19/21 18:12							
pH		8.1	s.u.	0.1				0.0	1.5	

**Qualifiers:**

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## QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Hilcorp Energy Corporation

Work Order: C21110744

Report Date: 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
<b>Method: E300.0</b>		Analytical Run: IC3-C_211124A									
<b>Lab ID: ICV</b>	4	Initial Calibration Verification Standard							11/24/21 14:16		
Bromide		5.19	mg/L	0.10	104	90	110				
Chloride		10.2	mg/L	1.0	102	90	110				
Fluoride		5.02	mg/L	0.10	100	90	110				
Sulfate		41.0	mg/L	1.0	102	90	110				
<b>Method: E300.0</b>		Batch: R277235									
<b>Lab ID: ICB</b>	4	Method Blank							Run: IC3-C_211124A 11/24/21 14:35		
Bromide		ND	mg/L	0.02							
Chloride		ND	mg/L	0.09							
Fluoride		ND	mg/L	0.02							
Sulfate		ND	mg/L	0.2							
<b>Lab ID: LFB</b>	4	Laboratory Fortified Blank							Run: IC3-C_211124A 11/24/21 14:54		
Bromide		5.02	mg/L	0.10	104	90	110				
Chloride		9.89	mg/L	1.0	103	90	110				
Fluoride		4.95	mg/L	0.10	103	90	110				
Sulfate		39.1	mg/L	1.0	102	90	110				
<b>Lab ID: C21110815-002AMS</b>	4	Sample Matrix Spike							Run: IC3-C_211124A 11/24/21 15:52		
Bromide		26.2	mg/L	0.26	104	80	120				
Chloride		203	mg/L	1.0	93	80	120				
Fluoride		24.7	mg/L	0.26	97	80	120				
Sulfate		1040	mg/L	2.1		80	120			A	
<b>Lab ID: C21110815-002AMSD</b>	4	Sample Matrix Spike Duplicate							Run: IC3-C_211124A 11/24/21 16:11		
Bromide		26.8	mg/L	0.26	106	80	120	2.1	20		
Chloride		202	mg/L	1.0	89	80	120	0.9	20		
Fluoride		24.7	mg/L	0.26	97	80	120	0.1	20		
Sulfate		1040	mg/L	2.1		80	120	0.6	20	A	

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

A - Analyte level was greater than four times the spike level - in accordance with the method, percent recovery is not calculated



# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: E353.2</b> Analytical Run: FIA201-C_211130B										
<b>Lab ID: ICV</b>		Initial Calibration Verification Standard								11/30/21 13:13
Nitrogen, Nitrate+Nitrite as N		0.951	mg/L	0.050	95	90	110			
<b>Method: E353.2</b> Batch: R277303										
<b>Lab ID: MBLK</b>		Method Blank								11/30/21 13:14
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.01						
<b>Lab ID: LFB</b>		Laboratory Fortified Blank								11/30/21 13:15
Nitrogen, Nitrate+Nitrite as N		0.988	mg/L	0.050	100	90	110			
<b>Lab ID: C21110814-001CMS</b>		Sample Matrix Spike								11/30/21 13:21
Nitrogen, Nitrate+Nitrite as N		1.02	mg/L	0.050	102	90	110			
<b>Lab ID: C21110814-001CMSD</b>		Sample Matrix Spike Duplicate								11/30/21 13:23
Nitrogen, Nitrate+Nitrite as N		1.02	mg/L	0.050	102	90	110	0.0	10	

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 11/30/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method:</b> E365.1 <span style="float: right;">Analytical Run: FIA201-C_211130A</span>										
<b>Lab ID:</b> ICV-65016		Initial Calibration Verification Standard								11/30/21 10:47
Phosphorus, Total as P		0.200	mg/L	0.0050	100	90	110			
<b>Method:</b> E365.1 <span style="float: right;">Batch: 65016</span>										
<b>Lab ID:</b> MB-65016		Method Blank								11/30/21 10:45
Phosphorus, Total as P		ND	mg/L	0.004						
<b>Method:</b> E365.1 <span style="float: right;">Run: FIA201-C_211130A</span>										
<b>Lab ID:</b> LCS-65016		Laboratory Control Sample								11/30/21 10:46
Phosphorus, Total as P		0.207	mg/L	0.0050	103	90	110			
<b>Method:</b> E365.1 <span style="float: right;">Run: FIA201-C_211130A</span>										
<b>Lab ID:</b> C21110724-001CMS		Sample Matrix Spike								11/30/21 10:49
Phosphorus, Total as P		0.223	mg/L	0.0050	108	90	110			
<b>Method:</b> E365.1 <span style="float: right;">Run: FIA201-C_211130A</span>										
<b>Lab ID:</b> C21110724-001CMSD		Sample Matrix Spike Duplicate								11/30/21 10:51
Phosphorus, Total as P		0.218	mg/L	0.0050	106	90	110	2.3	10	

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 12/06/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method:</b> E200.7		Analytical Run: ICP4-C_211201A								
<b>Lab ID:</b> QCS	3	Initial Calibration Verification Standard							12/01/21 09:51	
Boron		0.783	mg/L	0.10	98	95	105			
Potassium		40.1	mg/L	0.50	100	95	105			
Sodium		38.8	mg/L	0.53	97	95	105			
<b>Method:</b> E200.7		Batch: 65015								
<b>Lab ID:</b> MB-65015	3	Method Blank							Run: ICP4-C_211201A 12/01/21 23:41	
Boron		ND	mg/L	0.007						
Potassium		ND	mg/L	0.1						
Sodium		ND	mg/L	0.6						
<b>Lab ID:</b> LCS3-65015	7	Laboratory Control Sample							Run: ICP4-C_211201A 12/01/21 23:45	
Barium		0.469	mg/L	0.050	94	85	115			
Boron		0.477	mg/L	0.050	95	85	115			
Iron		2.53	mg/L	0.026	101	85	115			
Magnesium		24.8	mg/L	1.0	99	85	115			
Potassium		24.1	mg/L	1.0	96	85	115			
Sodium		24.6	mg/L	1.0	99	85	115			
Strontium		0.454	mg/L	0.010	91	85	115			
<b>Lab ID:</b> C21110744-001CMS3	7	Sample Matrix Spike							Run: ICP4-C_211201A 12/01/21 23:58	
Barium		2.67	mg/L	0.050	101	70	130			
Boron		5.05	mg/L	0.12	100	70	130			
Iron		14.7	mg/L	0.13	107	70	130			
Magnesium		134	mg/L	1.0	106	70	130			
Potassium		126	mg/L	1.2	98	70	130			
Sodium		912	mg/L	2.5		70	130			A
Strontium		2.38	mg/L	0.010	89	70	130			
<b>Lab ID:</b> C21110744-001CMSD	7	Sample Matrix Spike Duplicate							Run: ICP4-C_211201A 12/02/21 00:02	
Barium		2.73	mg/L	0.050	104	70	130	2.3	20	
Boron		5.21	mg/L	0.12	107	70	130	3.1	20	
Iron		14.8	mg/L	0.13	108	70	130	0.6	20	
Magnesium		136	mg/L	1.0	108	70	130	1.3	20	
Potassium		127	mg/L	1.2	99	70	130	0.6	20	
Sodium		954	mg/L	2.5		70	130	4.5	20	A
Strontium		2.36	mg/L	0.010	88	70	130	1.1	20	

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

A - Analyte level was greater than four times the spike level - in accordance with the method, percent recovery is not calculated



# QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 12/06/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
<b>Method:</b> E200.7										Analytical Run: ICP4-C_211202A	
<b>Lab ID:</b> QCS		4 Initial Calibration Verification Standard								12/02/21 16:06	
Barium		0.765	mg/L	0.10	96	90	110				
Iron		3.94	mg/L	0.10	98	90	110				
Magnesium		39.2	mg/L	0.50	98	90	110				
Strontium		0.757	mg/L	0.10	95	90	110				
<b>Method:</b> E200.7										Batch: 65015	
<b>Lab ID:</b> MB-65015		4 Method Blank								Run: ICP4-C_211202A 12/02/21 19:44	
Barium		ND	mg/L	0.0006							
Iron		ND	mg/L	0.03							
Magnesium		ND	mg/L	0.03							
Strontium		ND	mg/L	0.0006							

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



## QA/QC Summary Report

Prepared by Casper, WY Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 12/06/21

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method:</b> E200.8		Analytical Run: ICPMS5-C_211205A								
<b>Lab ID:</b> QCS	3	Initial Calibration Verification Standard							12/05/21 17:55	
Calcium		2.57	mg/L	0.64	103	90	110			
Manganese		0.243	mg/L	0.0010	97	90	110			
Selenium		0.0516	mg/L	0.0010	103	90	110			
<b>Method:</b> E200.8		Batch: 65015								
<b>Lab ID:</b> MB-65015	3	Method Blank							Run: ICPMS5-C_211205A 12/05/21 15:54	
Calcium		ND	mg/L	0.07						
Manganese		ND	mg/L	0.0007						
Selenium		ND	mg/L	0.0001						
<b>Lab ID:</b> LCS3-65015	3	Laboratory Control Sample							Run: ICPMS5-C_211205A 12/05/21 16:26	
Calcium		23.8	mg/L	1.0	95	85	115			
Manganese		2.30	mg/L	0.0010	92	85	115			
Selenium		0.464	mg/L	0.0010	93	85	115			
<b>Lab ID:</b> C21110744-001CMS3	3	Sample Matrix Spike							Run: ICPMS5-C_211205A 12/05/21 16:40	
Calcium		114	mg/L	1.0	89	70	130			
Manganese		11.9	mg/L	0.0070	95	70	130			
Selenium		2.36	mg/L	0.0017	95	70	130			
<b>Lab ID:</b> C21110744-001CMSD	3	Sample Matrix Spike Duplicate							Run: ICPMS5-C_211205A 12/05/21 16:44	
Calcium		115	mg/L	1.0	89	70	130	0.5	20	
Manganese		12.0	mg/L	0.0070	96	70	130	0.5	20	
Selenium		2.37	mg/L	0.0017	95	70	130	0.2	20	

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



# QA/QC Summary Report

Prepared by Billings, MT Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 12/08/21

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: SW8260B</b>									
Batch: R371324									
<b>Lab ID:</b> LCS120321_	Laboratory Control Sample			Run: VOA5975C.I_211203B			12/03/21 11:57		
Ethylbenzene	5.53	ug/L	0.50	111	78	131			
Toluene	5.62	ug/L	0.50	112	78	134			
m+p-Xylenes	11.0	ug/L	0.50	110	78	133			
o-Xylene	5.58	ug/L	0.50	112	79	136			
Xylenes, Total	16.6	ug/L	0.50	111	78	136			
<b>Lab ID:</b> MBLK120321_	Method Blank			Run: VOA5975C.I_211203B			12/03/21 13:19		
Ethylbenzene	ND	ug/L	0.50						
Toluene	ND	ug/L	0.50						
m+p-Xylenes	ND	ug/L	0.50						
o-Xylene	ND	ug/L	0.50						
Xylenes, Total	ND	ug/L	0.50						
<b>Lab ID:</b> B21120253-001AMS	Sample Matrix Spike			Run: VOA5975C.I_211203B			12/03/21 20:38		
Ethylbenzene	5.19	ug/L	0.50	104	78	131			
Toluene	5.35	ug/L	0.50	107	78	134			
m+p-Xylenes	10.4	ug/L	0.50	104	78	133			
o-Xylene	5.22	ug/L	0.50	104	79	136			
Xylenes, Total	15.7	ug/L	0.50	104	78	136			
<b>Lab ID:</b> B21120253-001AMSD	Sample Matrix Spike Duplicate			Run: VOA5975C.I_211203B			12/03/21 21:06		
Ethylbenzene	5.38	ug/L	0.50	108	78	131	3.5	20	
Toluene	5.50	ug/L	0.50	110	78	134	2.7	20	
m+p-Xylenes	10.8	ug/L	0.50	108	78	133	3.0	20	
o-Xylene	5.40	ug/L	0.50	108	79	136	3.3	20	
Xylenes, Total	16.1	ug/L	0.50	108	78	136	3.1	20	

**Qualifiers:**

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



## QA/QC Summary Report

Prepared by Billings, MT Branch

**Client:** Hilcorp Energy Corporation

**Work Order:** C21110744

**Report Date:** 12/08/21

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
<b>Method: SW8260B</b>							Batch: R371347		
<b>Lab ID:</b> LCS120221_	Laboratory Control Sample				Run: VOA5975C.I_211202C		12/02/21 11:17		
Benzene	4.91	ug/L	0.50	98	71	133			
Naphthalene	4.25	ug/L	0.50	85	55	139			
Surr: 1,2-Dichloroethane-d4			0.50	106	70	130			
Surr: Dibromofluoromethane			0.50	105	77	126			
Surr: p-Bromofluorobenzene			0.50	101	76	127			
Surr: Toluene-d8			0.50	108	79	122			
<b>Lab ID:</b> MBLK120221_	Method Blank				Run: VOA5975C.I_211202C		12/02/21 12:39		
Benzene	ND	ug/L	0.50						
Naphthalene	ND	ug/L	0.50						
Surr: 1,2-Dichloroethane-d4			0.50	111	70	130			
Surr: Dibromofluoromethane			0.50	105	77	126			
Surr: p-Bromofluorobenzene			0.50	102	76	127			
Surr: Toluene-d8			0.50	105	79	122			
<b>Lab ID:</b> B21120153-002FMS	Sample Matrix Spike				Run: VOA5975C.I_211202C		12/02/21 18:11		
Benzene	105	ug/L	10	105	71	133			
Surr: 1,2-Dichloroethane-d4			10	110	70	130			
Surr: Dibromofluoromethane			10	106	77	126			
Surr: p-Bromofluorobenzene			10	101	76	127			
Surr: Toluene-d8			10	105	79	122			
<b>Lab ID:</b> B21120153-002FMSD	Sample Matrix Spike Duplicate				Run: VOA5975C.I_211202C		12/02/21 18:39		
Benzene	103	ug/L	10	103	71	133	2.3	20	
Surr: 1,2-Dichloroethane-d4			10	109	70	130			
Surr: Dibromofluoromethane			10	105	77	126			
Surr: p-Bromofluorobenzene			10	101	76	127			
Surr: Toluene-d8			10	107	79	122			

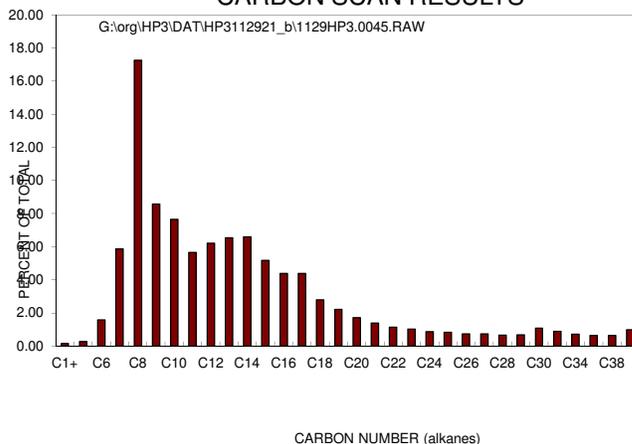
**Qualifiers:**

RL - Analyte Reporting Limit

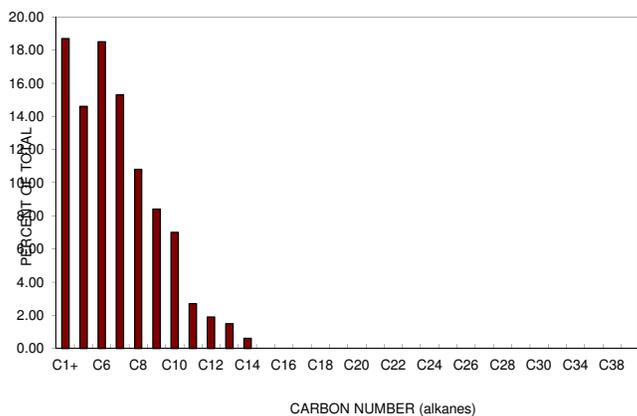
ND - Not detected at the Reporting Limit (RL)

**CARBON SCAN ANALYSIS RESULTS AND REFERENCE CARBON SCANS FOR COMPARISON PURPOSES**

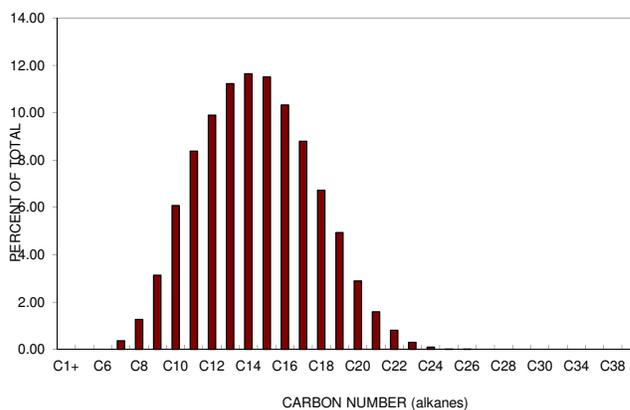
**C21110744-001E (Hiawatha B.2)  
CARBON SCAN RESULTS**



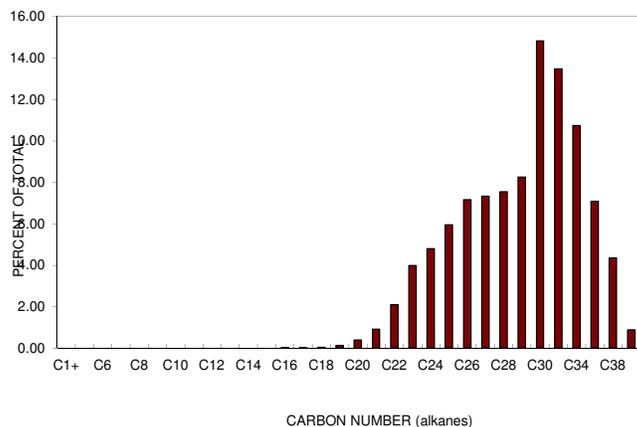
Gasoline, Regular



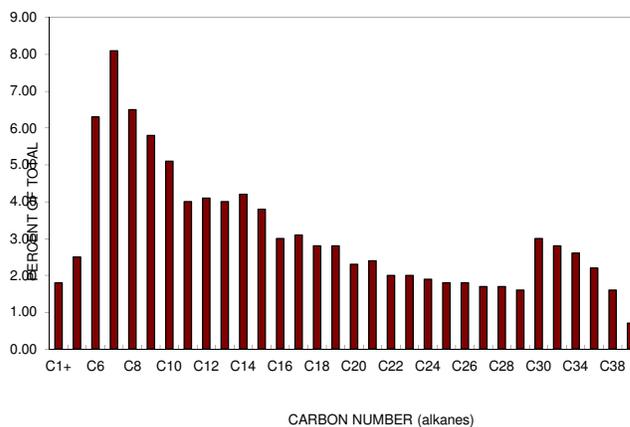
Diesel Fuel, #2



Oil, Motor Oil-30W

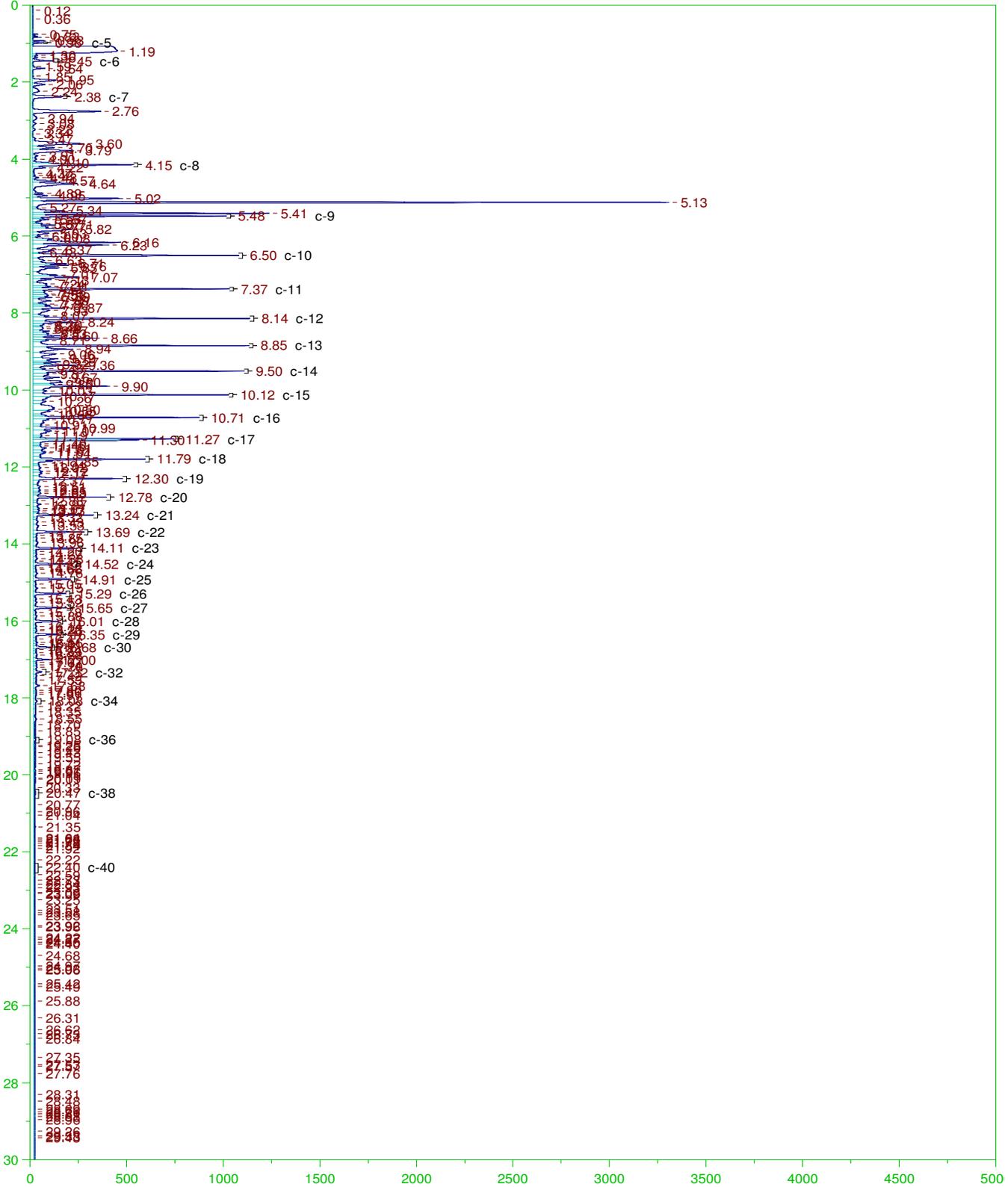


Crude Oil, Mission Canyon Formation



G:\org\HP3\DAT\HP3112921\_b\1129HP3.0045.RAW

B21112067-001E ;1129HP3 , \$HC-CSCAN-O,





# Work Order Receipt Checklist

Hilcorp Energy Corporation

C21110744

Login completed by: Kirsten L. Smith

Date Received: 11/19/2021

Reviewed by: Misty Stephens

Received by: iwm

Reviewed Date: 11/22/2021

Carrier name: NDA

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
Container/Temp Blank temperature:	3.4°C On Ice		
Containers requiring zero headspace have no headspace or bubble that is <6mm (1/4").	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	No VOA vials submitted <input type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>

---

## Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Radiochemical precision results represent a 2-sigma Total Measurement Uncertainty.

---

## Contact and Corrective Action Comments:

2 of 3 VOA's received with >1/4" headspace.  
Sample ID on sample labels is 67961.  
Sample ID on COC is Hiawatha B.2 11/19/2021-KS



Trust our People. Trust our Data.

# Chain of Custody & Analytical Request Record

www.energylab.com

Page \_\_\_\_\_ of \_\_\_\_\_

### Account Information (Billing Information)

Company Name: Alcapp Energy  
 Contact: Mike Killough  
 Phone: 281-851-2338  
 Mailing Address: 1111 Travis Street  
 City, State, Zip: Houston Tx, 77002  
 Email: mkillough@alcapp.com  
 Receive Invoice:  Hard Copy  Email  
 Purchase Order: 66093247 Quote: 67961

### Report Information (if different than Account Information)

Company Name: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Mailing Address: \_\_\_\_\_  
 City, State, Zip: \_\_\_\_\_  
 Email: \_\_\_\_\_  
 Receive Report:  Hard Copy  Email  
 Special Report/Formats:  LEVEL IV  DNEIAC  EDD/EDT (contact laboratory)  Other \_\_\_\_\_

### Comments

\_\_\_\_\_

### Project Information

Project Name, PWSID, Permit, etc.: Haweshta B:2 SWD  
 Sampler Name: Stinkins Sampler Phone: 307-705-2362  
 Sample Origin State: Co EPA State Compliance:  Yes  No  
 Unprocessed Ore  
 Processed Ore (Ground or Refined) \*\*CALL BEFORE SENDING  
 11(e)2 Byproduct Material (Can ONLY be Submitted to ELL Casper Location)

### Matrix Codes

- A - Air
- W - Water
- S - Solids
- V - Vegetation
- B - Biomass
- O - Oil
- DW - Drinking Water

### Analysis Requested

\_\_\_\_\_

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers	Matrix (See Codes Above)	Analysis Requested		Signature
	Date	Time					
1 <u>Haweshta B:2</u>	<u>11-18-21</u>	<u>9:15 AM</u>	<u>9</u>	<u>W</u>			<u>See Attached</u>
2							
3							
4							
5							
6							
7							
8							
9							

ELL is REQUIRED to provide preservative traceability. If the preservatives supplied with the bottle order were NOT used, please attach your preservative information with this COC.

Customer Record MUST be signed: Relinquished by (print) Sted Stinkins Date/Time 11-18-21 Signature \_\_\_\_\_  
 Relinquished by (print) \_\_\_\_\_ Date/Time \_\_\_\_\_ Signature \_\_\_\_\_

Shipped By: \_\_\_\_\_ Cooler ID(s): \_\_\_\_\_ Custody Seals: Y N C B Intact: Y N Receipt Temp: \_\_\_\_\_ Temp Blank: Y N On Ice: Y N  
 Received by Laboratory (print): TS&A Date/Time: 11/19/21 9:58 Signature: \_\_\_\_\_  
 Payment Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ Receipt Number (cash/check only): \_\_\_\_\_

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.



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www.energylab.com

Billings, MT 800.735.4489 • Casper, WY 888.235.0515 • Gillette, WY 866.686.7175 • Helena, MT 877.472.0711

# BOTTLE ORDER 67961



**SHIPPED**     **Hilcorp Energy Corporation**

**TO:**

Contact: Michael Ball

1515 Ninth St

Rock Springs WY 82901-

Phone: (281) 851-2338

Project: SWD

Order Created by: Misty Stephens

Shipped From: Casper, WY

Ship Date: 11/5/2021

VIA: Ground

Bottle Size/Type	Bottles Per Samp	Method	Tests	Critical Hold Time	Preservative	Notes	Num of Samp
<b>SWD</b>							
1 Liter Plastic	1	A2320 B E300.0 A4500-H B A2510 B A2540 C	Alkalinity Anions by Ion Chromatography pH Conductivity Solids, Total Dissolved	0.25 hrs			1
2 Liter Plastic	1	A2540 D	Solids, Total Suspended				1
250 mL Plastic	1	E200.7_8	Metals by ICP/ICPMS, Dissolved		<input type="checkbox"/> HNO3	Filter before preservation	1
1 Liter Amber Glass Narrow Mouth	2	SimDist	Hydrocarbon Identification, Simulated Distillation		<input type="checkbox"/> H2SO4		1
40 mL Clear Glass VOA	3	SW8260B	8260-Volatile Organic Compounds-Short List		<input checked="" type="checkbox"/> HCL	Zero headspace	1
250 mL Plastic	1	E365.1 E353.2	Phosphorus, Total Nitrogen, Nitrate + Nitrite		<input type="checkbox"/> H2SO4		1

**Supplies**

Trip Blank for VOC Analysis	1	FIELD	Supplies			Do Not Open	1
-----------------------------	---	-------	----------	--	--	-------------	---

- HNO3 - Nitric Acid
  - H2SO4 - Sulfuric Acid
  - NaOH - Sodium Hydroxide
  - ZnAc - Zinc Acetate
  - HCl - Hydrochloric Acid
  - H3PO4 - Phosphoric Acid
- We strongly suggest that the samples are shipped the same day as they are collected.**

**Material Safety Data Sheets(MSDS) Available @ EnergyLab.com ->Services -> MSDS Sheets**

Corrosive Chemicals: Nitric, Sulfuric, Phosphoric, Hydrochloric Acids and Sodium Hydroxide. Zinc Acetate is a skin Irritant.

Subcontracting of sample analyses to an outside laboratory may be required. If so, Energy Laboratories will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.