



Friday, August 12, 2022

Max Trehus  
PDC Energy  
4000 Burlington Ave.  
Evans, CO 80620

Re: ALS Workorder: 2207671  
Project Name: Thunder 5N BH  
Project Number:

Dear Mr. Trehus:

Two water samples were received from PDC Energy, on 7/28/2022. The samples were scheduled for the following analyses:

Dissolved Gasses

GC/MS Volatiles

Inorganics

Metals

Total Extractable Petroleum Hydrocarbons (Diesel)

Total Volatile Petroleum Hydrocarbons (Gasoline)

TDS - Subcontracted to ALS Holland, MI

The results for these analyses are contained in the enclosed reports.


The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

For

ALS Environmental  
Katie M. OBrien  
Project Manager

	<h1>Accreditations</h1>	Effective June 7, 2022
		ALS   Environmental – Fort Collins

**Accreditations:** ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
Arizona	AZ0828
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
Oklahoma	1301
Louisiana	197538
Maryland (MD)	285
PJLA (DoD ELAP/ISO 170250)	95377
PJLA (DOE-AP/ISO 17025)	95377
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280
Virginia	460305

**40 CFR Part 136:** All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.



## 2207671

### **GC/MS Volatiles:**

The sample was analyzed using GC/MS following the current revision of SOP 525 based on SW-846 Method 8260C.

All acceptance criteria were met.

### **Dissolved Gasses:**

The sample was prepared and analyzed according to method RSK-175 procedures and the current revision of SOP 449.

All acceptance criteria were met.

### **DRO:**

The sample was analyzed following the current revision of SOP 406 generally based on SW-846 Methods 8000C and 8015D. TEPH is a multicomponent mixture and is quantitated by summing the entire carbon range, rather than individual peaks. The carbon range integrated in this test extends from C10 to C28.

All acceptance criteria were met.

### **GRO:**

The sample was analyzed following the current revision of SOP 425 generally based on SW-846 Methods 8000C and 8015D. TVPH is a multicomponent mixture and is quantitated by summing the entire carbon range, rather than individual peaks. The carbon range integrated in this test extends from C6 to C10.

All surrogate recoveries were within acceptance criteria with the following exceptions:

Surrogate	Sample	Direction
2,3,4-Trifluorotoluene	MB, LCS/LCSD and -1	High

The hardware that delivers the surrogate to the sample was malfunctioning and not properly aliquoting the surrogate. Since this hardware only delivers the surrogate and does not otherwise interact with the sample, the discrepancy does not affect sample quantification, as demonstrated by the passing CCV's.

All remaining acceptance criteria were met.

**Metals:**

The samples were analyzed following Methods for the Determination of Metals in Environmental Samples – Supplement 1 procedures. Analysis by Trace ICP followed method 200.7 and the current revision of SOP 834.

Sample 2207671-2 was to be analyzed for dissolved metals. The sample was filtered through a 0.45 micron filter and preserved with nitric acid to a pH less than two prior to analysis.

All acceptance criteria were met.

**Inorganics:**

The sample was analyzed following EMSL and Standard Method procedures for the current revisions of the following SOPs and methods:

<u>Analyte</u>	<u>Method</u>	<u>SOP #</u>
Alkalinity	SM2320B	1106
Bicarbonate	SM2320B	1106
Carbonate	SM2320B	1106
Chloride	300.0 Revision 2.1	1113
Sulfate	300.0 Revision 2.1	1113

All acceptance criteria were met.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

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**OrderNum:** 2207671

**Client Name:** PDC Energy

**Client Project Name:** Thunder 5N BH

**Client Project Number:**

**Client PO Number:**

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
T-5N A	2207671-1		WATER	27-Jul-22	11:15
T-5N B	2207671-2		WATER	27-Jul-22	11:15



## Chain-of-Custody

Form 20218

ALS Environmental  
225 Commerce Drive, Fort Collins, Colorado 80524  
TF: (800) 443-1511 PH: (970) 490-1511 FX: (970) 490-1522

Chain-of-Custody

WORKORDER #
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220767
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PAGE	of
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DISPOSAL	By Lab or	Return to Client
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DATE	TURNAROUND
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SAMPLER	MATREHUS
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SITE ID	
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EDD FORMAT	
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PURCHASE ORDER	
----------------	--

BILL TO COMPANY	
-----------------	--

INVOICE ATTN TO	
-----------------	--

ADDRESS	
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CITY / STATE / ZIP	
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PHONE	
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FAX	
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E-MAIL	
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Matrix	Sample Date	Sample Time	# Bottles	Pres.	QC
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Field ID	W	7/27/02	11:15	3	-	X
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Lab ID	1	T-SN A				
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		T-SN A				
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		T-SN A				
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		T-SN A				
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		T-SN A				
--	--	--------	--	--	--	--

		T-SN B				
--	--	--------	--	--	--	--

		T-SN A				
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Time Zone (Circle): EST CST MST PST Matrix: O = oil S = soil NS = non-soil solid W = water L = liquid E = extract F = filter

**For metals or anions, please detail analytes below.**

RELINQUISHED BY	SIGNATURE	PRINTED NAME	DATE	TIME
RECEIVED BY		Max Tschew	7/28/22	9:35
RELINQUISHED BY		Amel K. G. G. G.	7/28/22	9:00
RECEIVED BY				
RELINQUISHED BY				
RECEIVED BY				

Comments:	QC PACKAGE (check below)			
		LEVEL II (Standard QC)		
		LEVEL III (Std QC + forms)		
		LEVEL IV (Std QC + forms + raw data)		

Facility ID: 463431

1.9°C

Preservative Key: 1-HCl 2-HNO3 3-H2SO4 4-NaOH 5-NaHSO4 7-Other 8-4 degrees C 9-5035



**ALS Environmental - Fort Collins**  
**CONDITION OF SAMPLE UPON RECEIPT FORM**

Client: PDC Workorder No: 2207671  
 Project Manager: KMO Initials: AXK Date: 07/28/2022

				N/A	YES	NO
1. Are airbills / shipping documents present and/or removable?				X		
Tracking number:						
2. Are custody seals on shipping containers intact?				X		
3. Are custody seals on sample containers intact?				X		
4. Is there a COC (chain-of-custody) present?					X	
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)					X	
6. Are short-hold samples present?						X
7. Are all samples within holding times for the requested analyses?					X	
8. Were all sample containers received intact? (not broken or leaking)					X	
9. Is there sufficient sample for the requested analyses?					X	
10. Are samples in proper containers for requested analyses? (form 250, <i>Sample Handling Guidelines</i> )					X	
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)					X	
12. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)					X	
13. Were the samples shipped on ice?					X	
14. Were cooler temperatures measured at 0.1-6.0°C?				IR gun used*: #6		
Cooler #: <u>1</u>						
Temperature (°C): <u>1.9</u>						
# of custody seals on cooler: <u>0</u>						
External µR/hr reading: <u>-</u>						
Background µR/hr reading: <u>12</u>						
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <u>NA</u> (If no, see Form 008.)						

\* Please provide details here for NO responses to boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

Split bottle 13 to make 14 for sub out.

Were unpreserved bottles pH checked? NA All client bottle ID's vs ALS lab ID's double-checked by: AK  
 If applicable, was the client contacted? YES / NO / NA Contact: Margaret G. O'Brien Date/Time: 7/28/22  
 Project Manager Signature / Date: Margaret G. O'Brien

## ALS -- Fort Collins

## SAMPLE SUMMARY REPORT

Client: PDC Energy  
 Project: Thunder 5N BH  
 Sample ID: T-5N A  
 Legal Location:  
 Collection Date: 7/27/2022 11:15

Date: 12-Aug-22  
 Work Order: 2207671  
 Lab ID: 2207671-1  
 Matrix: WATER  
 Percent Moisture:

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Alkalinity as Calcium Carbonate</b>		<b>SM2320B</b>			Prep Date: 8/2/2022	PrepBy: BML
BICARBONATE AS CaCO3	83		20	MG/L	1	8/2/2022
CARBONATE AS CaCO3	120		20	MG/L	1	8/2/2022
TOTAL ALKALINITY AS CaCO3	200		20	MG/L	1	8/2/2022
<b>Diesel Range Organics</b>		<b>SW8015M</b>			Prep Date: 8/8/2022	PrepBy: JRS
Diesel Range Organics	640		9.7	MG/L	10	8/9/2022 18:40
Surr: O-TERPHENYL	116		69-120	%REC	10	8/9/2022 18:40
<b>Dissolved Gasses</b>		<b>RSK175</b>			Prep Date: 8/9/2022	PrepBy: JRS
METHANE	110		2	UG/L	1	8/10/2022 14:47
ETHANE	62		4	UG/L	1	8/10/2022 14:47
PROPANE	27		6	UG/L	1	8/10/2022 14:47
<b>Gasoline Range Organics</b>		<b>SW8015</b>			Prep Date: 8/2/2022	PrepBy: JRS
GASOLINE RANGE ORGANICS	1.8		0.1	MG/L	1	8/3/2022 15:43
Surr: 2,3,4-TRIFLUOROTOLUENE	122	*	80-120	%REC	1	8/3/2022 15:43
<b>GC/MS Volatiles</b>		<b>SW8260_25</b>			Prep Date: 8/1/2022	PrepBy: TWK
BENZENE	27		1	UG/L	1	8/1/2022 21:15
TOLUENE	270		10	UG/L	10	8/5/2022 17:17
ETHYLBENZENE	8.3		1	UG/L	1	8/1/2022 21:15
M+P-XYLENE	37		1	UG/L	1	8/1/2022 21:15
O-XYLENE	20		1	UG/L	1	8/1/2022 21:15
TOTAL XYLENES	57		1	UG/L	1	8/1/2022 21:15
Surr: 4-BROMOFLUOROBENZENE	103		80-120	%REC	10	8/5/2022 17:17
Surr: 4-BROMOFLUOROBENZENE	99		80-120	%REC	1	8/1/2022 21:15
Surr: DIBROMOFLUOROMETHANE	102		80-120	%REC	10	8/5/2022 17:17
Surr: DIBROMOFLUOROMETHANE	100		80-120	%REC	1	8/1/2022 21:15
Surr: TOLUENE-D8	102		80-120	%REC	10	8/5/2022 17:17
Surr: TOLUENE-D8	98		80-120	%REC	1	8/1/2022 21:15
<b>Ion Chromatography</b>		<b>EPA300.0</b>			Prep Date: 8/1/2022	PrepBy: AOW
CHLORIDE	18000		400	MG/L	2000	8/1/2022 13:57
SULFATE	ND		500	MG/L	500	8/1/2022 12:50
<b>Total Recoverable Metals by 200.7</b>		<b>EPA200.7</b>			Prep Date: 8/4/2022	PrepBy: ETC
CALCIUM	9500		100	MG/L	100	8/11/2022 13:29
POTASSIUM	620		10	MG/L	10	8/11/2022 12:03
MAGNESIUM	ND		10	MG/L	10	8/11/2022 12:03
SODIUM	690		10	MG/L	10	8/11/2022 12:03



**Client:** PDC Energy  
**Project:** Thunder 5N BH  
**Sample ID:** T-5N B  
**Legal Location:**  
**Collection Date:** 7/27/2022 11:15

**Date:** 12-Aug-22  
**Work Order:** 2207671  
**Lab ID:** 2207671-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
<b>Dissolved Metals by 200.7</b>			<b>EPA200.7</b>		Prep Date: <b>8/4/2022</b>	PrepBy: <b>ETC</b>
<b>CALCIUM</b>	<b>9600</b>		<b>100</b>	<b>MG/L</b>	100	8/11/2022 13:30
<b>POTASSIUM</b>	<b>620</b>		<b>10</b>	<b>MG/L</b>	10	8/11/2022 12:04
<b>MAGNESIUM</b>	<b>ND</b>		<b>10</b>	<b>MG/L</b>	10	8/11/2022 12:04
<b>SODIUM</b>	<b>690</b>		<b>10</b>	<b>MG/L</b>	10	8/11/2022 12:04

**Client:** PDC Energy  
**Project:** Thunder 5N BH  
**Sample ID:** T-5N B  
**Legal Location:**  
**Collection Date:** 7/27/2022 11:15

**Date:** 12-Aug-22  
**Work Order:** 2207671  
**Lab ID:** 2207671-2  
**Matrix:** WATER  
**Percent Moisture:**

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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### Explanation of Qualifiers

#### Radiochemistry:

- "Report Limit" is the MDC  
 U or ND - Result is less than the sample specific MDC.  
 Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.  
 Y2 - Chemical Yield outside default limits.  
 W - DER is greater than Warning Limit of 1.42  
 \* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.  
 # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.  
 G - Sample density differs by more than 15% of LCS density.  
 D - DER is greater than Control Limit  
 M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.  
 L - LCS Recovery below lower control limit.  
 H - LCS Recovery above upper control limit.  
 P - LCS, Matrix Spike Recovery within control limits.  
 N - Matrix Spike Recovery outside control limits  
 NC - Not Calculated for duplicate results less than 5 times MDC  
 B - Analyte concentration greater than MDC.  
 B3 - Analyte concentration greater than MDC but less than Requested MDC.

#### Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).  
 U or ND - Indicates that the compound was analyzed for but not detected.  
 E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.  
 M - Duplicate injection precision was not met.  
 N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.  
 Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.  
 \* - Duplicate analysis (relative percent difference) not within control limits.  
 S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

#### Organics:

U or ND - Indicates that the compound was analyzed for but not detected.  
 B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.  
 E - Analyte concentration exceeds the upper level of the calibration range.  
 J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).  
 A - A tentatively identified compound is a suspected aldol-condensation product.  
 X - The analyte was diluted below an accurate quantitation level.  
 \* - The spike recovery is equal to or outside the control criteria used.  
 + - The relative percent difference (RPD) equals or exceeds the control criteria.  
 G - A pattern resembling gasoline was detected in this sample.  
 D - A pattern resembling diesel was detected in this sample.  
 M - A pattern resembling motor oil was detected in this sample.  
 C - A pattern resembling crude oil was detected in this sample.  
 4 - A pattern resembling JP-4 was detected in this sample.  
 5 - A pattern resembling JP-5 was detected in this sample.  
 H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.  
 L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.  
 Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:  
 - gasoline  
 - JP-8  
 - diesel  
 - mineral spirits  
 - motor oil  
 - Stoddard solvent  
 - bunker C

## ALS -- Fort Collins

Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

Date: 8/12/2022 8:48:0

## QC BATCH REPORT

Batch ID: **HC220802-61-1** Instrument ID: **FUELS-1** Method: **SW8015**

<b>LCS</b>	Sample ID: <b>HC220802-61</b>			Units: <b>MG/L</b>			Analysis Date: <b>8/3/2022 14:56</b>					
Client ID:	Run ID: <b>HC220804-61A</b>			Prep Date: <b>8/2/2022</b>			DF: <b>1</b>					
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual	
GASOLINE RANGE ORGANICS	0.479	0.1	0.5		96	80-120				20		
Surr: 2,3,4-TRIFLUOROTOLUENE	0.125		0.1		125	80-120					*	

<b>LCSD</b>	Sample ID: <b>HC220802-61</b>			Units: <b>MG/L</b>			Analysis Date: <b>8/3/2022 15:12</b>					
Client ID:	Run ID: <b>HC220804-61A</b>			Prep Date: <b>8/2/2022</b>			DF: <b>1</b>					
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual	
GASOLINE RANGE ORGANICS	0.458	0.1	0.5		92	80-120		0.479	4	20		
Surr: 2,3,4-TRIFLUOROTOLUENE	0.121		0.1		121	80-120			3		*	

MB	Sample ID: <b>HC220802-61</b>			Units: <b>MG/L</b>		Analysis Date: <b>8/3/2022 15:28</b>			
Client ID:	Run ID: <b>HC220804-61A</b>					Prep Date: <b>8/2/2022</b>		DF: <b>1</b>	
Analyte	Result	ReportLimit					Qual		
GASOLINE RANGE ORGANICS	ND	0.1							
Surr: 2,3,4-TRIFLUOROTOLUENE	0.121				121	80-120	*		

The following samples were analyzed in this batch:

2207671-1

Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

## QC BATCH REPORT

Batch ID: **HC220808-83-1** Instrument ID: **FUELS-1** Method: **SW8015M**

<b>LCS</b>		Sample ID: <b>HC220808-83</b>			Units: <b>MG/L</b>			Analysis Date: <b>8/9/2022 17:57</b>				
Client ID:		Run ID: <b>HC220810-81A</b>			Prep Date: <b>8/8/2022</b>			DF: <b>1</b>				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual	
Diesel Range Organics	7.25	1.07	8.33		87	53-120				20		
Surr: O-TERPHENYL	1.97		1.67		118	69-120						

<b>LCSD</b>		Sample ID: <b>HC220808-83</b>			Units: <b>MG/L</b>			Analysis Date: <b>8/9/2022 18:18</b>				
Client ID:		Run ID: <b>HC220810-81A</b>			Prep Date: <b>8/8/2022</b>			DF: <b>1</b>				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual	
Diesel Range Organics	7.32	1.07	8.33		88	53-120		7.25	1	20		
Surr: O-TERPHENYL	1.97		1.67		118	69-120				0		

MB		Sample ID: HC220808-83			Units: MG/L		Analysis Date: 8/9/2022 17:36			
Client ID:		Run ID: HC220810-81A			Prep Date: 8/8/2022			DF: 1		
Analyte		Result	ReportLimit							Qual
Diesel Range Organics		ND	1.1							
Surr: O-TERPHENYL		1.57			94	69-120				

The following samples were analyzed in this batch:

2207671-1

Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

## QC BATCH REPORT

Batch ID: **HC220809-91-1** Instrument ID: **MEE-1** Method: **RSK175**

**LCS** Sample ID: **HC220809-91** Units: **UG/L** Analysis Date: **8/10/2022 13:15**

Client ID: Run ID: **HC220811-91A** Prep Date: **8/9/2022** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
METHANE	145	2	142		102	76-125				25	
ETHANE	271	4	267		101	70-120				25	
PROPANE	398	6	391		102	72-120				25	

**LCSD** Sample ID: **HC220809-91** Units: **UG/L** Analysis Date: **8/10/2022 14:39**

Client ID: Run ID: **HC220811-91A** Prep Date: **8/9/2022** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
METHANE	151	2	142		106	76-125		145	4	25	
ETHANE	280	4	267		105	70-120		271	4	25	
PROPANE	411	6	391		105	72-120		398	3	25	

**MB** Sample ID: **HC220809-91** Units: **UG/L** Analysis Date: **8/10/2022 13:19**

Client ID: Run ID: **HC220811-91A** Prep Date: **8/9/2022** DF: **1**

Analyte	Result	ReportLimit	Qual
METHANE	ND	2	
ETHANE	ND	4	
PROPANE	ND	6	

The following samples were analyzed in this batch:

2207671-1

Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

## QC BATCH REPORT

Batch ID: IP220804-1-2 Instrument ID: ICP5900 Method: EPA200.7

LCS	Sample ID: IP220804-1				Units: MG/L		Analysis Date: 8/11/2022 11:59				
Client ID:	Run ID: IT220811-1A5				Prep Date: 8/4/2022			DF: 1			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
CALCIUM	38.9	1	40		97	85-115				20	
MAGNESIUM	38.4	1	40		96	85-115				20	
POTASSIUM	38.8	1	40		97	85-115				20	
SODIUM	38.9	1	40		97	85-115				20	

LCSD	Sample ID: IP220804-1				Units: MG/L		Analysis Date: 8/11/2022 12:02				
Client ID:	Run ID: IT220811-1A5				Prep Date: 8/4/2022			DF: 1			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
CALCIUM	38	1	40		95	85-115		38.9	2	20	
MAGNESIUM	37.5	1	40		94	85-115		38.4	2	20	
POTASSIUM	38.6	1	40		97	85-115		38.8	0	20	
SODIUM	38.6	1	40		96	85-115		38.9	1	20	

MB		Sample ID: IP220804-1		Units: MG/L		Analysis Date: 8/11/2022 11:57	
Client ID:		Run ID: IT220811-1A5		Prep Date: 8/4/2022		DF: 1	
Analyte		Result	ReportLimit	Qual			
CALCIUM		ND	1				
MAGNESIUM		ND	1				
POTASSIUM		ND	1				
SODIUM		ND	1				

The following samples were analyzed in this batch:

2207671-1

Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

## QC BATCH REPORT

Batch ID: **IP220804-1-3** Instrument ID: **ICP5900** Method: **EPA200.7**

LCS	Sample ID: IP220804-1				Units: MG/L		Analysis Date: 8/11/2022 11:59				
Client ID:	Run ID: IT220811-1A5				Prep Date: 8/4/2022			DF: 1			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
CALCIUM	38.9	1	40		97	85-115				20	
MAGNESIUM	38.4	1	40		96	85-115				20	
POTASSIUM	38.8	1	40		97	85-115				20	
SODIUM	38.9	1	40		97	85-115				20	

LCSD		Sample ID: IP220804-1				Units: MG/L		Analysis Date: 8/11/2022 12:02			
Client ID:		Run ID: IT220811-1A5				Prep Date: 8/4/2022		DF: 1			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
CALCIUM	38	1	40		95	85-115		38.9	2	20	
MAGNESIUM	37.5	1	40		94	85-115		38.4	2	20	
POTASSIUM	38.6	1	40		97	85-115		38.8	0	20	
SODIUM	38.6	1	40		96	85-115		38.9	1	20	

MB		Sample ID: <b>FP220803-1</b>		Units: <b>MG/L</b>		Analysis Date: <b>8/11/2022 11:58</b>	
Client ID:		Run ID: <b>IT220811-1A5</b>		Prep Date: <b>8/4/2022</b>		DF: <b>1</b>	
Analyte		Result	ReportLimit	Qual			
CALCIUM		ND	1				
MAGNESIUM		ND	1				
POTASSIUM		ND	1				
SODIUM		ND	1				

The following samples were analyzed in this batch:

2207671-2

Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

## QC BATCH REPORT

Batch ID: VL220801-4-2 Instrument ID: HPV4 Method: SW8260\_25

LCS	Sample ID: VL220801-4				Units: %REC		Analysis Date: 8/1/2022 11:40				
Client ID:		Run ID: VL220801-4A				Prep Date: 8/1/2022			DF: 1		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
Surr: 4-BROMOFLUOROBENZENE	24.9		25		100	80-120					
Surr: DIBROMOFLUOROMETHANE	25		25		100	80-120					
Surr: TOLUENE-D8	24.9		25		100	80-120					
BENZENE	9.7	1	10		97	80-120				20	
TOLUENE	9.83	1	10		98	80-120				20	
ETHYLBENZENE	9.8	1	10		98	80-120				20	
M+P-XYLENE	19.9	1	20		99	80-120				20	
O-XYLENE	9.86	1	10		99	80-120				20	

LCSD		Sample ID: VL220801-4				Units: %REC		Analysis Date: 8/1/2022 12:01			
Client ID:		Run ID: VL220801-4A				Prep Date: 8/1/2022			DF: 1		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
Surr: 4-BROMOFLUOROBENZENE	25.1		25		100	80-120			1		
Surr: DIBROMOFLUOROMETHANE	25		25		100	80-120			0		
Surr: TOLUENE-D8	25.3		25		101	80-120			2		
BENZENE	9.63	1	10		96	80-120		9.7	1	20	
TOLUENE	9.9	1	10		99	80-120		9.83	1	20	
ETHYLBENZENE	9.8	1	10		98	80-120		9.8	0	20	
M+P-XYLENE	19.9	1	20		99	80-120		19.9	0	20	
O-XYLENE	10	1	10		100	80-120		9.86	2	20	

MB		Sample ID: VL220801-4			Units: %REC		Analysis Date: 8/1/2022 13:05		
Client ID:		Run ID: VL220801-4A			Prep Date: 8/1/2022			DF: 1	
Analyte		Result	ReportLimit						Qual
Surr: 4-BROMOFLUOROBENZENE		27.2			109	80-120			
Surr: DIBROMOFLUOROMETHANE		24.5			98	80-120			
Surr: TOLUENE-D8		26.2			105	80-120			
BENZENE		ND	1						
TOLUENE		ND	1						
ETHYLBENZENE		ND	1						
M+P-XYLENE		ND	1						
O-XYLENE		ND	1						
TOTAL XYLENES		ND	1						

The following samples were analyzed in this batch:

2207671-1



Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

## QC BATCH REPORT

Batch ID: VL220805-4-2 Instrument ID: HPV4 Method: SW8260\_25

LCS		Sample ID: VL220805-4				Units: %REC		Analysis Date: 8/5/2022 14:23			
Client ID:		Run ID: VL220805-4A				Prep Date: 8/5/2022			DF: 1		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
Surr: 4-BROMOFLUOROBENZENE	24.9		25		100	80-120					
Surr: DIBROMOFLUOROMETHANE	25.6		25		102	80-120					
Surr: TOLUENE-D8	25		25		100	80-120					
BENZENE	9.83	1	10		98	80-120				20	
TOLUENE	9.79	1	10		98	80-120				20	
ETHYLBENZENE	9.87	1	10		99	80-120				20	
M+P-XYLENE	20.1	1	20		100	80-120				20	
O-XYLENE	9.98	1	10		100	80-120				20	

LCSD		Sample ID: VL220805-4				Units: %REC		Analysis Date: 8/5/2022 14:44			
Client ID:		Run ID: VL220805-4A				Prep Date: 8/5/2022			DF: 1		
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
Surr: 4-BROMOFLUOROBENZENE	24.8		25		99	80-120			0		
Surr: DIBROMOFLUOROMETHANE	25.6		25		102	80-120			0		
Surr: TOLUENE-D8	25		25		100	80-120			0		
BENZENE	9.4	1	10		94	80-120		9.83	4	20	
TOLUENE	9.29	1	10		93	80-120		9.79	5	20	
ETHYLBENZENE	9.57	1	10		96	80-120		9.87	3	20	
M+P-XYLENE	19.3	1	20		96	80-120		20.1	4	20	
O-XYLENE	9.6	1	10		96	80-120		9.98	4	20	

MB		Sample ID: VL220805-4			Units: %REC		Analysis Date: 8/5/2022 15:28		
Client ID:		Run ID: VL220805-4A			Prep Date: 8/5/2022			DF: 1	
Analyte		Result	ReportLimit					Qual	
Surr: 4-BROMOFLUOROBENZENE		26.9			108	80-120			
Surr: DIBROMOFLUOROMETHANE		25.3			101	80-120			
Surr: TOLUENE-D8		25.9			104	80-120			
BENZENE		ND	1						
TOLUENE		ND	1						
ETHYLBENZENE		ND	1						
M+P-XYLENE		ND	1						
O-XYLENE		ND	1						
TOTAL XYLENES		ND	1						

The following samples were analyzed in this batch:

2207671-1

**Client:** PDC Energy  
**Work Order:** 2207671  
**Project:** Thunder 5N BH

## QC BATCH REPORT

Batch ID: **AK220802-1-3** Instrument ID: **NONE** Method: **SM2320B**

LCS		Sample ID: AK220802-1				Units: MG/L		Analysis Date: 8/2/2022			
Client ID:		Run ID: AK220802-1A1				Prep Date: 8/2/2022		DF: 1			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
TOTAL ALKALINITY AS CaCO3	102	5	100		102	85-115				15	

MB		Sample ID: AK220802-1		Units: MG/L		Analysis Date: 8/2/2022	
Client ID:		Run ID: AK220802-1A1		Prep Date: 8/2/2022		DF: 1	
Analyte		Result	ReportLimit	Qual			
BICARBONATE AS CaCO3		ND	5				
CARBONATE AS CaCO3		ND	5				
TOTAL ALKALINITY AS CaCO3		ND	5				

The following samples were analyzed in this batch:

2207671-1

Client: PDC Energy  
Work Order: 2207671  
Project: Thunder 5N BH

## QC BATCH REPORT

Batch ID: IC220801-1-1 Instrument ID: IC3 Method: EPA300.0

LCS	Sample ID: IC220801-1			Units: MG/L			Analysis Date: 8/1/2022 12:02				
Client ID:	Run ID: IC220801-1A1			Prep Date: 8/1/2022			DF: 1				
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
CHLORIDE	9.9	0.2	10		99	90-110				15	
SULFATE	48.5	1	50		97	90-110				15	

LCSD		Sample ID: IC220801-1			Units: MG/L		Analysis Date: 8/1/2022 13:14				
Client ID:		Run ID: IC220801-1A1			Prep Date: 8/1/2022			DF: 1			
Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
CHLORIDE	9.75	0.2	10		98	90-110		9.9	1	15	
SULFATE	48	1	50		96	90-110		48.5	1	15	

MB		Sample ID: IC220801-1		Units: MG/L		Analysis Date: 8/1/2022 12:08	
Client ID:		Run ID: IC220801-1A1		Prep Date: 8/1/2022		DF: 1	
Analyte		Result	ReportLimit	Qual			
CHLORIDE		ND	0.2				
SULFATE		ND	1				

The following samples were analyzed in this batch:

2207671-1



05-Aug-2022

Katie O'Brien  
ALS Environmental  
225 Commerce Dr  
Ft. Collins, CO 80524

Re: **2207671**

Work Order: **22080022**

Dear Katie,

ALS Environmental received 1 sample on 29-Jul-2022 03:30 PM 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 8.

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,

Electronically approved by: Jodi Blouw

Jodi Blouw

## Report of Laboratory Analysis

Certificate No: MN 026-999-449

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

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**Client:** ALS Environmental  
**Project:** 2207671  
**Work Order:** 22080022

**Work Order Sample Summary**

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<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
22080022-01	T-5N A	Water		7/27/2022 11:15	7/29/2022 15:30	<input type="checkbox"/>

**Client:** ALS Environmental  
**Project:** 2207671  
**WorkOrder:** 22080022

## QUALIFIERS, ACRONYMS, UNITS

<u>Qualifier</u>	<u>Description</u>
*	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
n	Analyte accreditation is not offered
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.

<u>Acronym</u>	<u>Description</u>
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

<u>Units Reported</u>	<u>Description</u>
mg/L	Milligrams per Liter

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**Client:** ALS Environmental  
**Project:** 2207671  
**Work Order:** 22080022

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**Case Narrative**

Samples for the above noted Work Order were received on 07/29/2022. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Wet Chemistry:  
No deviations or anomalies were noted.

**ALS Group USA, Corp**

Date: 05-Aug-22

**CLIENT:** ALS Environmental  
**Project:** 2207671**Work Order:** 22080022**Lab ID:** 22080022-01A**Collection Date:** 7/27/2022 11:15:00 AM**Client Sample ID:** T-5N A**Matrix:** WATER

Analyses	Result	Report Limit	MDL	Qual	Units	Dilution Factor	Date Analyzed
<b>TOTAL DISSOLVED SOLIDS</b>			<b>A2540 C-11</b>				Analyst: <b>LAD</b>
Total Dissolved Solids	34,000	1,500	1,100		mg/L	1	8/5/2022 12:50 PM

**Qualifiers:** U - Analyzed for but Not Detected  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
P - Dual Column results RPD > 40%  
E - Value above quantitation range  
H - Analyzed outside of Hold Time

AR Page 1 of 1



## ALS Group, USA

Date: 05-Aug-22

Client: ALS Environmental

Work Order: 22080022

Project: 2207671

## QC BATCH REPORT

Batch ID: 200701

Instrument ID TDS

Method: A2540 C-11

<b>MBLK</b>		Sample ID: <b>MBLK-200701-200701</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/5/2022 12:50 PM</b>			
Client ID:		Run ID: <b>TDS_220805A</b>				SeqNo: <b>8682635</b>		Prep Date: <b>8/2/2022</b>		DF: <b>1</b>	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	U	22	30								

<b>LCS</b>		Sample ID: <b>LCS-200701-200701</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/5/2022 12:50 PM</b>			
Client ID:		Run ID: <b>TDS_220805A</b>				SeqNo: <b>8682633</b>		Prep Date: <b>8/2/2022</b>		DF: <b>1</b>	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	516	22	30	495	0	104	85-109	0			

<b>DUP</b>		Sample ID: <b>22072626-05A DUP</b>				Units: <b>mg/L</b>		Analysis Date: <b>8/5/2022 12:50 PM</b>			
Client ID:		Run ID: <b>TDS_220805A</b>				SeqNo: <b>8682624</b>		Prep Date: <b>8/2/2022</b>		DF: <b>1</b>	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	720	37	50	0	0	0	0-0	730	1.38	10	

The following samples were analyzed in this batch:

22080022-01A

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

QC Page: 1 of 1



# ALS Environmental

225 Commerce Drive, Fort Collins, Colorado 80524

TF: (800) 443-1511 w PH: (970) 490-1511 w FX: (970) 490-1522

## Chain-of-Custody

LAB ID

DATE

7/28/2022

PAGE

of

PROJECT NAME Thunder 5N BH E-MAIL kathleen.obrien@alsglobal.com TURNAROUND Standard DISPOSAL By Lab or Return to Client

PROJECT No.

PHONE

970-490-1511

125ml Poly Unp.

REPORT TO

Katie O'Brien

FAX

970-490-1522

COMPANY

ALS Environmental

ADDRESS

225 Commerce Drive, Fort Collins, Colorado 80524

22080022

ALS - FORT COLLINS: ALS Laboratory Group  
Project: Thunder 5N BH



Lab ID

Field ID

Matrix

Sample  
Date

Sample  
Time

#  
Btls

QC

TDS

T-5N A

Water

07/27/2022

11:15

1

x

COMMENTS

ALS 2207671

Summary Report. COGCC\_EDD

Facility ID: 463431

SIGNATURE

DATE

TIME

COMPANY

Relinquished By

*Karen Craven*

*Karen Craven*

*7/28/22*

*1:30*

*ALS*

Received By

*Colby Kent*

*7-24-22*

*1:30*

*IR3*

*1.9*

Sample Receipt Checklist

Client Name: **ALS - FORT COLLINS**

Date/Time Received: **29-Jul-22 15:30**

Work Order: **22080022**

Received by: **CMK**

Checklist completed by Caleb Kaetje 01-Aug-22  
eSignature Date

Reviewed by: Jodi Blum 01-Aug-22  
eSignature Date

Matrices: **Water**

Carrier name: **FedEx**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on 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 checked="" type="checkbox"/>	No <input 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?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>1.4/2.4c</u>		<u>IR3</u>
Cooler(s)/Kit(s):	<u></u>		
Date/Time sample(s) sent to storage:	<u>8/1/2022 9:52:03 AM</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:	<u>-</u>		

Login Notes:

-----

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction: