LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 31

2018

Bate Stamp Numbers
00883536 – 00884901

Prepared for

Department of the Army
Longhorn Army Ammunition Plant

1976 – 2018

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
ADMINISTRATIVE RECORD – CHRONOLOGICAL INDEX

VOLUME 31

2018

A. Title: Report (cont'd) – Draft Quarterly Evaluation Report 1st Quarter (January-March) 2018 Groundwater Treatment Plant
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: July 27, 2018
Bate Stamp: 00883536 – 00884375

B. Title: Report – Draft Final, Third Annual Remedial Action Operation Report, LHAAP-50, Former Sump Water Tank
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: August 14, 2018
Bate Stamp: 00884376 – 00884597

C. Title: Report (cont'd) – Draft Final, Third Annual Remedial Action Operation Report, LHAAP-50, Former Sump Water Tank (LAB DATA)
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: August 14, 2018
Bate Stamp: 00884598 – 00884901

ANALYTICAL REPORT

Report Date: March 09, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1806588**
Project ID: HS18030054 022818
Purchase Order: HS18030054
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP140_022818	1806588001	02/28/18	03/03/18	

ANALYTICAL REPORT

Workorder: 34-1806588
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP140_022818**	Sampling Site: NA	Collected: 02/28/2018
Lab ID: 1806588001	Media: 125 mL Nalgene	Received: 03/03/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2058 (HBN: 209974)	**Percent Solid:** NA
	Analyzed: 03/08/2018 16:40	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**5400**	1000	2000	4000	1000	

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 03/09/2018 11:30	/S/ Stephen Brose 03/09/2018 13:36

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1806588
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ANAB (DoD ELAP)	ADE-1420	http://www.anab.org/accredited-organizations/
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
	Kansas	E-10416	http://www.kdheks.gov/lipo/index.html
Industrial Hygiene	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
Lead Testing:			
CPSC	ANAB (ISO 17025, CPSC)	ADE-1420	http://www.anab.org/accredited-organizations/
Soil, Dust, Paint ,Air	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

Workorder: 34-1806588
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1806588

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2058 (HBN: 209974)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 590393
Analyzed: 03/08/2018 14:46
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 590394
Analyzed: 03/08/2018 15:00
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.38	5.00	108	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1806736001	**MS:** 590395	**MSD:** 590396
Analyzed: 03/08/2018 15:15	**Analyzed:** 03/08/2018 15:29	**Analyzed:** 03/08/2018 15:44
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	1.80	7.01	5	105	78.8	123.8	7.16	108	2.11	0.0	20.0

Continuing Calibration Verification

CCV: 590390		**CCV:** 590397
Analyzed: 03/08/2018 14:02		**Analyzed:** 03/08/2018 17:09
Units: ug/L		**Units:** ug/L
Criteria: ± 15%		**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	26.4	25.0	105	27.6	25.0	111

Interference Check Sample

ICSA: 590392
Analyzed: 03/08/2018 14:32
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.967	1.00	96.7

Limit of Detection Verification

LODV: 590391		**LODV:** 590398
Analyzed: 03/08/2018 14:17		**Analyzed:** 03/08/2018 17:23
Units: ug/L		**Units:** ug/L
Criteria: ± 50%		**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.13	1.00	113	1.10	1.00	110

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1806588

Limits:	Client SOW/Contract Specified	**Preparation:**	NA
Basis:	DoD QSM	**Batch:**	NA
		Prepared By:	NA
Analysis:	EPA 6850		
Batch:	ELMS/2058 (HBN: 209974)		
Analyzed By:	Thomas Bosch		

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
03/09/2018 11:30	03/09/2018 13:36

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◆ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

18698/#2





10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

W 1806588

Subcontract Chain of Custody

COC ID: 8698

1806588

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	
Email:	

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18030054
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18030054-01**	**LH18/24-SP140_022818**	**Water**	**28 Feb 2018 14:00**
	SUB_Perch-6850			15 Mar 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By:	[signature]	Date/Time:	3/2/18 1800
Received By:	[signature]	Date/Time:	3/3/2018 9:01
Cooler ID(s):	2900	Temperature(s):	2°

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18030054	***Split:***	**Workorder ID:** 1806588	**Level:** ENV_LVL4
Client: ALS Environmental (Houston)		**Account:** 8101	**Type:** 125Poly
Comments:			**Preservatives**

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	02/28/2018 14:00	LH18/24-SP140_022818	1806588001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

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ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath Julie	03/03/2018 09:01	ALS Sample Receiving	Sample Login
Julie Warath	3/6/18 1600	ISB	Storage
R.331	3-8-18/13.02	T.Burd	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00883543

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston

Project/Task/Site: 1806588

Date/Time of Receipt: 3/3/2018 9:01

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:						
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 2900	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Meredith Edwards (Signature) Meredith Edwards (Printed Name) 3/3/2018 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

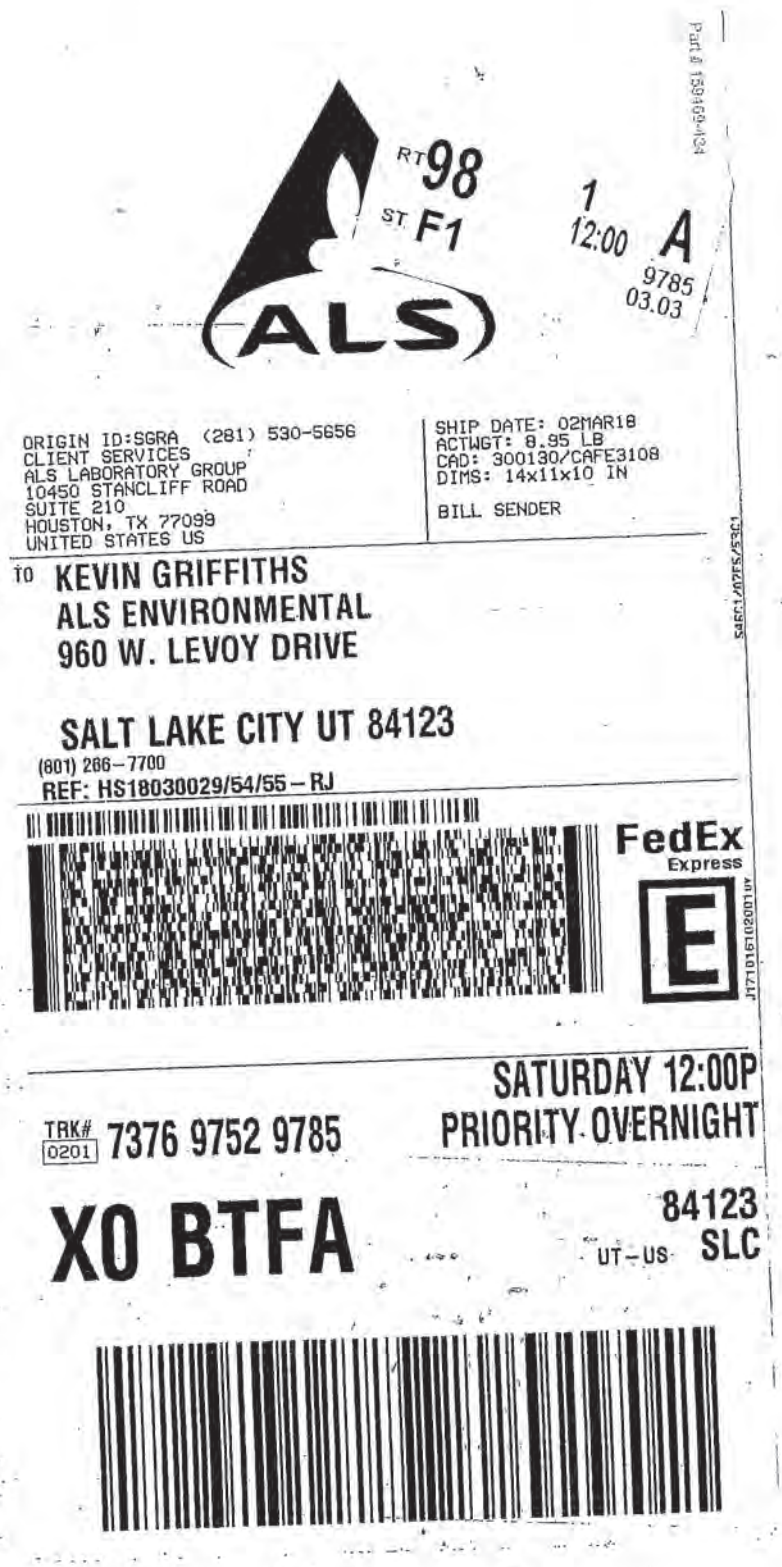
Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

CRIR.doc Revised 01/01/2018



Part # 159459-124

RT 98
ST F1

1
12:00 A
9785
03.03

ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 02MAR18
ACTWGT: 8.95 LB
CAD: 300130/CAFE3108
DIMS: 14x11x10 IN

BILL SENDER

TO KEVIN GRIFFITHS
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18030029/54/55 - RJ

FedEx Express

SATURDAY 12:00P
PRIORITY OVERNIGHT

TRK# 0201 7376 9752 9785

XO BTFA

84123
UT-US SLC

Batch Worklist

Batch: ELMS/ 2058
Rule: EPA 6850, DoD QSM Water

Created: 3/8/2018 13:38
Analyst: T. Bosch

Instrument: LCMS04
Status: WP

HBN: 209974

Workorder: 1806586 [ENV_LVL4]
Workorder: 1806588 [ENV_LVL4]
Workorder: 1806590 [ENV_LVL4]
Workorder: 1806736 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	590390	CCV for HBN 209974 [ELMS/2058]				CCV	3		E685041C3Q	5311		3/9/2018	3/8/2018
2	590391	LODV for HBN 209974 [ELMS/2058				LODV	3		E6850..D3Q	5311		3/9/2018	3/8/2018
3	590392	ICS for HBN 209974 [ELMS/2058]				ICS	3		E6850..D3Q	5311		3/9/2018	3/8/2018
4	590393	LMB for HBN 209974 [ELMS/2058]				LMB	3		E6850Q413Q	5311		3/9/2018	3/8/2018
5	590394	LCS for HBN 209974 [ELMS/2058]				LCS	3		E6850Q413Q	5311		3/9/2018	3/8/2018
6	1806736001	INF Pond-Inlet_030718				SAMPLE	3	1806736001-A	E6850Q41.3	5480	4/4/2018	3/9/2018	3/8/2018
7	590395	INF Pond-Inle...(1806736001MS)				MS	3		E6850Q413Q	5311		3/9/2018	3/8/2018
8	590396	INF Pond-Inl...(1806736001MSD)				MSD	3		E6850Q413Q	5311		3/9/2018	3/8/2018
9	1806736002	INF Pond-Outlet_030718				SAMPLE	3	1806736002-A	E6850Q41.3	5480	4/4/2018	3/9/2018	3/8/2018
10	1806586001	LH18/24-SP650-022818				SAMPLE	3	1806586001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
11	1806588001	LH18/24-SP140_022818				SAMPLE	3	1806588001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
12	1806590001	LH18/25-SP650_022818				SAMPLE	3	1806590001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
13	590397	CCV for HBN 209974 [ELMS/2058]				CCV	3		E685041C3Q	5311		3/9/2018	3/8/2018
14	590398	LODV for HBN 209974 [ELMS/2058				LODV	3		E6850..D3Q	5311		3/9/2018	3/8/2018

00883546



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1806736 (001,02); 1806586 (001); 1806588 (001); 1806590 (001)
ELMS Batch/HBN ID: 2058 (209974)
Prep Date: 03/08/2018 Analysis Date: 03/08/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAR\08MAR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 590394; Target = 5.0µg/L. ASTM type II water was used for LMB 590393.

MS/MSD: MS/MSD was performed on sample 1806736001 (Client ID: INF Pond-Inlet_030718). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters. The ion ratio of m/z 83 to 85 may fail at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 590391).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafile 08MARD04.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\209974-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK	Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: T. Bosch
Create Date: 5/11/2017
Lab Lot: CLO4 QC STOCK

Amount: 100 mL
Expires: 3/31/2020
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 38780	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 10/09/2017 01:10PM	Expires: 10/09/2018
MFG Lot: TNB: 10/09/17	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ACCREDITATION No. 34 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ACCREDITATION No. 1029 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard,® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

** For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 16, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18030055**

Laboratory Results for: **Longhorn GW Treatment Plant**

Dear Marcia,

ALS Environmental received 2 sample(s) on Mar 01, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: Jumoke.Lawal
RJ Modashia
Project Manager

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS18030055

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18030055-01	LH18/24-SP650_022818	Water		28-Feb-2018 14:00	01-Mar-2018 09:15	☐
HS18030055-02	Trip Blank	Water	ALS-021518-42	28-Feb-2018 00:01	01-Mar-2018 09:15	☐

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: Longhorn GW Treatment Plant
Work Order:

Work Order Comments

• The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 125840

Sample ID: LH18/24-SP650_022818 (HS18030055-01)

• The surrogate recoveries could not be determined due to dilution below the calibration range.

GCMS Volatiles by Method SW8260

Batch ID: R311972

Sample ID: HS18030131-05MS

• MS and MSD are for an unrelated sample.

Metals by Method SW6020

Batch ID: 126131

Sample ID: HS18030472-02MS

• MS/MSD and DUPs for an unrelated sample

Metals by Method SW7470

Batch ID: 125884

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E1664A

Batch ID: R312478

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: R312306

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E410.4

Batch ID: R312257

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_022818
Collection Date: 28-Feb-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18030055
Lab ID:HS18030055-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,2-Dichloroethane	**0.76**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	05-Mar-2018 12:29
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	05-Mar-2018 12:29
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	05-Mar-2018 12:29
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	05-Mar-2018 12:29
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	05-Mar-2018 12:29
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	05-Mar-2018 12:29
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_022818
Collection Date: 28-Feb-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18030055
Lab ID:HS18030055-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
cis-1,2-Dichloroethene	**3.8**		**0.20**	**0.50**	**1.0**	**ug/L**	1	05-Mar-2018 12:29
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	05-Mar-2018 12:29
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	05-Mar-2018 12:29
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:29
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Trichloroethene	**2.4**		**0.20**	**0.50**	**1.0**	**ug/L**	1	05-Mar-2018 12:29
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:29
Surr: 1,2-Dichloroethane-d4	*83.3*			**0**	*81-118*	*%REC*	*1*	*05-Mar-2018 12:29*
Surr: 4-Bromofluorobenzene	*98.8*			**0**	*85-114*	*%REC*	*1*	*05-Mar-2018 12:29*
Surr: Dibromofluoromethane	*87.6*			**0**	*80-119*	*%REC*	*1*	*05-Mar-2018 12:29*
Surr: Toluene-d8	*105*			**0**	*89-112*	*%REC*	*1*	*05-Mar-2018 12:29*
SEMIVOLATILES SIM	**Method:SW8270SIM**					Prep:SW3510 / 05-Mar-2018		Analyst: ACN
1,4-Dioxane	**13**		**1.0**	**1.0**	**1.0**	**ug/L**	100	07-Mar-2018 16:38
Surr: 2-Fluorobiphenyl	*0*	*S*		0	*40-140*	*%REC*	*100*	*07-Mar-2018 16:38*
Surr: 4-Terphenyl-d14	*0*	*S*		0	*40-140*	*%REC*	*100*	*07-Mar-2018 16:38*
Surr: Nitrobenzene-d5	*0*	*S*		0	*40-140*	*%REC*	*100*	*07-Mar-2018 16:38*

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_022818
Collection Date: 28-Feb-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18030055
Lab ID:HS18030055-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**				Prep:SW3010A / 13-Mar-2018		Analyst: JCJ
Aluminum	**0.0108**		**0.00180**	**0.00500**	**0.0100**	**mg/L**	1	15-Mar-2018 14:35
Antimony	**0.000532**	J	**0.000400**	**0.00100**	**0.00200**	**mg/L**	1	15-Mar-2018 14:35
Arsenic	**0.000931**	J	**0.000400**	**0.00100**	**0.00200**	**mg/L**	1	15-Mar-2018 14:35
Barium	**0.155**		**0.00190**	**0.00250**	**0.00400**	**mg/L**	1	15-Mar-2018 14:35
Beryllium	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	15-Mar-2018 14:35
Cadmium	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	15-Mar-2018 14:35
Calcium	**15.3**		**0.0340**	**0.100**	**0.500**	**mg/L**	1	15-Mar-2018 14:35
Chromium	**0.00669**		**0.000400**	**0.00100**	**0.00400**	**mg/L**	1	15-Mar-2018 14:35
Cobalt	**0.00266**	J	**0.000200**	**0.00100**	**0.00500**	**mg/L**	1	15-Mar-2018 14:35
Iron	**0.140**	J	**0.0120**	**0.100**	**0.200**	**mg/L**	1	15-Mar-2018 14:35
Lead	0.00100	U	0.000600	0.00100	0.00200	mg/L	1	15-Mar-2018 14:35
Magnesium	**28.3**		**0.0100**	**0.100**	**0.200**	**mg/L**	1	15-Mar-2018 14:35
Manganese	**0.0579**		**0.000700**	**0.00100**	**0.00500**	**mg/L**	1	15-Mar-2018 14:35
Nickel	**0.0121**		**0.000600**	**0.00100**	**0.00200**	**mg/L**	1	15-Mar-2018 14:35
Potassium	**1.93**		**0.0180**	**0.100**	**0.200**	**mg/L**	1	15-Mar-2018 14:35
Selenium	**0.00149**	J	**0.00110**	**0.00200**	**0.00200**	**mg/L**	1	15-Mar-2018 14:35
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	15-Mar-2018 14:35
Sodium	**483**		**0.280**	**2.00**	**4.00**	**mg/L**	20	15-Mar-2018 16:01
Thallium	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	15-Mar-2018 14:35
Vanadium	0.00100	U	0.000600	0.00100	0.00500	mg/L	1	15-Mar-2018 14:35
Zinc	**0.0357**		**0.00200**	**0.00250**	**0.00400**	**mg/L**	1	15-Mar-2018 14:35
MERCURY BY SW7470A		**Method:SW7470**				Prep:SW7470 / 05-Mar-2018		Analyst: JBA
Mercury	0.0000500	U	0.0000300	0.0000500	0.000200	mg/L	1	06-Mar-2018 10:27
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**						Analyst: KAH
Oil and Grease	**3.54**		**0.610**	**1.00**	**2.00**	**mg/L**	1	14-Mar-2018 13:35
CHEMICAL OXYGEN DEMAND BY E410.4		**Method:E410.4**						Analyst: AJH
Chemical Oxygen Demand	**86.0**		**5.00**	**5.00**	**15.0**	**mg/L**	1	09-Mar-2018 14:00
ANIONS BY SW9056A		**Method:SW9056**						Analyst: KMU
Chloride	**531**		**2.00**	**2.50**	**5.00**	**mg/L**	10	09-Mar-2018 07:47
Sulfate	**182**		**2.00**	**2.50**	**5.00**	**mg/L**	10	09-Mar-2018 07:47
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	09-Mar-2018 14:02

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank
Collection Date: 28-Feb-2018 00:01

ANALYTICAL REPORT
WorkOrder:HS18030055
Lab ID:HS18030055-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	05-Mar-2018 12:05
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	05-Mar-2018 12:05
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	05-Mar-2018 12:05
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	05-Mar-2018 12:05
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	05-Mar-2018 12:05
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank
Collection Date: 28-Feb-2018 00:01

ANALYTICAL REPORT
WorkOrder:HS18030055
Lab ID:HS18030055-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	05-Mar-2018 12:05
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	05-Mar-2018 12:05
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	05-Mar-2018 12:05
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	05-Mar-2018 12:05
Surr: 1,2-Dichloroethane-d4	*82.5*			**0**	*81-118*	*%REC*	*1*	*05-Mar-2018 12:05*
Surr: 4-Bromofluorobenzene	*96.1*			**0**	*85-114*	*%REC*	*1*	*05-Mar-2018 12:05*
Surr: Dibromofluoromethane	*88.1*			**0**	*80-119*	*%REC*	*1*	*05-Mar-2018 12:05*
Surr: Toluene-d8	*107*			**0**	*89-112*	*%REC*	*1*	*05-Mar-2018 12:05*

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

WEIGHT LOG

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

Batch ID: 125840 **Method:** SEMIVOLATILES SIM **Prep:** 3510_B_SIM

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18030055-01	1	990	1 (mL)	0.00101

Batch ID: 125884 **Method:** MERCURY BY SW7470A **Prep:** HG_WPR

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18030055-01	1	10	10 (mL)	1

Batch ID: 126131 **Method:** ICP-MS METALS BY SW6020A **Prep:** 3010A

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18030055-01	1	10	10 (mL)	1

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 125840	**Test Name :** SEMIVOLATILES SIM			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00		05 Mar 2018 12:19	07 Mar 2018 16:38	100
Batch ID 125884	**Test Name :** MERCURY BY SW7470A			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00		05 Mar 2018 14:00	06 Mar 2018 10:27	1
Batch ID 126131	**Test Name :** ICP-MS METALS BY SW6020A			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00		13 Mar 2018 11:00	15 Mar 2018 16:01	20
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00		13 Mar 2018 11:00	15 Mar 2018 14:35	1
Batch ID R311972	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00			05 Mar 2018 12:29	1
HS18030055-02	Trip Blank	28 Feb 2018 00:01			05 Mar 2018 12:05	1
Batch ID R312238	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00			09 Mar 2018 14:02	1
Batch ID R312257	**Test Name :** CHEMICAL OXYGEN DEMAND BY E410.4			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00			09 Mar 2018 14:00	1
Batch ID R312306	**Test Name :** ANIONS BY SW9056A			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00			09 Mar 2018 07:47	10
Batch ID R312478	**Test Name :** OIL & GREASE (HEM) BY E1664A			**Matrix:** Water		
HS18030055-01	LH18/24-SP650_022818	28 Feb 2018 14:00			14 Mar 2018 13:35	1

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 125884 **Instrument: HG03** **Method: SW7470**

MBLK Sample ID: **MBLK-125884** Units: **mg/L** Analysis Date: **06-Mar-2018 09:55**
Client ID: Run ID: **HG03_311947** SeqNo: **4461339** PrepDate: **05-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0000500	0.000200								U

LCS Sample ID: **LCS-125884** Units: **mg/L** Analysis Date: **06-Mar-2018 10:00**
Client ID: Run ID: **HG03_311947** SeqNo: **4461340** PrepDate: **05-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00504	0.000200	0.005	0	101	80 - 120				

MS Sample ID: **HS18030111-01MS** Units: **mg/L** Analysis Date: **06-Mar-2018 10:09**
Client ID: Run ID: **HG03_311947** SeqNo: **4461344** PrepDate: **05-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00509	0.000200	0.005	0.000228	97.2	75 - 125				

MSD Sample ID: **HS18030111-01MSD** Units: **mg/L** Analysis Date: **06-Mar-2018 10:06**
Client ID: Run ID: **HG03_311947** SeqNo: **4461343** PrepDate: **05-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00506	0.000200	0.005	0.000228	96.6	75 - 125	0.00509	0.591	20	

The following samples were analyzed in this batch: HS18030055-01

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 126131 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-126131** Units: **mg/L** Analysis Date: **15-Mar-2018 14:28**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475111** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.003935	0.0100								J
Antimony	0.00100	0.00200								U
Arsenic	0.00100	0.00200								U
Barium	0.00250	0.00400								U
Beryllium	0.00100	0.00200								U
Cadmium	0.00100	0.00200								U
Calcium	0.100	0.500								U
Chromium	0.00100	0.00400								U
Cobalt	0.00100	0.00500								U
Iron	0.100	0.200								U
Lead	0.00100	0.00200								U
Magnesium	0.100	0.200								U
Manganese	0.00100	0.00500								U
Nickel	0.00100	0.00200								U
Potassium	0.04249	0.200								J
Selenium	0.00200	0.00200								U
Silver	0.00100	0.00200								U
Thallium	0.00100	0.00200								U
Vanadium	0.00100	0.00500								U
Zinc	0.00250	0.00400								U

MBLK Sample ID: **MBLK-126131** Units: **mg/L** Analysis Date: **15-Mar-2018 15:50**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475370** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sodium	0.07897	0.200								J

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 126131 **Instrument: ICPMS04** **Method: SW6020**

LCS Sample ID: **LCS-126131** Units: **mg/L** Analysis Date: **15-Mar-2018 14:30**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475112** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.09485	0.0100	0.1	0	94.8	80 - 120				
Antimony	0.04668	0.00200	0.05	0	93.4	80 - 120				
Arsenic	0.04888	0.00200	0.05	0	97.8	80 - 120				
Barium	0.04512	0.00400	0.05	0	90.2	80 - 120				
Beryllium	0.04763	0.00200	0.05	0	95.3	80 - 120				
Cadmium	0.04636	0.00200	0.05	0	92.7	80 - 120				
Calcium	5.156	0.500	5	0	103	80 - 120				
Chromium	0.04785	0.00400	0.05	0	95.7	80 - 120				
Cobalt	0.04806	0.00500	0.05	0	96.1	80 - 120				
Iron	5.028	0.200	5	0	101	80 - 120				
Lead	0.04414	0.00200	0.05	0	88.3	80 - 120				
Magnesium	4.552	0.200	5	0	91.0	80 - 120				
Manganese	0.04894	0.00500	0.05	0	97.9	80 - 120				
Nickel	0.04881	0.00200	0.05	0	97.6	80 - 120				
Potassium	4.784	0.200	5	0	95.7	80 - 120				
Selenium	0.04512	0.00200	0.05	0	90.2	80 - 120				
Silver	0.0474	0.00200	0.05	0	94.8	80 - 120				
Thallium	0.04365	0.00200	0.05	0	87.3	80 - 120				
Vanadium	0.04672	0.00500	0.05	0	93.4	80 - 120				
Zinc	0.04796	0.00400	0.05	0	95.9	80 - 120				

LCS Sample ID: **LCS-126131** Units: **mg/L** Analysis Date: **15-Mar-2018 15:52**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475371** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sodium	4.686	0.200	5	0	93.7	80 - 120				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 126131 **Instrument: ICPMS04** **Method: SW6020**

MS Sample ID: **HS18030472-02MS** Units: **mg/L** Analysis Date: **15-Mar-2018 14:41**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475117** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1362	0.0100	0.1	0.0632	73.0	80 - 120				S
Antimony	0.04697	0.00200	0.05	0.000151	93.6	80 - 120				
Arsenic	0.04907	0.00200	0.05	0.000762	96.6	80 - 120				
Barium	0.06834	0.00400	0.05	0.02408	88.5	80 - 120				
Beryllium	0.04064	0.00200	0.05	0.00002	81.2	80 - 120				
Cadmium	0.04478	0.00200	0.05	0.000132	89.3	80 - 120				
Calcium	349.7	0.500	5	345.4	85.5	80 - 120				EO
Chromium	0.04536	0.00400	0.05	0.000324	90.1	80 - 120				
Cobalt	0.04828	0.00500	0.05	0.003523	89.5	80 - 120				
Iron	4.792	0.200	5	0.2489	90.9	80 - 120				
Lead	0.04518	0.00200	0.05	0.000716	88.9	80 - 120				
Magnesium	198.4	0.200	5	198.4	0.00238	80 - 120				SEO
Manganese	0.2801	0.00500	0.05	0.2357	88.8	80 - 120				O
Nickel	0.0526	0.00200	0.05	0.007836	89.5	80 - 120				
Potassium	8.002	0.200	5	3.429	91.5	80 - 120				
Selenium	0.05347	0.00200	0.05	0.003589	99.8	80 - 120				
Silver	0.04234	0.00200	0.05	0.000014	84.6	80 - 120				
Sodium	0.100	0.200	5	0	0	80 - 120				S U
Thallium	0.04325	0.00200	0.05	0.000007	86.5	80 - 120				
Vanadium	0.04736	0.00500	0.05	-0.000104	94.9	80 - 120				
Zinc	0.05324	0.00400	0.05	0.009825	86.8	80 - 120				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 126131 **Instrument: ICPMS04** **Method: SW6020**

MSD Sample ID: **HS18030472-02MSD** Units: **mg/L** Analysis Date: **15-Mar-2018 14:43**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475118** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1372	0.0100	0.1	0.0632	74.0	80 - 120	0.1362	0.715	20	S
Antimony	0.0452	0.00200	0.05	0.000151	90.1	80 - 120	0.04697	3.85	20	
Arsenic	0.04836	0.00200	0.05	0.000762	95.2	80 - 120	0.04907	1.45	20	
Barium	0.06914	0.00400	0.05	0.02408	90.1	80 - 120	0.06834	1.16	20	
Beryllium	0.04008	0.00200	0.05	0.00002	80.1	80 - 120	0.04064	1.4	20	
Cadmium	0.04598	0.00200	0.05	0.000132	91.7	80 - 120	0.04478	2.66	20	
Calcium	337.8	0.500	5	345.4	-154	80 - 120	349.7	3.48	20	SEO
Chromium	0.04746	0.00400	0.05	0.000324	94.3	80 - 120	0.04536	4.52	20	
Cobalt	0.04697	0.00500	0.05	0.003523	86.9	80 - 120	0.04828	2.74	20	
Iron	4.716	0.200	5	0.2489	89.3	80 - 120	4.792	1.6	20	
Lead	0.04544	0.00200	0.05	0.000716	89.4	80 - 120	0.04518	0.578	20	
Magnesium	199.6	0.200	5	198.4	25.5	80 - 120	198.4	0.64	20	SEO
Manganese	0.2738	0.00500	0.05	0.2357	76.1	80 - 120	0.2801	2.3	20	SO
Nickel	0.04882	0.00200	0.05	0.007836	82.0	80 - 120	0.0526	7.44	20	
Potassium	8.05	0.200	5	3.429	92.4	80 - 120	8.002	0.599	20	
Selenium	0.0491	0.00200	0.05	0.003589	91.0	80 - 120	0.05347	8.53	20	
Silver	0.04224	0.00200	0.05	0.000014	84.5	80 - 120	0.04234	0.229	20	
Sodium	0.100	0.200	5	0	0	80 - 120	0	0	20	S U
Thallium	0.04401	0.00200	0.05	0.000007	88.0	80 - 120	0.04325	1.75	20	
Vanadium	0.04829	0.00500	0.05	-0.000104	96.8	80 - 120	0.04736	1.94	20	
Zinc	0.05408	0.00400	0.05	0.009825	88.5	80 - 120	0.05324	1.57	20	

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 126131 **Instrument: ICPMS04** **Method: SW6020**

PDS Sample ID: **HS18030472-02PDS** Units: **mg/L** Analysis Date: **15-Mar-2018 14:46**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475119** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1314	0.0100	0.1	0.0632	68.2	75 - 125				S
Antimony	0.07836	0.00200	0.1	0.000151	78.2	75 - 125				
Arsenic	0.09169	0.00200	0.1	0.000762	90.9	75 - 125				
Barium	0.1104	0.00400	0.1	0.02408	86.3	75 - 125				
Beryllium	0.0812	0.00200	0.1	0.00002	81.2	75 - 125				
Cadmium	0.08602	0.00200	0.1	0.000132	85.9	75 - 125				
Chromium	0.08908	0.00400	0.1	0.000324	88.8	75 - 125				
Cobalt	0.09229	0.00500	0.1	0.003523	88.8	75 - 125				
Iron	8.895	0.200	10	0.2489	86.5	75 - 125				
Lead	0.0875	0.00200	0.1	0.000716	86.8	75 - 125				
Nickel	0.09517	0.00200	0.1	0.007836	87.3	75 - 125				
Potassium	12.28	0.200	10	3.429	88.5	75 - 125				
Selenium	0.08526	0.00200	0.1	0.003589	81.7	75 - 125				
Silver	0.08347	0.00200	0.1	0.000014	83.5	75 - 125				
Thallium	0.08694	0.00200	0.1	0.000007	86.9	75 - 125				
Vanadium	0.09259	0.00500	0.1	-0.000104	92.7	75 - 125				
Zinc	0.09939	0.00400	0.1	0.009825	89.6	75 - 125				

PDS Sample ID: **HS18030472-02PDS** Units: **mg/L** Analysis Date: **15-Mar-2018 16:08**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475378** PrepDate: **13-Mar-2018** DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Calcium	509.4	10.0	200	369.1	70.2	75 - 125				S
Magnesium	386.4	4.00	200	217	84.7	75 - 125				
Sodium	869.3	4.00	200	713.5	77.9	75 - 125				

PDS Sample ID: **HS18030472-02PDS** Units: **mg/L** Analysis Date: **15-Mar-2018 15:57**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475373** PrepDate: **13-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	0.3109	0.00500	0.1	0.2357	75.1	75 - 125				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 126131 **Instrument: ICPMS04** **Method: SW6020**

SD Sample ID: **HS18030472-02SD** Units: **mg/L** Analysis Date: **15-Mar-2018 14:39**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475116** PrepDate: **13-Mar-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Aluminum	0.06348	0.0500					0.0632	0.441	10	
Antimony	0.00500	0.0100					0.000151	0	10	U
Arsenic	0.00500	0.0100					0.000762	0	10	U
Barium	0.0231	0.0200					0.02408	4.08	10	
Beryllium	0.00500	0.0100					0.00002	0	10	U
Cadmium	0.00500	0.0100					0.000132	0	10	U
Chromium	0.00500	0.0200					0.000324	0	10	U
Cobalt	0.004117	0.0250					0.003523	0	10	J
Iron	0.2493	1.00					0.2489	0	10	J
Lead	0.00500	0.0100					0.000716	0	10	U
Manganese	0.2312	0.0250					0.2357	1.91	10	
Nickel	0.006589	0.0100					0.007836	0	10	J
Potassium	4.009	1.00					3.429	16.9	10	R
Selenium	0.0100	0.0100					0.003589	0	10	U
Silver	0.00500	0.0100					0.000014	0	10	U
Thallium	0.00500	0.0100					0.000007	0	10	U
Vanadium	0.00500	0.0250					-0.000104	0	10	U
Zinc	0.01038	0.0200					0.009825	0	10	J

SD Sample ID: **HS18030472-02SD** Units: **mg/L** Analysis Date: **15-Mar-2018 16:05**
Client ID: Run ID: **ICPMS04_312510** SeqNo: **4475377** PrepDate: **13-Mar-2018** DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Calcium	378.8	50.0					369.1	2.64	10	
Magnesium	230	20.0					217	5.99	10	
Sodium	760	20.0					713.5	6.53	10	

The following samples were analyzed in this batch: HS18030055-01

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: 125840 **Instrument: SV-5** **Method: SW8270SIM**

MBLK Sample ID: **MBLK-125840** Units: **ug/L** Analysis Date: **06-Mar-2018 12:07**
Client ID: Run ID: **SV-5_312182** SeqNo: **4465945** PrepDate: **05-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.010	0.010								U
Surr: 2-Fluorobiphenyl	*0.09098*	*0*	*0.08*	*0*	*114*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.06762*	*0*	*0.08*	*0*	*84.5*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05812*	*0*	*0.08*	*0*	*72.7*	*40 - 140*				

LCS Sample ID: **LCS-125840** Units: **ug/L** Analysis Date: **06-Mar-2018 12:27**
Client ID: Run ID: **SV-5_312182** SeqNo: **4465946** PrepDate: **05-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.08456	0.010	0.08	0	106	40 - 140				
Surr: 2-Fluorobiphenyl	*0.1006*	*0*	*0.08*	*0*	*126*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.07046*	*0*	*0.08*	*0*	*88.1*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.0667*	*0*	*0.08*	*0*	*83.4*	*40 - 140*				

LCSD Sample ID: **LCSD-125840** Units: **ug/L** Analysis Date: **06-Mar-2018 12:48**
Client ID: Run ID: **SV-5_312182** SeqNo: **4465947** PrepDate: **05-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.08525	0.010	0.08	0	107	40 - 140	0.08456	0.814	20	
Surr: 2-Fluorobiphenyl	*0.08862*	*0*	*0.08*	*0*	*111*	*40 - 140*	*0.1006*	*12.7*	*20*	
Surr: 4-Terphenyl-d14	*0.0721*	*0*	*0.08*	*0*	*90.1*	*40 - 140*	*0.07046*	*2.3*	*20*	
Surr: Nitrobenzene-d5	*0.06383*	*0*	*0.08*	*0*	*79.8*	*40 - 140*	*0.0667*	*4.39*	*20*	

The following samples were analyzed in this batch: HS18030055-01

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180305** Units: **ug/L** Analysis Date: **05-Mar-2018 11:16**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461668** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180305** Units: **ug/L** Analysis Date: **05-Mar-2018 11:16**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461668** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*41.35*	*1.0*	*50*	*0*	*82.7*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*48.22*	*1.0*	*50*	*0*	*96.4*	*85 - 114*				
Surr: Dibromofluoromethane	*43.62*	*1.0*	*50*	*0*	*87.2*	*80 - 119*				
Surr: Toluene-d8	*53.2*	*1.0*	*50*	*0*	*106*	*89 - 112*				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180305** Units: **ug/L** Analysis Date: **05-Mar-2018 10:27**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461666** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	46.41	1.0	50	0	92.8	78 - 124				
1,1,1-Trichloroethane	48	1.0	50	0	96.0	74 - 131				
1,1,2,2-Tetrachloroethane	43.35	1.0	50	0	86.7	71 - 121				
1,1,2-Trichloroethane	46.26	1.0	50	0	92.5	80 - 119				
1,1-Dichloroethane	46.71	1.0	50	0	93.4	77 - 125				
1,1-Dichloroethene	51.22	1.0	50	0	102	71 - 131				
1,1-Dichloropropene	50.3	1.0	50	0	101	79 - 125				
1,2,3-Trichlorobenzene	46.78	1.0	50	0	93.6	69 - 129				
1,2,3-Trichloropropane	44.39	1.0	50	0	88.8	73 - 122				
1,2,4-Trichlorobenzene	47.79	1.0	50	0	95.6	69 - 130				
1,2,4-Trimethylbenzene	47.8	1.0	50	0	95.6	76 - 124				
1,2-Dibromo-3-chloropropane	44.3	1.0	50	0	88.6	62 - 128				
1,2-Dibromoethane	49.33	1.0	50	0	98.7	77 - 121				
1,2-Dichlorobenzene	42.52	1.0	50	0	85.0	80 - 119				
1,2-Dichloroethane	46.12	1.0	50	0	92.2	73 - 128				
1,2-Dichloropropane	47.73	1.0	50	0	95.5	78 - 122				
1,3,5-Trimethylbenzene	48.65	1.0	50	0	97.3	75 - 124				
1,3-Dichlorobenzene	43.84	1.0	50	0	87.7	80 - 119				
1,3-Dichloropropane	45.56	1.0	50	0	91.1	80 - 119				
1,4-Dichlorobenzene	43	1.0	50	0	86.0	79 - 118				
2,2-Dichloropropane	47.52	1.0	50	0	95.0	60 - 139				
2-Butanone	99.4	2.0	100	0	99.4	56 - 143				
2-Chlorotoluene	47.66	1.0	50	0	95.3	79 - 122				
2-Hexanone	96.75	2.0	100	0	96.7	57 - 139				
4-Chlorotoluene	48.13	1.0	50	0	96.3	78 - 122				
4-Isopropyltoluene	42.73	1.0	50	0	85.5	77 - 127				
4-Methyl-2-pentanone	89.12	2.0	100	0	89.1	67 - 130				
Acetone	97.46	2.0	100	0	97.5	39 - 160				
Benzene	47.79	1.0	50	0	95.6	79 - 120				
Bromobenzene	42.21	1.0	50	0	84.4	80 - 120				
Bromochloromethane	53.13	1.0	50	0	106	78 - 123				
Bromodichloromethane	49.18	1.0	50	0	98.4	79 - 125				
Bromoform	50.65	1.0	50	0	101	66 - 130				
Bromomethane	54.48	1.0	50	0	109	53 - 141				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180305** Units: **ug/L** Analysis Date: **05-Mar-2018 10:27**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461666** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	99.87	2.0	100	0	99.9	64 - 133				
Carbon tetrachloride	45.13	1.0	50	0	90.3	72 - 136				
Chlorobenzene	45.59	1.0	50	0	91.2	80 - 120				
Chloroethane	41.15	1.0	50	0	82.3	82 - 118				
Chloroform	45.32	1.0	50	0	90.6	79 - 124				
Chloromethane	48.64	1.0	50	0	97.3	50 - 139				
cis-1,2-Dichloroethene	50.28	1.0	50	0	101	78 - 123				
cis-1,3-Dichloropropene	51.55	1.0	50	0	103	75 - 124				
Dibromochloromethane	48.22	1.0	50	0	96.4	74 - 126				
Dibromomethane	52.19	1.0	50	0	104	79 - 123				
Dichlorodifluoromethane	47.49	1.0	50	0	95.0	32 - 152				
Ethylbenzene	51.5	1.0	50	0	103	79 - 121				
Hexachlorobutadiene	44.3	1.0	50	0	88.6	66 - 134				
Isopropylbenzene	46.09	1.0	50	0	92.2	72 - 131				
m,p-Xylene	90.41	2.0	100	0	90.4	80 - 121				
Methylene chloride	46.02	2.0	50	0	92.0	74 - 124				
Naphthalene	50.1	1.0	50	0	100	61 - 128				
n-Butylbenzene	44.67	1.0	50	0	89.3	75 - 128				
n-Propylbenzene	42.62	1.0	50	0	85.2	76 - 126				
o-Xylene	46.04	1.0	50	0	92.1	78 - 122				
sec-Butylbenzene	44.42	1.0	50	0	88.8	77 - 126				
Styrene	46.4	1.0	50	0	92.8	78 - 128				
tert-Butylbenzene	42.72	1.0	50	0	85.4	78 - 124				
Tetrachloroethene	46.09	1.0	50	0	92.2	74 - 129				
Toluene	44.28	1.0	50	0	88.6	80 - 121				
trans-1,2-Dichloroethene	51.39	1.0	50	0	103	75 - 124				
trans-1,3-Dichloropropene	52.24	1.0	50	0	104	73 - 127				
Trichloroethene	50.27	1.0	50	0	101	79 - 123				
Trichlorofluoromethane	49.06	1.0	50	0	98.1	65 - 141				
Vinyl chloride	49.49	1.0	50	0	99.0	58 - 137				
Surr: 1,2-Dichloroethane-d4	*42.23*	*1.0*	*50*	*0*	*84.5*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.77*	*1.0*	*50*	*0*	*99.5*	*85 - 114*				
Surr: Dibromofluoromethane	*41.77*	*1.0*	*50*	*0*	*83.5*	*80 - 119*				
Surr: Toluene-d8	*51.4*	*1.0*	*50*	*0*	*103*	*89 - 112*				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030131-05MS** Units: **ug/L** Analysis Date: **05-Mar-2018 14:13**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461675** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	40.33	1.0	50	0	80.7	78 - 124				
1,1,1-Trichloroethane	43.51	1.0	50	0	87.0	74 - 131				
1,1,2,2-Tetrachloroethane	38.48	1.0	50	0	77.0	71 - 121				
1,1,2-Trichloroethane	40.59	1.0	50	0	81.2	80 - 119				
1,1-Dichloroethane	41.37	1.0	50	0	82.7	77 - 125				
1,1-Dichloroethene	45.69	1.0	50	0	91.4	71 - 131				
1,1-Dichloropropene	47	1.0	50	0	94.0	79 - 125				
1,2,3-Trichlorobenzene	40.4	1.0	50	0	80.8	69 - 129				
1,2,3-Trichloropropane	38.11	1.0	50	0	76.2	73 - 122				
1,2,4-Trichlorobenzene	40.95	1.0	50	0	81.9	69 - 130				
1,2,4-Trimethylbenzene	41.46	1.0	50	0	82.9	76 - 124				
1,2-Dibromo-3-chloropropane	41.55	1.0	50	0	83.1	62 - 128				
1,2-Dibromoethane	42.32	1.0	50	0	84.6	77 - 121				
1,2-Dichlorobenzene	37.56	1.0	50	0	75.1	80 - 119				S
1,2-Dichloroethane	37.91	1.0	50	0	75.8	73 - 128				
1,2-Dichloropropane	40.9	1.0	50	0	81.8	78 - 122				
1,3,5-Trimethylbenzene	42.17	1.0	50	0	84.3	75 - 124				
1,3-Dichlorobenzene	37.74	1.0	50	0	75.5	80 - 119				S
1,3-Dichloropropane	39.8	1.0	50	0	79.6	80 - 119				S
1,4-Dichlorobenzene	36.27	1.0	50	0	72.5	79 - 118				S
2,2-Dichloropropane	41.82	1.0	50	0	83.6	60 - 139				
2-Butanone	92.01	2.0	100	0	92.0	56 - 143				
2-Chlorotoluene	41.84	1.0	50	0	83.7	79 - 122				
2-Hexanone	91.6	2.0	100	0	91.6	57 - 139				
4-Chlorotoluene	41.13	1.0	50	0	82.3	78 - 122				
4-Isopropyltoluene	38.01	1.0	50	0	76.0	77 - 127				S
4-Methyl-2-pentanone	82.85	2.0	100	0	82.9	67 - 130				
Acetone	83.47	2.0	100	0	83.5	39 - 160				
Benzene	43.3	1.0	50	1.278	84.0	79 - 120				
Bromobenzene	36.25	1.0	50	0	72.5	80 - 120				S
Bromochloromethane	46.21	1.0	50	0	92.4	78 - 123				
Bromodichloromethane	41.34	1.0	50	0	82.7	79 - 125				
Bromoform	45.62	1.0	50	0	91.2	66 - 130				
Bromomethane	45.66	1.0	50	0	91.3	53 - 141				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030131-05MS** Units: **ug/L** Analysis Date: **05-Mar-2018 14:13**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461675** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	91.64	2.0	100	0	91.6	64 - 133				
Carbon tetrachloride	41.44	1.0	50	0	82.9	72 - 136				
Chlorobenzene	39.82	1.0	50	0	79.6	80 - 120				S
Chloroethane	38.94	1.0	50	0	77.9	82 - 118				S
Chloroform	39.24	1.0	50	0	78.5	79 - 124				S
Chloromethane	37.95	1.0	50	0	75.9	50 - 139				
cis-1,2-Dichloroethene	43.77	1.0	50	0.9194	85.7	78 - 123				
cis-1,3-Dichloropropene	42.68	1.0	50	0	85.4	75 - 124				
Dibromochloromethane	41.76	1.0	50	0	83.5	74 - 126				
Dibromomethane	44.57	1.0	50	0	89.1	79 - 123				
Dichlorodifluoromethane	37.22	1.0	50	0	74.4	32 - 152				
Ethylbenzene	47.94	1.0	50	0	95.9	79 - 121				
Hexachlorobutadiene	40.1	1.0	50	0	80.2	66 - 134				
Isopropylbenzene	45.36	1.0	50	4.021	82.7	72 - 131				
m,p-Xylene	81.82	2.0	100	0	81.8	80 - 121				
Methylene chloride	39.4	2.0	50	0	78.8	74 - 124				
Naphthalene	53.41	1.0	50	3.313	100	61 - 128				
n-Butylbenzene	39.19	1.0	50	0	78.4	75 - 128				
n-Propylbenzene	39.43	1.0	50	1.998	74.9	76 - 126				S
o-Xylene	41.32	1.0	50	0	82.6	78 - 122				
sec-Butylbenzene	39.51	1.0	50	0	79.0	77 - 126				
Styrene	1.259	1.0	50	0	2.52	78 - 128				S
tert-Butylbenzene	38.22	1.0	50	0.4095	75.6	78 - 124				S
Tetrachloroethene	42.45	1.0	50	0	84.9	74 - 129				
Toluene	39.68	1.0	50	0	79.4	80 - 121				S
trans-1,2-Dichloroethene	45.75	1.0	50	0	91.5	75 - 124				
trans-1,3-Dichloropropene	43.22	1.0	50	0	86.4	73 - 127				
Trichloroethene	48.11	1.0	50	8.255	79.7	79 - 123				
Trichlorofluoromethane	43.65	1.0	50	0	87.3	65 - 141				
Vinyl chloride	45.72	1.0	50	0	91.4	58 - 137				
Surr: 1,2-Dichloroethane-d4	*43.54*	*1.0*	*50*	*0*	*87.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.4*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*41.52*	*1.0*	*50*	*0*	*83.0*	*80 - 119*				
Surr: Toluene-d8	*51.73*	*1.0*	*50*	*0*	*103*	*89 - 112*				

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030131-05MSD** Units: **ug/L** Analysis Date: **05-Mar-2018 14:37**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461676** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	40.54	1.0	50	0	81.1	78 - 124	40.33	0.519	20	
1,1,1-Trichloroethane	42.49	1.0	50	0	85.0	74 - 131	43.51	2.39	20	
1,1,2,2-Tetrachloroethane	38.75	1.0	50	0	77.5	71 - 121	38.48	0.706	20	
1,1,2-Trichloroethane	40.56	1.0	50	0	81.1	80 - 119	40.59	0.0675	20	
1,1-Dichloroethane	39.76	1.0	50	0	79.5	77 - 125	41.37	3.96	20	
1,1-Dichloroethene	44.29	1.0	50	0	88.6	71 - 131	45.69	3.11	20	
1,1-Dichloropropene	45.97	1.0	50	0	91.9	79 - 125	47	2.21	20	
1,2,3-Trichlorobenzene	41.62	1.0	50	0	83.2	69 - 129	40.4	2.99	20	
1,2,3-Trichloropropane	37.75	1.0	50	0	75.5	73 - 122	38.11	0.95	20	
1,2,4-Trichlorobenzene	42	1.0	50	0	84.0	69 - 130	40.95	2.53	20	
1,2,4-Trimethylbenzene	41.49	1.0	50	0	83.0	76 - 124	41.46	0.0623	20	
1,2-Dibromo-3-chloropropane	41.13	1.0	50	0	82.3	62 - 128	41.55	1.03	20	
1,2-Dibromoethane	42.52	1.0	50	0	85.0	77 - 121	42.32	0.471	20	
1,2-Dichlorobenzene	36.95	1.0	50	0	73.9	80 - 119	37.56	1.63	20	S
1,2-Dichloroethane	38.7	1.0	50	0	77.4	73 - 128	37.91	2.04	20	
1,2-Dichloropropane	40.86	1.0	50	0	81.7	78 - 122	40.9	0.102	20	
1,3,5-Trimethylbenzene	41.84	1.0	50	0	83.7	75 - 124	42.17	0.78	20	
1,3-Dichlorobenzene	37.88	1.0	50	0	75.8	80 - 119	37.74	0.377	20	S
1,3-Dichloropropane	39.75	1.0	50	0	79.5	80 - 119	39.8	0.117	20	S
1,4-Dichlorobenzene	36	1.0	50	0	72.0	79 - 118	36.27	0.767	20	S
2,2-Dichloropropane	41	1.0	50	0	82.0	60 - 139	41.82	1.97	20	
2-Butanone	90.47	2.0	100	0	90.5	56 - 143	92.01	1.68	20	
2-Chlorotoluene	41.21	1.0	50	0	82.4	79 - 122	41.84	1.52	20	
2-Hexanone	91.43	2.0	100	0	91.4	57 - 139	91.6	0.192	20	
4-Chlorotoluene	41.68	1.0	50	0	83.4	78 - 122	41.13	1.32	20	
4-Isopropyltoluene	37.85	1.0	50	0	75.7	77 - 127	38.01	0.415	20	S
4-Methyl-2-pentanone	85.7	2.0	100	0	85.7	67 - 130	82.85	3.37	20	
Acetone	84.73	2.0	100	0	84.7	39 - 160	83.47	1.49	20	
Benzene	42.36	1.0	50	1.278	82.2	79 - 120	43.3	2.19	20	
Bromobenzene	35.96	1.0	50	0	71.9	80 - 120	36.25	0.81	20	S
Bromochloromethane	43.59	1.0	50	0	87.2	78 - 123	46.21	5.83	20	
Bromodichloromethane	40.87	1.0	50	0	81.7	79 - 125	41.34	1.14	20	
Bromoform	45.21	1.0	50	0	90.4	66 - 130	45.62	0.915	20	
Bromomethane	41.18	1.0	50	0	82.4	53 - 141	45.66	10.3	20	

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R311972 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030131-05MSD** Units: **ug/L** Analysis Date: **05-Mar-2018 14:37**
Client ID: Run ID: **VOA2_311972** SeqNo: **4461676** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	88.1	2.0	100	0	88.1	64 - 133	91.64	3.94	20	
Carbon tetrachloride	40.56	1.0	50	0	81.1	72 - 136	41.44	2.14	20	
Chlorobenzene	39.89	1.0	50	0	79.8	80 - 120	39.82	0.175	20	S
Chloroethane	37.89	1.0	50	0	75.8	82 - 118	38.94	2.72	20	S
Chloroform	38.42	1.0	50	0	76.8	79 - 124	39.24	2.09	20	S
Chloromethane	35.65	1.0	50	0	71.3	50 - 139	37.95	6.25	20	
cis-1,2-Dichloroethene	44.34	1.0	50	0.9194	86.8	78 - 123	43.77	1.28	20	
cis-1,3-Dichloropropene	42.43	1.0	50	0	84.9	75 - 124	42.68	0.58	20	
Dibromochloromethane	41.78	1.0	50	0	83.6	74 - 126	41.76	0.0529	20	
Dibromomethane	44.73	1.0	50	0	89.5	79 - 123	44.57	0.348	20	
Dichlorodifluoromethane	34.79	1.0	50	0	69.6	32 - 152	37.22	6.74	20	
Ethylbenzene	47.57	1.0	50	0	95.1	79 - 121	47.94	0.778	20	
Hexachlorobutadiene	40.97	1.0	50	0	81.9	66 - 134	40.1	2.17	20	
Isopropylbenzene	45.19	1.0	50	4.021	82.3	72 - 131	45.36	0.382	20	
m,p-Xylene	81.93	2.0	100	0	81.9	80 - 121	81.82	0.135	20	
Methylene chloride	38.89	2.0	50	0	77.8	74 - 124	39.4	1.31	20	
Naphthalene	53.93	1.0	50	3.313	101	61 - 128	53.41	0.968	20	
n-Butylbenzene	39.79	1.0	50	0	79.6	75 - 128	39.19	1.52	20	
n-Propylbenzene	39.26	1.0	50	1.998	74.5	76 - 126	39.43	0.443	20	S
o-Xylene	41.3	1.0	50	0	82.6	78 - 122	41.32	0.0521	20	
sec-Butylbenzene	39.17	1.0	50	0	78.3	77 - 126	39.51	0.876	20	
Styrene	1.215	1.0	50	0	2.43	78 - 128	1.259	3.57	20	S
tert-Butylbenzene	37.92	1.0	50	0.4095	75.0	78 - 124	38.22	0.797	20	S
Tetrachloroethene	42.48	1.0	50	0	85.0	74 - 129	42.45	0.0808	20	
Toluene	39.73	1.0	50	0	79.5	80 - 121	39.68	0.122	20	S
trans-1,2-Dichloroethene	44.52	1.0	50	0	89.0	75 - 124	45.75	2.73	20	
trans-1,3-Dichloropropene	43	1.0	50	0	86.0	73 - 127	43.22	0.511	20	
Trichloroethene	45.88	1.0	50	8.255	75.2	79 - 123	48.11	4.74	20	S
Trichlorofluoromethane	41.37	1.0	50	0	82.7	65 - 141	43.65	5.36	20	
Vinyl chloride	44.03	1.0	50	0	88.1	58 - 137	45.72	3.76	20	
Surr: 1,2-Dichloroethane-d4	*42.33*	*1.0*	*50*	*0*	*84.7*	*81 - 118*	*43.54*	*2.83*	*20*	
Surr: 4-Bromofluorobenzene	*50.53*	*1.0*	*50*	*0*	*101*	*85 - 114*	*50.4*	*0.255*	*20*	
Surr: Dibromofluoromethane	*40.86*	*1.0*	*50*	*0*	*81.7*	*80 - 119*	*41.52*	*1.61*	*20*	
Surr: Toluene-d8	*52.37*	*1.0*	*50*	*0*	*105*	*89 - 112*	*51.73*	*1.23*	*20*	

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

ALS Group USA, Corp Date: 16-Mar-18

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant
WorkOrder:	HS18030055

QC BATCH REPORT

Batch ID:	**R311972**	**Instrument:**	**VOA2**	**Method:**	**SW8260**

The following samples were analyzed in this batch:	HS18030055-01	HS18030055-02

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R312257 **Instrument: WetChem_HS** **Method: E410.4**

MBLK Sample ID: **MBLK-R312257** Units: **mg/L** Analysis Date: **09-Mar-2018 14:00**
Client ID: Run ID: **WetChem_HS_312257** SeqNo: **4468001** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chemical Oxygen Demand	5.00	15.0								U

LCS Sample ID: **LCS-R312257** Units: **mg/L** Analysis Date: **09-Mar-2018 14:00**
Client ID: Run ID: **WetChem_HS_312257** SeqNo: **4468000** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chemical Oxygen Demand	96	15.0	100	0	96.0	85 - 115				

MS Sample ID: **HS18030316-01MS** Units: **mg/L** Analysis Date: **09-Mar-2018 14:00**
Client ID: Run ID: **WetChem_HS_312257** SeqNo: **4468002** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chemical Oxygen Demand	61	15.0	50	18	86.0	80 - 120				

DUP Sample ID: **HS18030316-01DUP** Units: **mg/L** Analysis Date: **09-Mar-2018 14:00**
Client ID: Run ID: **WetChem_HS_312257** SeqNo: **4468003** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chemical Oxygen Demand	19	15.0					18	5.41	20	

The following samples were analyzed in this batch: HS18030055-01

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R312306 **Instrument: ICS2100** **Method: SW9056**

MBLK Sample ID: **WBLKW1-030818** Units: **mg/L** Analysis Date: **09-Mar-2018 00:02**
Client ID: Run ID: **ICS2100_312306** SeqNo: **4469079** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.250	0.500								U
Sulfate	0.250	0.500								U

LCS Sample ID: **WLCSW1-030818** Units: **mg/L** Analysis Date: **09-Mar-2018 00:16**
Client ID: Run ID: **ICS2100_312306** SeqNo: **4469080** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.53	0.500	20	0	103	80 - 120				
Sulfate	20.79	0.500	20	0	104	80 - 120				

LCSD Sample ID: **WLCSDW1-030818** Units: **mg/L** Analysis Date: **09-Mar-2018 00:31**
Client ID: Run ID: **ICS2100_312306** SeqNo: **4469081** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.97	0.500	20	0	99.9	80 - 120	20.53	2.77	20	
Sulfate	20.81	0.500	20	0	104	80 - 120	20.79	0.0673	20	

MS Sample ID: **HS18030366-03MS** Units: **mg/L** Analysis Date: **09-Mar-2018 04:24**
Client ID: Run ID: **ICS2100_312306** SeqNo: **4469095** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	61.04	0.500	10	49.24	118	80 - 120				O
Sulfate	51.89	0.500	10	40.12	118	80 - 120				O

MSD Sample ID: **HS18030366-03MSD** Units: **mg/L** Analysis Date: **09-Mar-2018 04:38**
Client ID: Run ID: **ICS2100_312306** SeqNo: **4469096** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	60.9	0.500	10	49.24	117	80 - 120	61.04	0.23	20	O
Sulfate	51.71	0.500	10	40.12	116	80 - 120	51.89	0.349	20	O

The following samples were analyzed in this batch: HS18030055-01

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18030055

QC BATCH REPORT

Batch ID: R312478 **Instrument: Balance1** **Method: E1664A**

MBLK Sample ID: **WBLKW-031418** Units: **mg/L** Analysis Date: **14-Mar-2018 13:35**
Client ID: Run ID: **Balance1_312478** SeqNo: **4473442** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	1.00	2.00								U

LCS Sample ID: **WLCSW-031418** Units: **mg/L** Analysis Date: **14-Mar-2018 13:35**
Client ID: Run ID: **Balance1_312478** SeqNo: **4473444** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	40	2.00	40	0	100.0	78 - 114				

LCSD Sample ID: **WLCSDW-031418** Units: **mg/L** Analysis Date: **14-Mar-2018 13:35**
Client ID: Run ID: **Balance1_312478** SeqNo: **4473443** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.2	2.00	40	0	93.0	78 - 114	40	7.25	18	

MS Sample ID: **HS18030276-02MS** Units: **mg/L** Analysis Date: **14-Mar-2018 13:35**
Client ID: Run ID: **Balance1_312478** SeqNo: **4473432** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.33	2.00	40	-0.4167	96.9	78 - 114				

The following samples were analyzed in this batch: HS18030055-01

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

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: **HS18030055**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	17-027-0	27-Mar-2018
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

ALS Group USA, Corp Date: 16-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS18030055

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18030055-01	LH18/24-SP650_022818	Login	3/1/2018 5:55:39 PM	PMG	Sub
HS18030055-01	LH18/24-SP650_022818	Login	3/1/2018 5:55:39 PM	PMG	WET231
HS18030055-01	LH18/24-SP650_022818	Login	3/1/2018 5:55:39 PM	PMG	EXT060
HS18030055-01	LH18/24-SP650_022818	Login	3/1/2018 5:55:39 PM	PMG	WET231
HS18030055-01	LH18/24-SP650_022818	Login	3/1/2018 5:55:39 PM	PMG	WET231
HS18030055-01	LH18/24-SP650_022818	Login	3/1/2018 5:55:39 PM	PMG	MET075
HS18030055-01	LH18/24-SP650_022818	Login	3/1/2018 5:55:39 PM	PMG	VOA148

ALS Group USA, Corp Date: 16-Mar-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18030055
Date/Time Received: **01-Mar-2018 09:15**
Received by: **JRM**

Checklist completed by: *Paresh M. Giga* eSignature — 2-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 2-Mar-2018 Date

Matrices: **Water**
Carrier name: **FedEx**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	2.3c/1.7c U/c	IR25	
Cooler(s)/Kit(s):	42663		
Date/Time sample(s) sent to storage:	3/1/18 20:00		
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:

Corrective Action:

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd., Suite 210 Houston, Tx. 77099 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No.
NWO1312.0150.0
16.0001

Job:
GROUNDWATER TREATMENT PLANT
QUARTERLY EFFLUENT SAMPLES

Prepared By:
Scott Beesinger

P. O. Number

HS18030055

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: ROD Volatiles	Total Metals	Oil & Grease	Chemnical Oxygen Demand	Chloride & Sulfate	1, 4 - DIOXANE	PERCHLORATE				Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_022818	Water	02/28/18 / 14:00		4	3		1								HCL	
LH18/24-SP650_022818	Water	02/28/18 / 14:00		1		1									HNO3	
LH18/24-SP650_022818	Water	02/28/18 / 14:00		3					1	1	1				NONE	
LH18/24-SP650_022818	Water	02/28/18 / 14:00		1				1							H2SO4	
Trip Blank	Water	02/28/18		2	2										HCL	

Additional Remarks: **STANDARD TURN AROUND TIME**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	02/28/18	14:30									

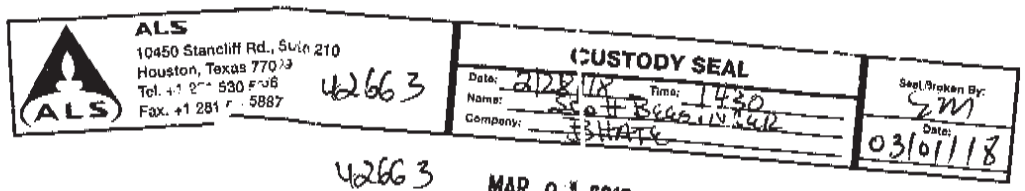
For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
Jm	3/1/18	09:15							

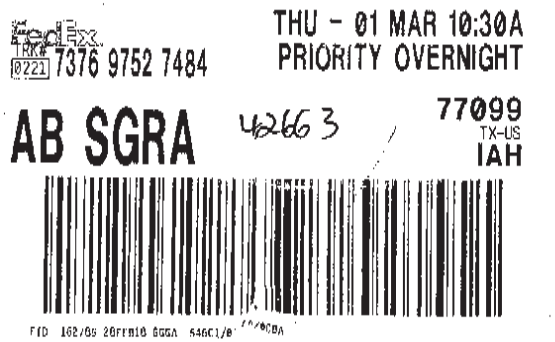
Remarks:

(Word) S:\Forms\Chain of Custody - BiWeekly

Cooler 4263 IR25
Temp 2.3 C-0.6



42663 MAR 01 2018



Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1806736; 1806586; 1806588; 1806590

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2058 (209974)

General Set Information: There were five field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: NA

Method QC data: The method blank (LMB 590393) was less than 1/2 the CRDL. The recovery for the LCS (590394) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1806736001 (Client ID: INF Pond-Inlet_030718). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 590391). These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 08MARD04.

Thomas Bosch March 09, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: March 09, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1806590**
Project ID: HS18030055 022818
Purchase Order: HS18030055
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/25-SP650_022818	1806590001	02/28/18	03/03/18	

ANALYTICAL REPORT

Workorder: 34-1806590
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/25-SP650_022818**	Sampling Site: NA	Collected: 02/28/2018
Lab ID: 1806590001	Media: 125 mL Nalgene	Received: 03/03/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2058 (HBN: 209974)	**Percent Solid:** NA
	Analyzed: 03/08/2018 16:54	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**71**	1.0	2.0	4.0	1	

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 03/09/2018 11:30	/S/ Stephen Brose 03/09/2018 13:36

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1806590
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ANAB (DoD ELAP)	ADE-1420	http://www.anab.org/accredited-organizations/
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
	Kansas	E-10416	http://www.kdheks.gov/lipo/index.html
Industrial Hygiene	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
Lead Testing:			
CPSC	ANAB (ISO 17025, CPSC)	ADE-1420	http://www.anab.org/accredited-organizations/
Soil, Dust, Paint ,Air	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

Workorder: 34-1806590
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1806590

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2058 (HBN: 209974)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 590393
Analyzed: 03/08/2018 14:46
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 590394
Analyzed: 03/08/2018 15:00
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.38	5.00	108	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1806736001	**MS:** 590395	**MSD:** 590396
Analyzed: 03/08/2018 15:15	**Analyzed:** 03/08/2018 15:29	**Analyzed:** 03/08/2018 15:44
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	1.80	7.01	5	105	78.8	123.8	7.16	108	2.11	0.0	20.0

Continuing Calibration Verification

CCV: 590390	**CCV:** 590397
Analyzed: 03/08/2018 14:02	**Analyzed:** 03/08/2018 17:09
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	26.4	25.0	105	27.6	25.0	111

Interference Check Sample

ICSA: 590392
Analyzed: 03/08/2018 14:32
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.967	1.00	96.7

Limit of Detection Verification

LODV: 590391	**LODV:** 590398
Analyzed: 03/08/2018 14:17	**Analyzed:** 03/08/2018 17:23
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.13	1.00	113	1.10	1.00	110

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1806590

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2058 (HBN: 209974)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
03/09/2018 11:30	03/09/2018 13:36

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◆ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

18698/#2

W 1806590

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 8699

1806590

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	
Email:	

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18030055
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18030055-01**	**LH18/24-SP650_022818**	**Water**	**28 Feb 2018 14:00**
	SUB_Perch-6850			15 Mar 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 3/2/18 1800

Received By: _____ Date/Time: 3/2 2018 731

Cooler ID(s): 2900 Temperature(s): 2°

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18030055	*Split:*	**Workorder ID:** 1806590	**Level:** ENV_LVL4	**Requested Analysis**
Client: ALS Environmental (Houston)		**Account:** 8101	**Type:** 125Poly	
Comments:			**Preservatives**	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	COOL	EPA 6850, DoD QSM
1	02/28/2018 14:00	LH18/25-SP650_022818	1806590001		Water	A	1		A
2									
3									
4									
5									
6									
7									
8									
9									
10									

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ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	03/03/2018 09:01	ALS Sample Receiving	Sample Login
Julie Warath	3/6/18 1600	ISB	Storage
R. 33.1	3.8.18/13:02	T. Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00883607

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

1806590

Client Name: ALS Houston

Project/Task/Site: _____

Date/Time of Receipt: 3/3/2018 9:01

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Cntr/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 2900	7 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Meredith Edwards (Signature) Meredith Edwards (Printed Name) 3/3/2018 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

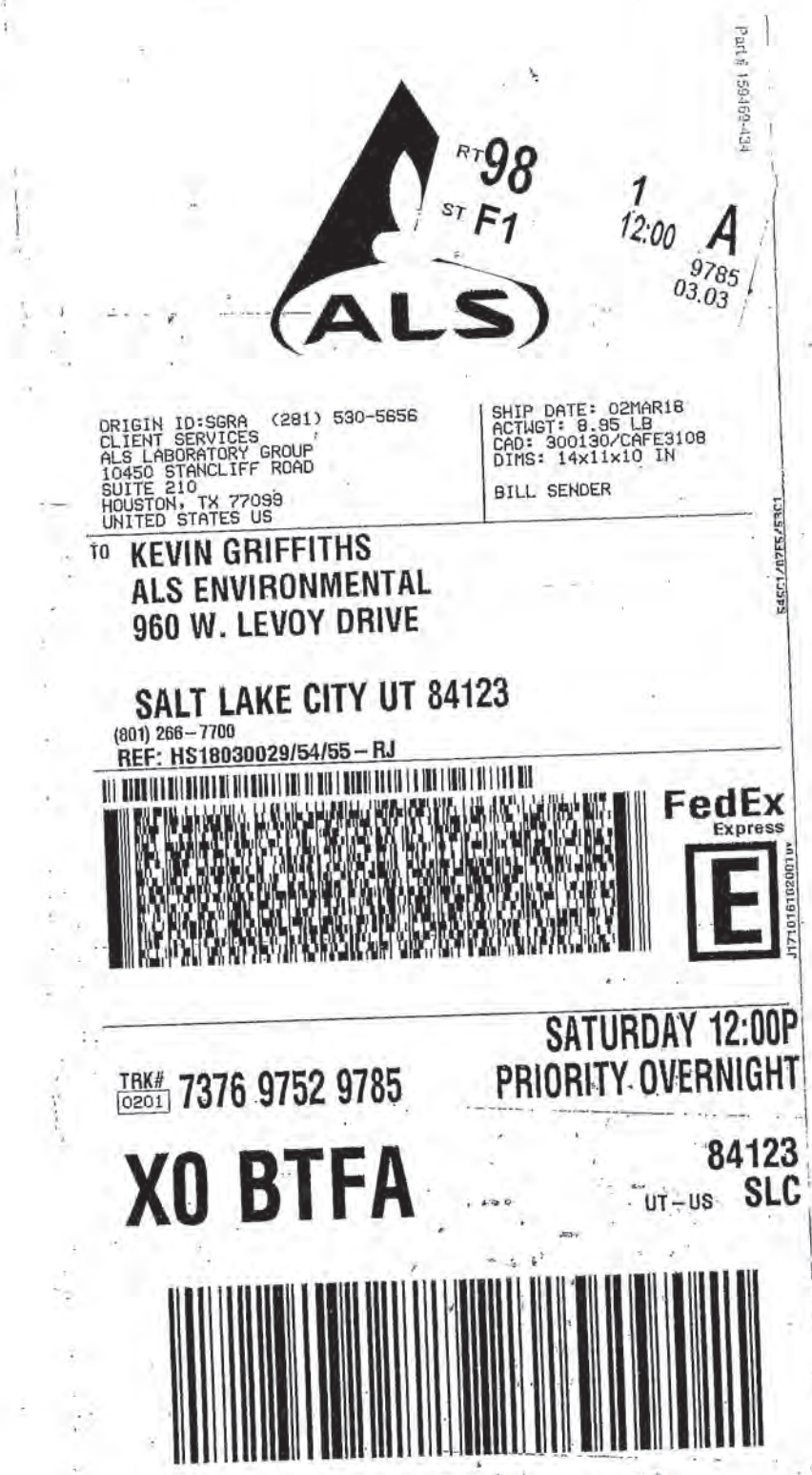
Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____


Part# 158469-434
RT 98
ST F1
1
12:00 A
9785
03.03
ALS
ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US
SHIP DATE: 02MAR18
ACTWGT: 8.95 LB
CAD: 300130/CAFE3108
DIMS: 14x11x10 IN
BILL SENDER
TO KEVIN GRIFFITHS
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE
SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18030029/54/55-RJ
FedEx
Express
E
SATURDAY 12:00P
PRIORITY OVERNIGHT
TRK# 0201 7376 9752 9785
XO BTFA
84123
UT-US SLC

Batch Worklist

Batch: ELMS/ 2058
Rule: EPA 6850, DoD QSM Water

Created: 3/8/2018 13:38
Analyst: T. Bosch

Instrument: LCMS04
Status: WP

HBN: 209974

Workorder: 1806586 [ENV_LVL4]
Workorder: 1806588 [ENV_LVL4]
Workorder: 1806590 [ENV_LVL4]
Workorder: 1806736 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	590390	CCV for HBN 209974 [ELMS/2058]				CCV	3		E685041C3Q	5311		3/9/2018	3/8/2018
2	590391	LODV for HBN 209974 [ELMS/2058				LODV	3		E6850..D3Q	5311		3/9/2018	3/8/2018
3	590392	ICS for HBN 209974 [ELMS/2058]				ICS	3		E6850..D3Q	5311		3/9/2018	3/8/2018
4	590393	LMB for HBN 209974 [ELMS/2058]				LMB	3		E6850Q413Q	5311		3/9/2018	3/8/2018
5	590394	LCS for HBN 209974 [ELMS/2058]				LCS	3		E6850Q413Q	5311		3/9/2018	3/8/2018
6	1806736001	INF Pond-Inlet_030718				SAMPLE	3	1806736001-A	E6850Q41.3	5480	4/4/2018	3/9/2018	3/8/2018
7	590395	INF Pond-Inle...(1806736001MS)				MS	3		E6850Q413Q	5311		3/9/2018	3/8/2018
8	590396	INF Pond-Inl...(1806736001MSD)				MSD	3		E6850Q413Q	5311		3/9/2018	3/8/2018
9	1806736002	INF Pond-Outlet_030718				SAMPLE	3	1806736002-A	E6850Q41.3	5480	4/4/2018	3/9/2018	3/8/2018
10	1806586001	LH18/24-SP650-022818				SAMPLE	3	1806586001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
11	1806588001	LH18/24-SP140_022818				SAMPLE	3	1806588001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
12	1806590001	LH18/25-SP650_022818				SAMPLE	3	1806590001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
13	590397	CCV for HBN 209974 [ELMS/2058]				CCV	3		E685041C3Q	5311		3/9/2018	3/8/2018
14	590398	LODV for HBN 209974 [ELMS/2058				LODV	3		E6850..D3Q	5311		3/9/2018	3/8/2018

00883610

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1806736 (001,02); 1806586 (001); 1806588 (001); 1806590 (001)
ELMS Batch/HBN ID: 2058 (209974)
Prep Date: 03/08/2018 Analysis Date: 03/08/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAR\08MAR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 590394; Target = 5.0µg/L. ASTM type II water was used for LMB 590393.

MS/MSD: MS/MSD was performed on sample 1806736001 (Client ID: INF Pond-Inlet_030718). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters. The ion ratio of m/z 83 to 85 may fail at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 590391).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafile 08MARD04.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\209974-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL
Standard: 36748	Created By: T. Bosch	Amount: 100 mL
MFG: Ultra Scientific	Create Date: 5/11/2017	Expires: 3/31/2020
MFG Lot: CP-0860	Lab Lot: CLO4 QC STOCK	Usable: Yes
Part ID: ICC-013		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 38780	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 10/09/2017 01:10PM	Expires: 10/09/2018
MFG Lot: TNB: 10/09/17	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK — **Description - Perchlorate ISTD Stock**

Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ACCREDITATION No. 4 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ACCREDITATION No. 1 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

TRIPLE ISO CERTIFICATION ULTRA ISO 9001 ISO GUIDE 34 ISO 17025

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

125 Market Street
New Haven, CT 06513
USA

AccuStandard,® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

Cambridge Isotope Laboratories, Inc. Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

** For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1804763; 1804764; 1804765; 1805239; 1805240; 1805310

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2053 (209112)

General Set Information: There were seven field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Sample 1804765001 was analyzed and reported at a 1:1,000 dilution. Sample 1805310001 was re-analyzed and reported at a 1:10 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 588565) was less than 1/2 the CRDL. The recovery for the LCS (588566) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1804763001 (Client ID: LH18/24-SP650_021418). The Matrix Spike and duplicate (MS/MSD – 588567/68) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The relative percent difference (RPD) was within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 588563). These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations were performed for datafiles 22FEBD21/26.

Thomas Bosch — February 23, 2018
Analyst — Date

ANALYTICAL REPORT

Report Date: February 23, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1805310**
Project ID: Longhorn Army Plant 022118
Purchase Order: NWO1312.0150.0160001
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_022118_BIX	1805310001	02/21/18	02/22/18	Longhorn Army Plant
LH18/24-SP650_022118_AIX	1805310002	02/21/18	02/22/18	Longhorn Army Plant

ANALYTICAL REPORT

Workorder: 34-1805310
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_022118_BIX** | Sampling Site: Longhorn Army Plant | Collected: 02/21/2018
Lab ID: 1805310001 | Media: 250 mL Amber Glass | Received: 02/22/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2053 (HBN: 209112) | **Percent Solid:** NA
Analyzed: 02/22/2018 20:31 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**81**	10	20	40	10	

Sample ID: **LH18/24-SP650_022118_AIX** | Sampling Site: Longhorn Army Plant | Collected: 02/21/2018
Lab ID: 1805310002 | Media: 250 mL Amber Glass | Received: 02/22/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2053 (HBN: 209112) | **Percent Solid:** NA
Analyzed: 02/22/2018 20:16 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Comments

Quality Control: **EPA 6850, DoD QSM - (HBN: 209112)**

The Matrix Spike and duplicate (MS/MSD – 588567/68) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 02/23/2018 09:38	/S/ Stephen Brose 02/23/2018 11:13

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1805310
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ANAB (DoD ELAP)	ADE-1420	http://www.anab.org/accredited-organizations/
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
	Kansas	E-10416	http://www.kdheks.gov/lipo/index.html
Industrial Hygiene	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
Lead Testing:			
CPSC	ANAB (ISO 17025, CPSC)	ADE-1420	http://www.anab.org/accredited-organizations/
Soil, Dust, Paint ,Air	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

Workorder: 34-1805310
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1805310

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2053 (HBN: 209112)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 588565
Analyzed: 02/22/2018 17:50
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 588566
Analyzed: 02/22/2018 18:04
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.72	5.00	94.4	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1804763001	**MS:** 588567	**MSD:** 588568
Analyzed: 02/22/2018 18:19	**Analyzed:** 02/22/2018 18:34	**Analyzed:** 02/22/2018 18:48
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec		QC Limits		Result	% Rec		RPD	QC Limits	
Perchlorate	ND	6.41	5	#	128	78.8	123.8	6.43	#	129	0.269	0.0	20.0

Continuing Calibration Verification

CCV: 588562	**CCV:** 588569
Analyzed: 02/22/2018 16:51	**Analyzed:** 02/22/2018 20:46
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	23.6	25.0	94.4	28.1	25.0	112

Interference Check Sample

ICSA: 588564
Analyzed: 02/22/2018 17:20
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	1.16	1.00	116

Limit of Detection Verification

LODV: 588563	**LODV:** 588570
Analyzed: 02/22/2018 17:06	**Analyzed:** 02/22/2018 21:00
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.999	1.00	99.9	1.20	1.00	120

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1805310

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2053 (HBN: 209112)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Comments

The Matrix Spike and duplicate (MS/MSD – 588567/68) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
02/23/2018 09:38	02/23/2018 11:13

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
⬣ - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

00883634

W 1805310

960 West Levoy Drive Salt Lake City UT. 84123

18098/#4

1805310

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS ~~10450 Stanecliff Rd. Suite 210 Houston, TX. 77099~~ (281) 530-5656 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: PERCHLORATE										Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_022118_BIX	Water	02/21/18 / 14:00		1	X										NONE	
LH18/24-SP650_022118_AIX	Water	02/21/18 / 14:00		1	X											

Additional Remarks: **24 HOUR TAT**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	02/21/18	14:30	M Schultz	2/22/18	0940						

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks:

00883635

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: NWO1312.0150.016000	Split:	Workorder ID: 1805310	Level: ENV_LVL4
Client: ALS Environmental (Houston)		Account: 8101	Type: 250AG
Comments:			Preservatives: COOL

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 8850, DoD QSM
1	02/21/2018 14:00	LH18/24-SP650_022118_BIX	1805310001		Water	A	1	A
2	02/21/2018 14:00	LH18/24-SP650_022118_AIX	1805310002		Water	A	1	A
3								
4								
5								
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	02/22/2018 09:40	ALS Sample Receiving	Sample Login
Christi Warath 2/22/18 1110		13B	Storage
R.33.1 02.22.18/12:00		T. Bosch	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00883636

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: Corps Army Project/Task/Site: 1805310

Date/Time of Receipt: 02/22/2018 0916 Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA		
	Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA		
	Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA	VOA Headspace Present?	Yes/No/NA
	Frozen/Melted/NA		

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8269	3 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: [signature] (Signature) M Schmith (Printed Name) 02/22/2018 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN: Rush!

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

FedEx Express **Package US Airbill**

FedEx Tracking Number **8106 9579 7928**

Form ID No. **0200**

1 From

Date 2/21/18

Sender's Name Scott Beesinger Phone 903 930-6198

Company BHATE ENVIRONMENTAL

Address 1203-B E. GRAND AVE. PMB 202

Dept/Floor/Suite/Room

City MARSHALL State TX ZIP 75670

2 Your Internal Billing Reference

3 To

Recipient's Name Kevin Griffith (Sample Recipient) Phone 801 266-7700

Company ALS ENVIRONMENTAL

Address 960 WEST LEVOY DRIVE

We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept/Floor/Suite/Room

Address

Use this line for the HOLD location address or for continuation of your shipping address.

City SALT LAKE CITY State UT ZIP 84123

Hold Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.

Hold Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

8106 9579 7928

4 Express Package Service * To most locations.

Packages up to 150 lbs. *For packages over 150 lbs., use the FedEx Express Freight US Airbill.*

Next Business Day

- ☐ FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless Saturday Delivery is selected.
- ☒ FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless Saturday Delivery is selected.
- ☐ FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

- ☐ FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- ☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless Saturday Delivery is selected.
- ☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

☐ FedEx Envelope* ☐ FedEx Pak* ☐ FedEx Box ☐ FedEx Tube ☒ Other

6 Special Handling and Delivery Signature Options Fees may apply. See the FedEx Service Guide.

☐ Saturday Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

☒ No Signature Required — Package may be left without obtaining a signature for delivery.
☐ Direct Signature — Someone at recipient's address may sign for delivery.
☐ Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only.

Does this shipment contain dangerous goods? One box must be checked.

☒ No ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. ☐ Dry Ice Dry Ice, 9, UN 1845 ____ x ____ kg

Restrictions apply for dangerous goods — see the current FedEx Service Guide. ☐ Cargo Aircraft Only

7 Payment *Bill to:* Enter FedEx Acct. No. or Credit Card No. below. Obtain recip. Acct. No. ☐

☒ Sender Acct. No. in Section 1 will be billed. ☐ Recipient ☐ Third Party ☒ Credit Card ☐ Cash/Check

[redacted]

Total Packages Total Weight Credit Card Auth.

____ ____ lbs. [redacted]

*Our liability is limited to US$100 unless you declare a higher value. See the current FedEx Service Guide for details.

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00883637

Batch Worklist

Batch: ELMS/ 2053 **Created:** 2/22/2018 08:05 **Instrument:** LCMS04 **HBN:** 209112

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1804763 [ENV_LVL4]
Workorder: 1804764 [ENV_LVL4]
Workorder: 1804765 [ENV_LVL4]
Workorder: 1805239 [ENV_LVL4]
Workorder: 1805240 [ENV_LVL4]
Workorder: 1805310 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	588562	CCV for HBN 209112 [ELMS/2053]				CCV	3		E685041C3Q	5311		2/23/2018	2/22/2018
2	588563	LODV for HBN 209112 [ELMS/2053				LODV	3		E6850..D3Q	5311		2/23/2018	2/22/2018
3	588564	ICS for HBN 209112 [ELMS/2053]				ICS	3		E6850..D3Q	5311		2/23/2018	2/22/2018
4	588565	LMB for HBN 209112 [ELMS/2053]				LMB	3		E6850Q413Q	5311		2/23/2018	2/22/2018
5	588566	LCS for HBN 209112 [ELMS/2053]				LCS	3		E6850Q413Q	5311		2/23/2018	2/22/2018
6	1804763001	LH18/24-SP650-021418				SAMPLE	3	1804763001-A	E6850Q41.3	5480	3/14/2018	3/2/2018	2/22/2018
7	588567	LH18/24-SP650...(1804763001MS)				MS	3		E6850Q413Q	5311		2/23/2018	2/22/2018
8	588568	LH18/24-SP65...(1804763001MSD)				MSD	3		E6850Q413Q	5311		2/23/2018	2/22/2018
9	1804764001	LH18/24-SP-650_021418				SAMPLE	3	1804764001-A	E6850Q41.3	5480	3/14/2018	3/2/2018	2/22/2018
10	1804765001	LH18/24-SP140_021418				SAMPLE	3	1804765001-A	E6850Q41.3	5480	3/14/2018	3/2/2018	2/22/2018
11	1805239001	LHSMW02-021518				SAMPLE	3	1805239001-A	E6850Q41.3	5480	3/15/2018	2/23/2018	2/22/2018
12	1805240001	17WW12-021518				SAMPLE	3	1805240001-A	E6850Q41.3	5480	3/15/2018	2/23/2018	2/22/2018
13	1805310002	LH18/24-SP650_022118_AIX				SAMPLE	3	1805310002-A	E6850Q41.3	5480	3/21/2018	2/23/2018	2/22/2018
14	1805310001	LH18/24-SP650_022118_BIX				SAMPLE	3	1805310001-A	E6850Q41.3	5480	3/21/2018	2/23/2018	2/22/2018
15	588569	CCV for HBN 209112 [ELMS/2053]				CCV	3		E685041C3Q	5311		2/23/2018	2/22/2018
16	588570	LODV for HBN 209112 [ELMS/2053				LODV	3		E6850..D3Q	5311		2/23/2018	2/22/2018

00883638



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1804763 (001); 1804764 (001); 1804765 (001); 1805239 (001); 1805240 (001); 1805310 (001,02)
ELMS Batch/HBN ID: 2053 (209112)
Prep Date: 02/22/2018 Analysis Date: 02/22/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\FEB\22FEB18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 588566; Target = 5.0µg/L. ASTM type II water was used for LMB 588565.

MS/MSD: MS/MSD was performed on sample 1804763001 (Client ID: LH18/24-SP650_021418). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L. Sample 1804765001 was analyzed and reported at a 1:1,000 dilution. Sample 1805310001 was re-analyzed and reported at a 1:10 dilution. The reporting limits have been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike and duplicate (MS/MSD – 588567/68) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The ion ratio of m/z 83 to 85 often fails at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 588563).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\FEB\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for datafiles 22FEBD21/26.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\209112-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT	Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025	
MFG Lot:	Lab Lot: LAB 109	Usable: Yes	
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK	Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: T. Bosch
Create Date: 5/11/2017
Lab Lot: CLO4 QC STOCK

Amount: 100 mL
Expires: 3/31/2020
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 38780	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 10/09/2017 01:10PM	Expires: 10/09/2018
MFG Lot: TNB: 10/09/17	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

00883652

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

DR-ORG/IND-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

** For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Batch Report: C:\HPCHEM\1\DATA\22FEB18D\22FEB18S.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
#*	588562 CCV@25	Vial 75	1	Control	9	8.78861e5	9.035	23.59635
#*	588563 LODV@1.	Vial 71	1	Control	10	3.29706e4	9.051	9.99149e-1
#*	588564 ICS@1.0	Vial 81	1	Control	11	2.81874e4	8.877	1.15712
#*	588565 LMB	Vial 82	1	Control	13	0.00000	0.000	0.00000
#*	588566 QC@5	Vial 83	1	Control	14	1.46393e5	9.076	4.71902
#*	1804763001	Vial 84	1	Sample	15	0.00000	0.000	0.00000
#*	588567 47631MS	Vial 85	1	Control	16	1.34078e5	8.957	6.41443
#*	588568 47631SD	Vial 86	1	Control	17	1.60865e5	8.956	6.43174
#*	1804764001	Vial 87	1	Sample	18	0.00000	0.000	0.00000
#*	1804765001 1K	Vial 88	1	Sample	19	5.32468e5	9.105	1.64521e4
#*	1805239001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
#*	1805240001	Vial 90	1	Sample	21	1.49771e4	8.822	7.91525e-1 < RL
#*	1805310001	Vial 91	1	Sample	22	3.16382e6	8.613	98.11382 D,1a
#*	1805310002	Vial 92	1	Sample	23	0.00000	0.000	0.00000
#*	1805310001 10X	Vial 93	1	Sample	24	2.55271e5	8.876	80.61597
#*	588569 CCV@25	Vial 75	1	Control	25	1.06438e6	8.967	28.11030
*	588570 LODV@1.	Vial 71	1	Control	26	4.11749e4	8.989	1.19673

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
#*	588562 CCV@25	Vial 75	1	Control	9	1.89943e5	9.063	5.00000
#*	588563 LODV@1.	Vial 71	1	Control	10	2.01600e5	9.062	5.00000
#*	588564 ICS@1.0	Vial 81	1	Control	11	1.47192e5	8.888	5.00000
#*	588565 LMB	Vial 82	1	Control	13	1.98584e5	9.194	5.00000
#*	588566 QC@5	Vial 83	1	Control	14	1.75541e5	9.096	5.00000
#*	1804763001	Vial 84	1	Sample	15	1.12710e5	8.979	5.00000
#*	588567 47631MS	Vial 85	1	Control	16	1.16801e5	8.979	5.00000
#*	588568 47631SD	Vial 86	1	Control	17	1.39743e5	8.981	5.00000
#*	1804764001	Vial 87	1	Sample	18	1.12690e5	9.004	5.00000
#*	1804765001 1K	Vial 88	1	Sample	19	1.70955e5	9.131	5000.00000
#*	1805239001	Vial 89	1	Sample	20	1.15041e5	8.532	5.00000
#*	1805240001	Vial 90	1	Sample	21	1.18047e5	8.828	5.00000
#*	1805310001	Vial 91	1	Sample	22	1.21795e5	8.633	5.00000
#*	1805310002	Vial 92	1	Sample	23	1.18359e5	9.080	5.00000
#*	1805310001 10X	Vial 93	1	Sample	24	1.75083e5	8.907	50.00000
#*	588569 CCV@25	Vial 75	1	Control	25	1.89031e5	8.988	5.00000
*	588570 LODV@1.	Vial 71	1	Control	26	2.07413e5	9.004	5.00000

#	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
#*	588562 CCV@25	Vial 75	1	Control	9	3.08884e5	9.059	23.81243
#*	588563 LODV@1.	Vial 71	1	Control	10	1.56443e4	9.040	1.06901
#*	588564 ICS@1.0	Vial 81	1	Control	11	1.18038e4	8.860	1.11050
#*	588565 LMB	Vial 82	1	Control	13	0.00000	0.000	0.00000
#*	588566 QC@5	Vial 83	1	Control	14	5.76830e4	9.089	5.02562
#*	1804763001	Vial 84	1	Sample	15	0.00000	0.000	0.00000
#*	588567 47631MS	Vial 85	1	Control	16	4.79141e4	8.975	6.28653
#*	588568 47631SD	Vial 86	1	Control	17	5.69505e4	8.991	6.24529
#*	1804764001	Vial 87	1	Sample	18	0.00000	0.000	0.00000
#*	1804765001 1K	Vial 88	1	Sample	19	1.86758e5	9.123	1.63871e4
#*	1805239001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
#*	1805240001	Vial 90	1	Sample	21	5355.87451	8.801	5.51917e-1
#*	1805310001	Vial 91	1	Sample	22	9.79095e5	8.631	94.17253
#*	1805310002	Vial 92	1	Sample	23	0.00000	0.000	0.00000
#*	1805310001 10X	Vial 93	1	Sample	24	9.63299e4	8.892	84.21251
#*	588569 CCV@25	Vial 75	1	Control	25	3.49697e5	8.980	26.81727
*	588570 LODV@1.	Vial 71	1	Control	26	1.78348e4	8.992	1.20320

*** End of Report ***

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\FEB\22FEB18D.S

Sequence Table:

Method and Injection Info Part:

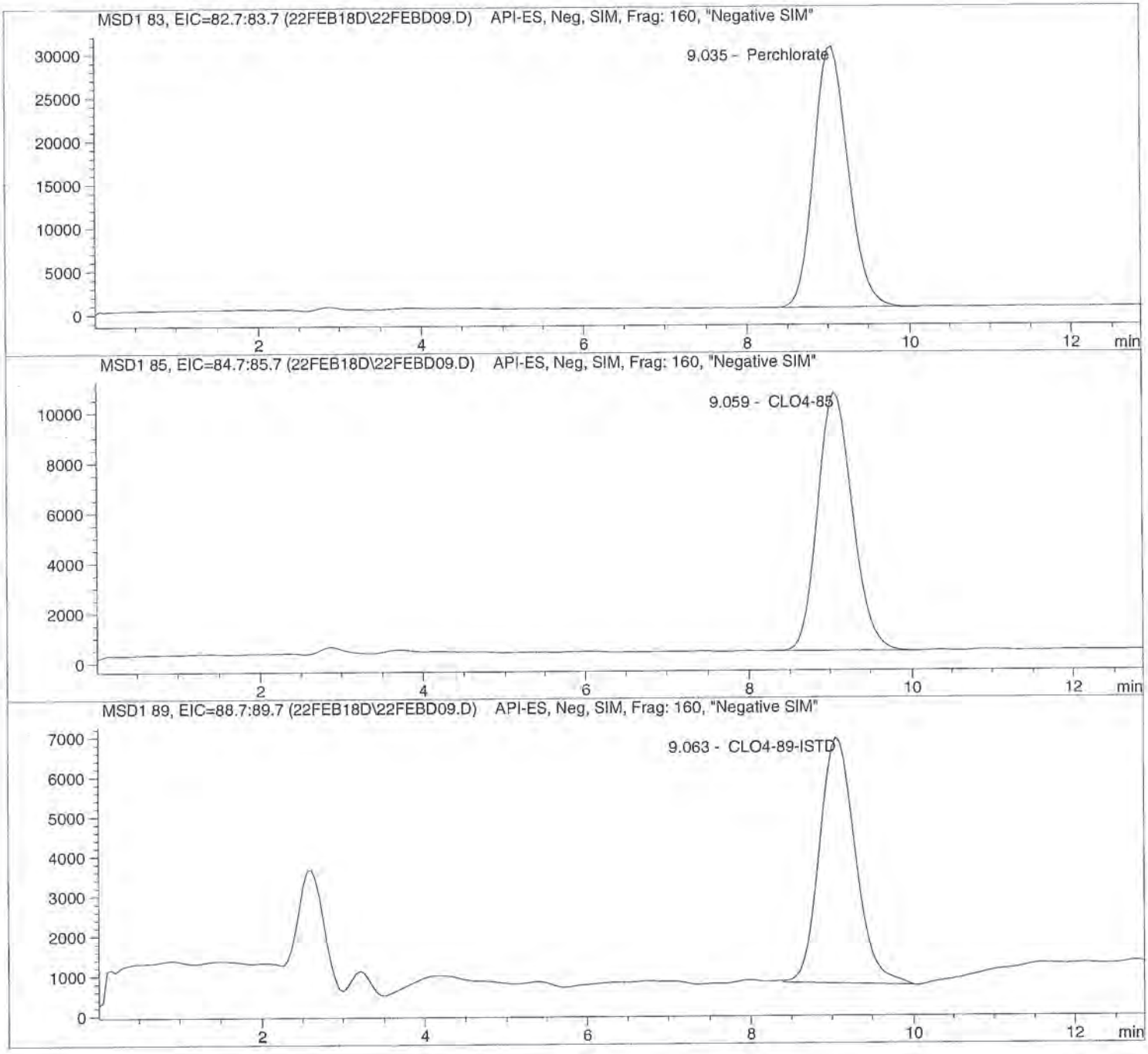
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	ICAL1@ 1.0ug/L	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	ICAL2@ 2.0ug/L	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	ICAL3@ 5.0ug/L	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	ICAL4@ 10.ug/L	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	ICAL5@ 25.ug/L	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	ICAL6@ 50.ug/L	CLO4-DOD	1	Ctrl Samp		
7	Vial 77	ICAL7@ 75.ug/L	CLO4-DOD	1	Ctrl Samp		
8	Vial 78	ICAL Verf@10ug/L	CLO4-DOD	1	Ctrl Samp		
9	Vial 75	588562 CCV@25	CLO4-DOD	1	Ctrl Samp		
10	Vial 71	588563 LODV@1.	CLO4-DOD	1	Ctrl Samp		
11	Vial 81	588564 ICS@1.0	CLO4-DOD	1	Ctrl Samp		
12	Vial 61	588564 ICS@1.0	CLO4-DOD	1	Ctrl Samp		
13	Vial 82	588565 LMB	CLO4-DOD	1	Ctrl Samp		
14	Vial 83	588566 QC@5	CLO4-DOD	1	Ctrl Samp		
15	Vial 84	1804763001	CLO4-DOD	1	Sample		
16	Vial 85	588567 47631MS	CLO4-DOD	1	Ctrl Samp		
17	Vial 86	588568 47631SD	CLO4-DOD	1	Ctrl Samp		
18	Vial 87	1804764001	CLO4-DOD	1	Sample		
19	Vial 88	1804765001 1K	CLO4-DOD	1	Sample		
20	Vial 89	1805239001	CLO4-DOD	1	Sample		
- 21	Vial 90	1805240001	CLO4-DOD	1	Sample		
22	Vial 91	1805310001	CLO4-DOD	1	Sample		
23	Vial 92	1805310002	CLO4-DOD	1	Sample		
24	Vial 93	1805310001 10X	CLO4-DOD	1	Sample		
25	Vial 75	588569 CCV@25	CLO4-DOD	1	Ctrl Samp		
- 26	Vial 71	588570 LODV@1.	CLO4-DOD	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD09.D Sample Name: 588562 CCV@25

Injection Date:	2/22/2018 16:51:32	Seq Line:	9
Sample Name:	588562 CCV@25	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD09.D Sample Name: 588562 CCV@25

Injection Date:	2/22/2018 16:51:32	Seq Line:	9
Sample Name:	588562 CCV@25	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.035	PBA	878860.5	23.5964	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.059	BBA	308884.0	23.8124	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.063	BBA	189943.3	5.0000	CLO4-89-ISTD

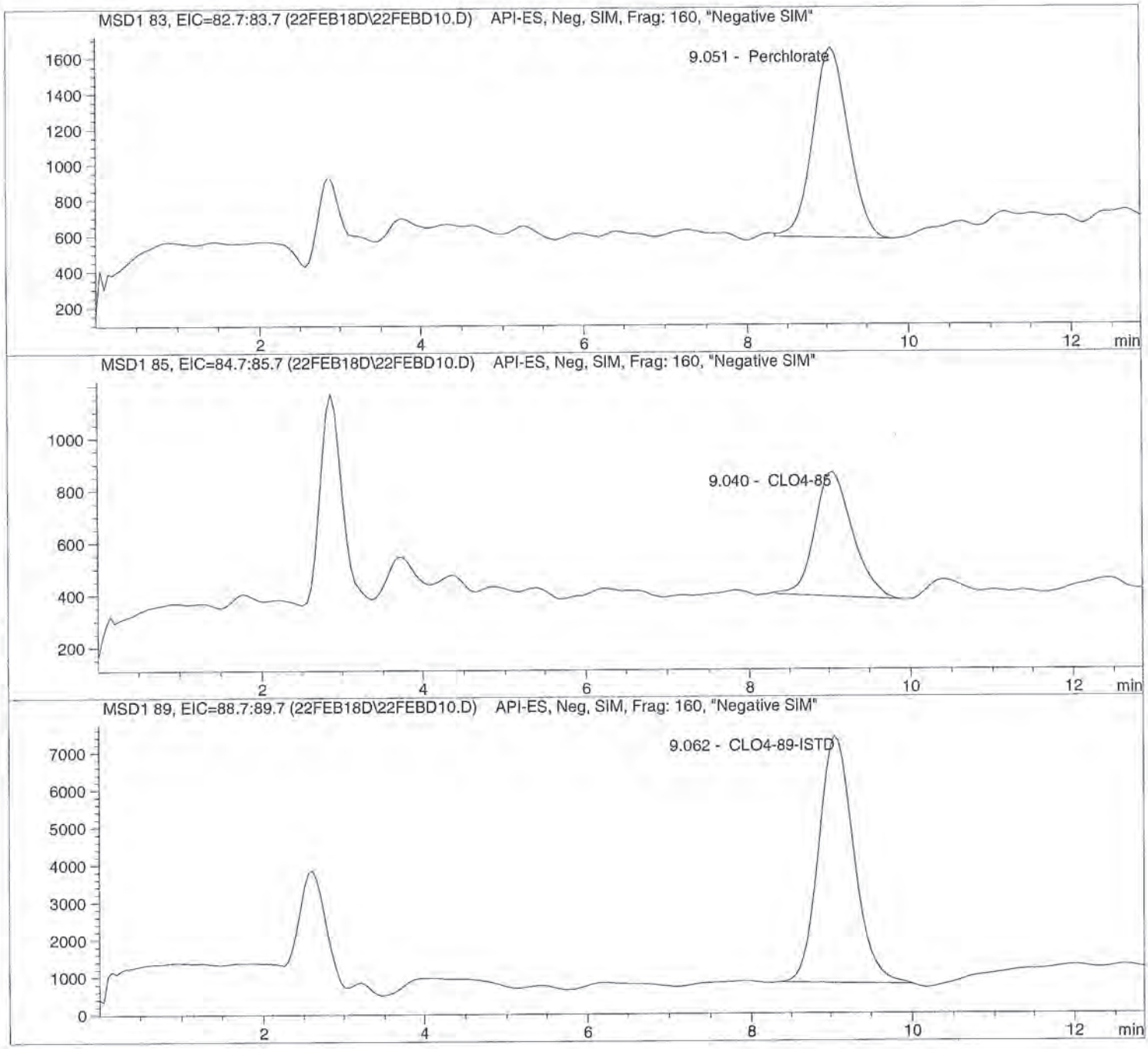
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD10.D Sample Name: 588563 LODV@1.

Injection Date:	2/22/2018 17:06:13	Seq Line:	10
Sample Name:	588563 LODV@1.	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD10.D Sample Name: 588563 LODV@1.

Injection Date:	2/22/2018 17:06:13	Seq Line:	10
Sample Name:	588563 LODV@1.	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.051	BBA	32970.6	0.9991	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.040	BBA	15644.3	1.0690	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.062	BBA	201599.6	5.0000	CLO4-89-ISTD

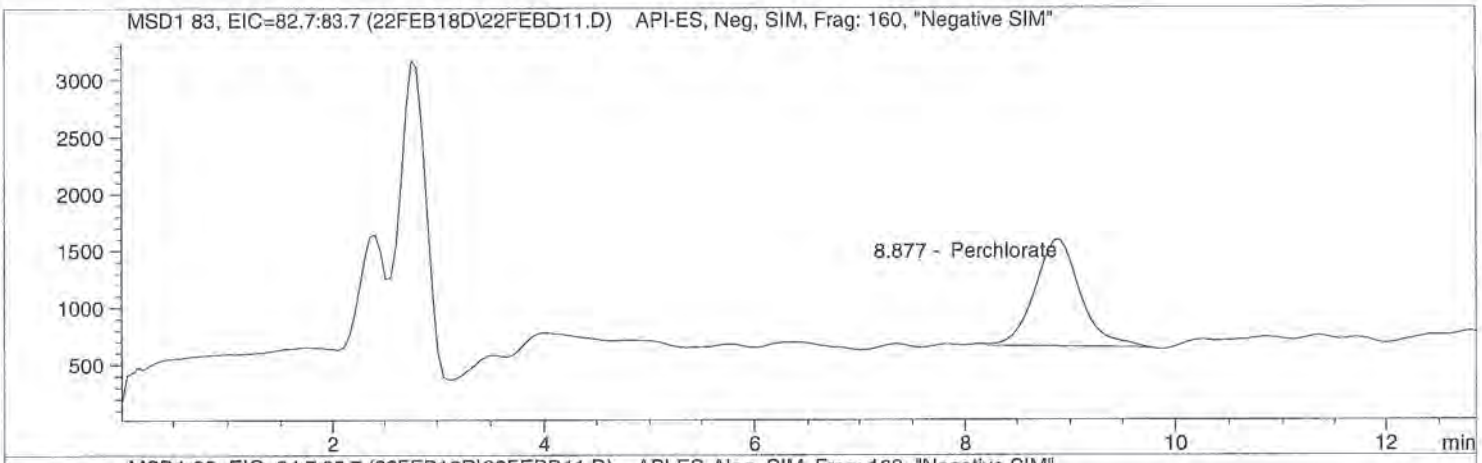
*** End of Report ***

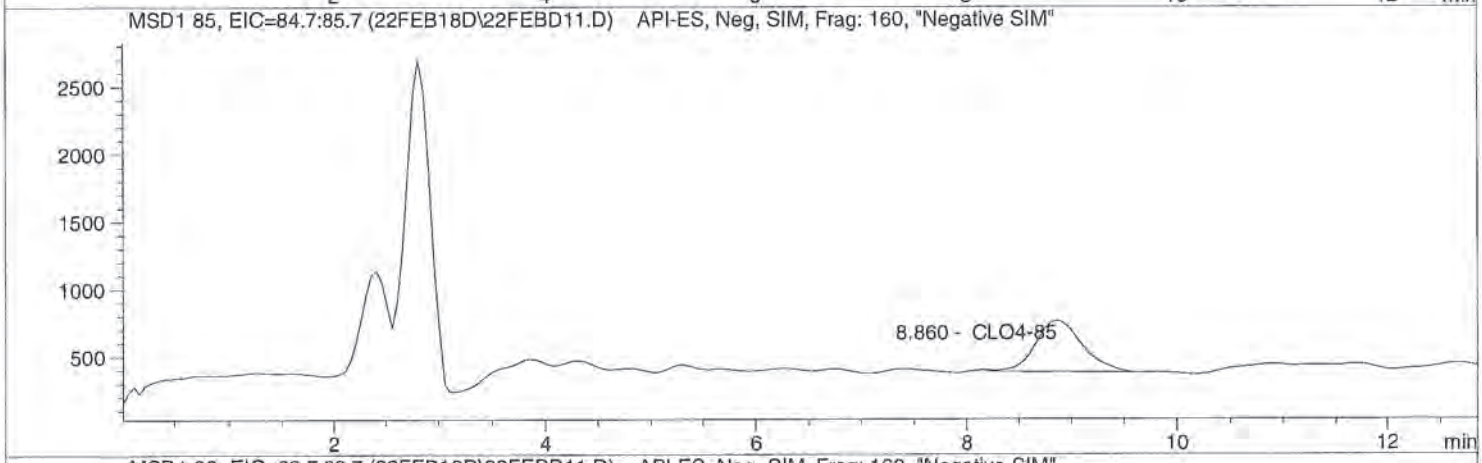
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD11.D Sample Name: 588564 ICS@1.0

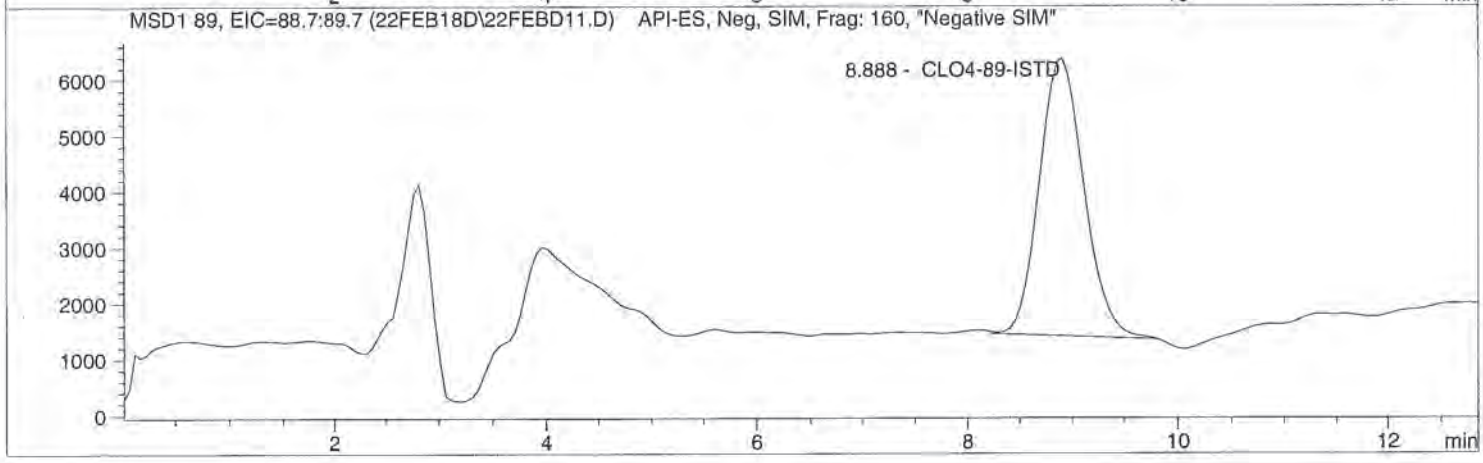
Injection Date:	2/22/2018 17:20:50	Seq Line:	11
Sample Name:	588564 ICS@1.0	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD11.D Sample Name: 588564 ICS@1.0

Injection Date:	2/22/2018 17:20:50	Seq Line:	11
Sample Name:	588564 ICS@1.0	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.877	BBA	28187.4	1.1571	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.860	BBA	11803.8	1.1105	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.888	BBA	147192.5	5.0000	CLO4-89-ISTD

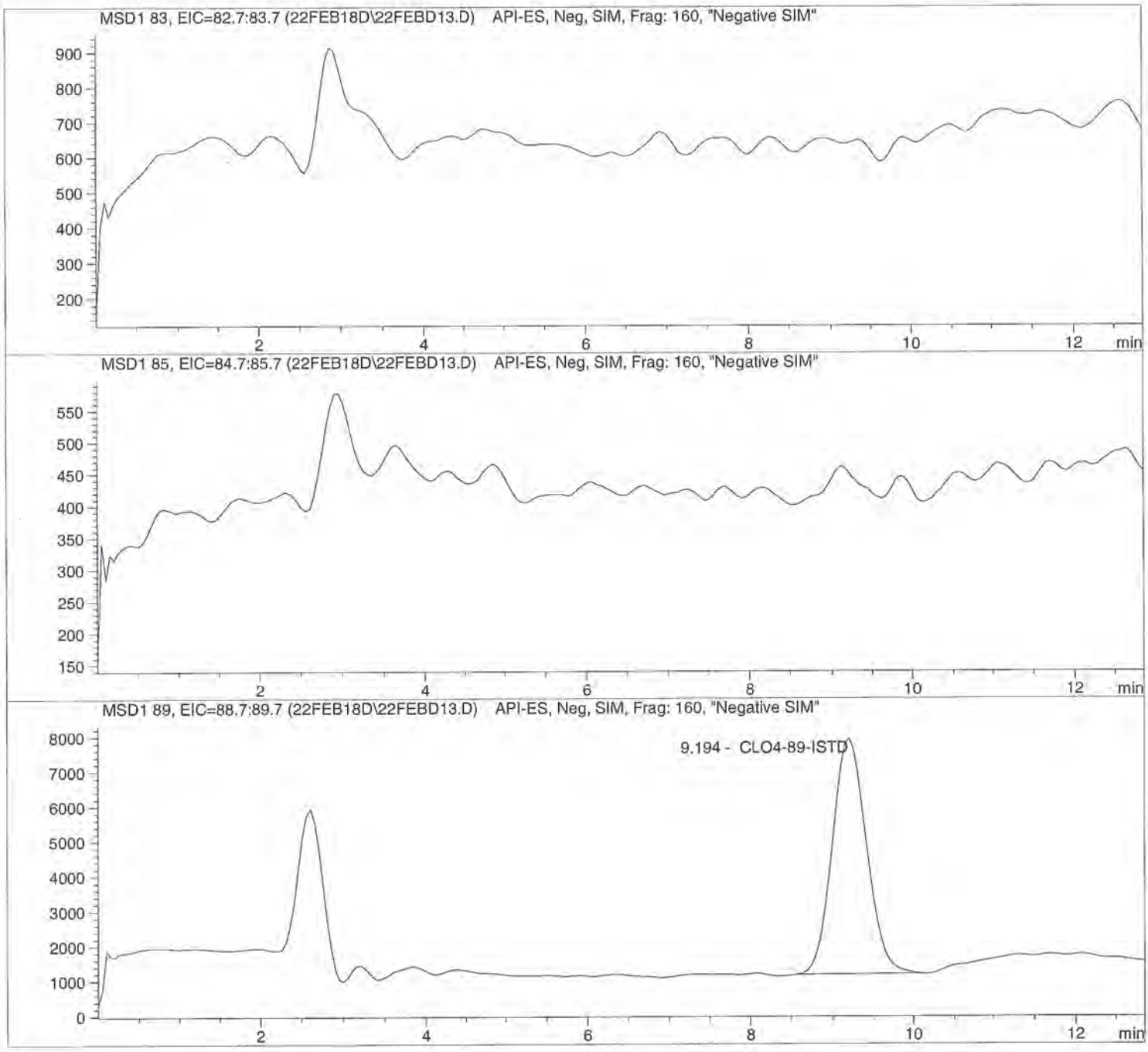
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD13.D Sample Name: 588565 LMB

Injection Date:	2/22/2018 17:50:08	Seq Line:	13
Sample Name:	588565 LMB	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD13.D Sample Name: 588565 LMB

Injection Date:	2/22/2018 17:50:08	Seq Line:	13
Sample Name:	588565 LMB	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.194	BBA	198584.4	5.0000	CLO4-89-ISTD

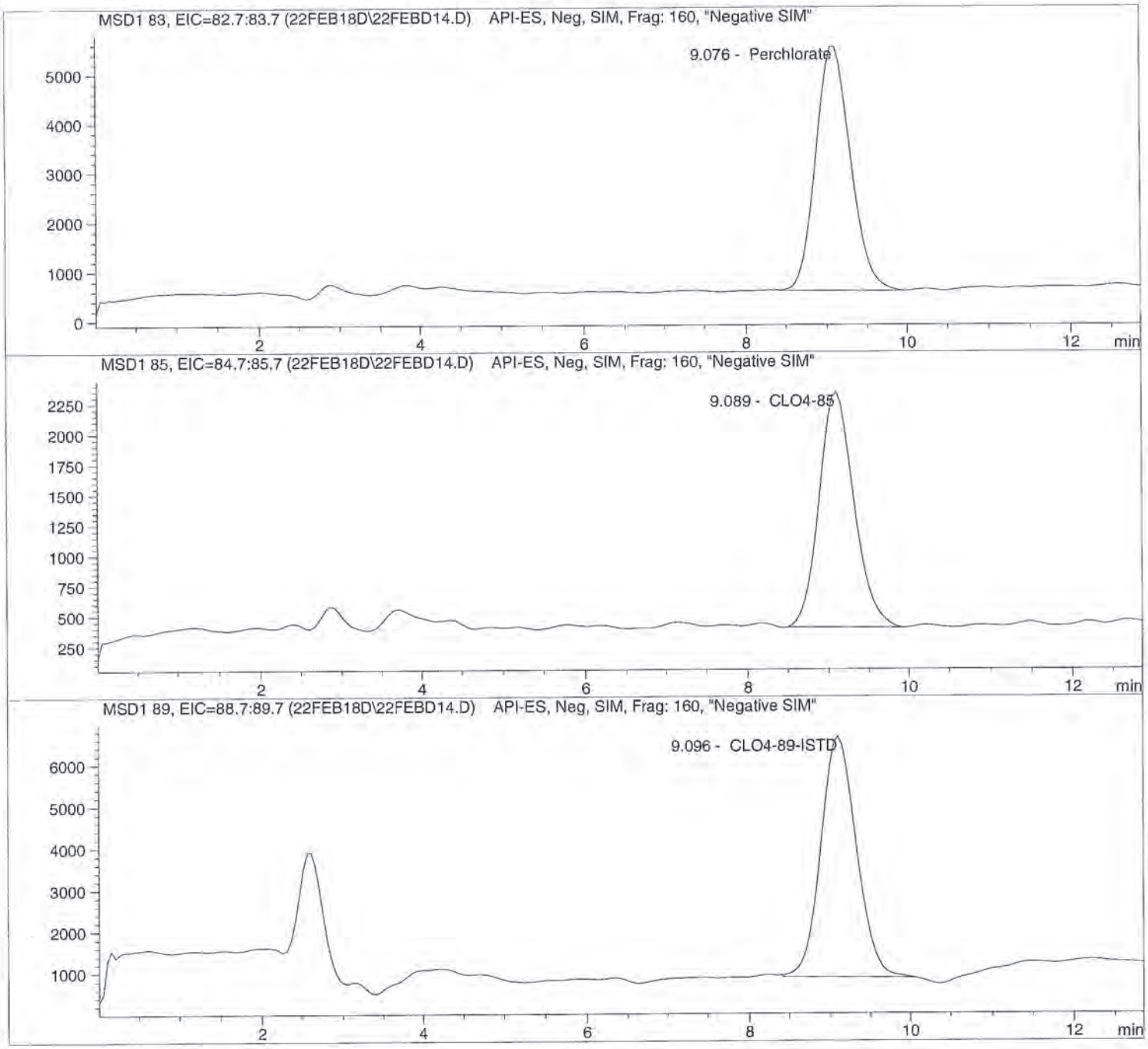
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD14.D Sample Name: 588566 QC@5

Injection Date:	2/22/2018 18:04:45	Seq Line:	14
Sample Name:	588566 QC@5	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD14.D Sample Name: 588566 QC@5

Injection Date:	2/22/2018 18:04:45	Seq Line:	14
Sample Name:	588566 QC@5	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.076	BBA	146393.3	4.7190	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.089	PBA	57683.0	5.0256	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.096	BBA	175541.1	5.0000	CLO4-89-ISTD

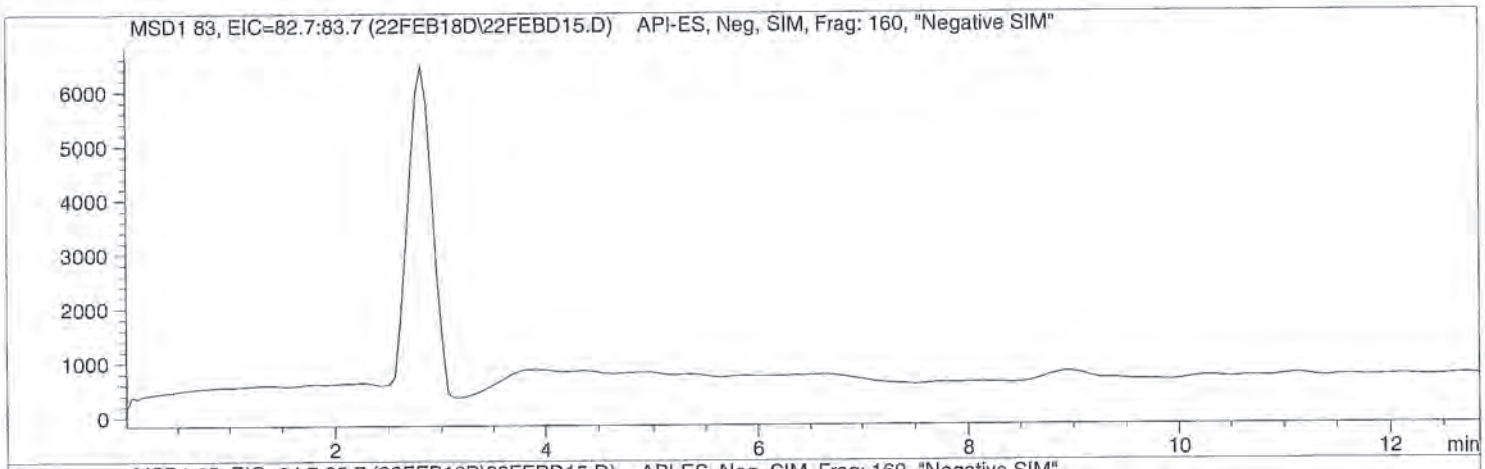
*** End of Report ***

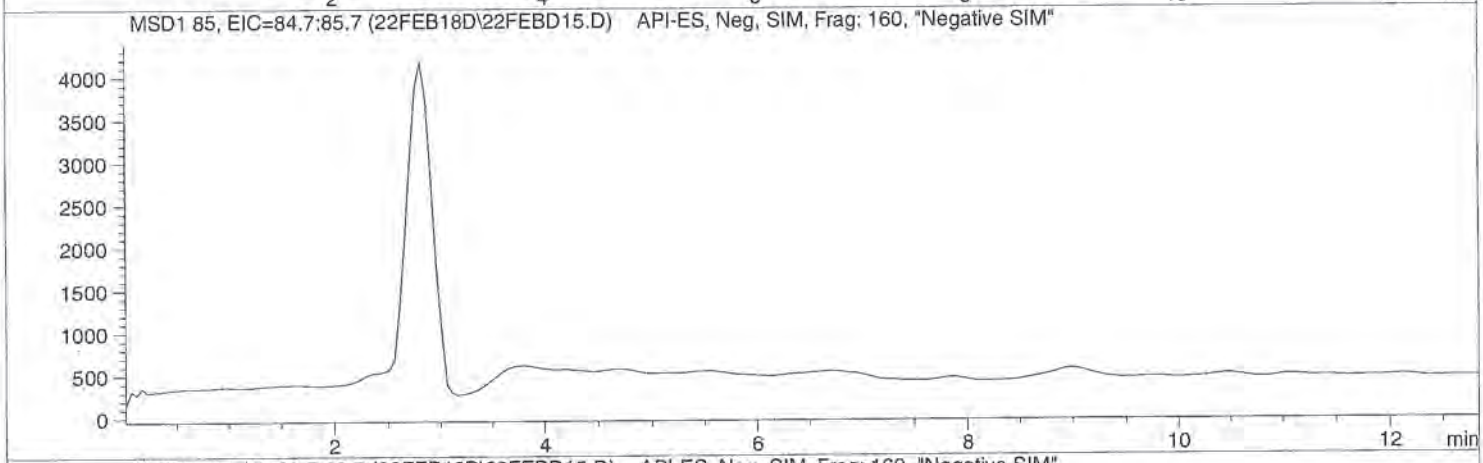
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD15.D Sample Name: 1804763001

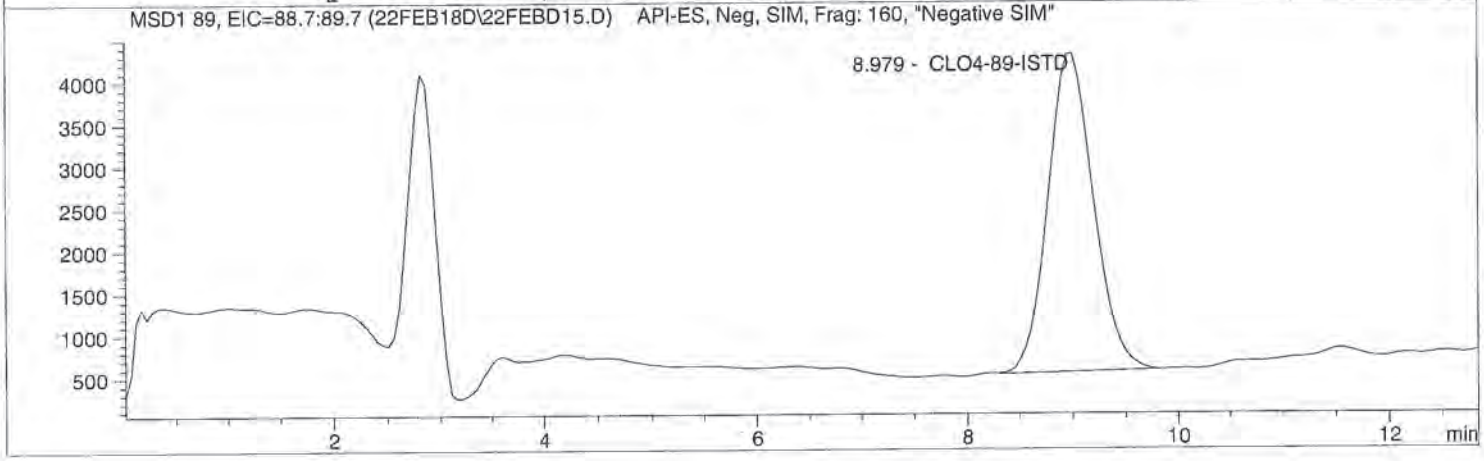
Injection Date:	2/22/2018 18:19:24	Seq Line:	15
Sample Name:	1804763001	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD15.D Sample Name: 1804763001

Injection Date:	2/22/2018 18:19:24	Seq Line:	15
Sample Name:	1804763001	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.979	BBA	112710.3	5.0000	CLO4-89-ISTD

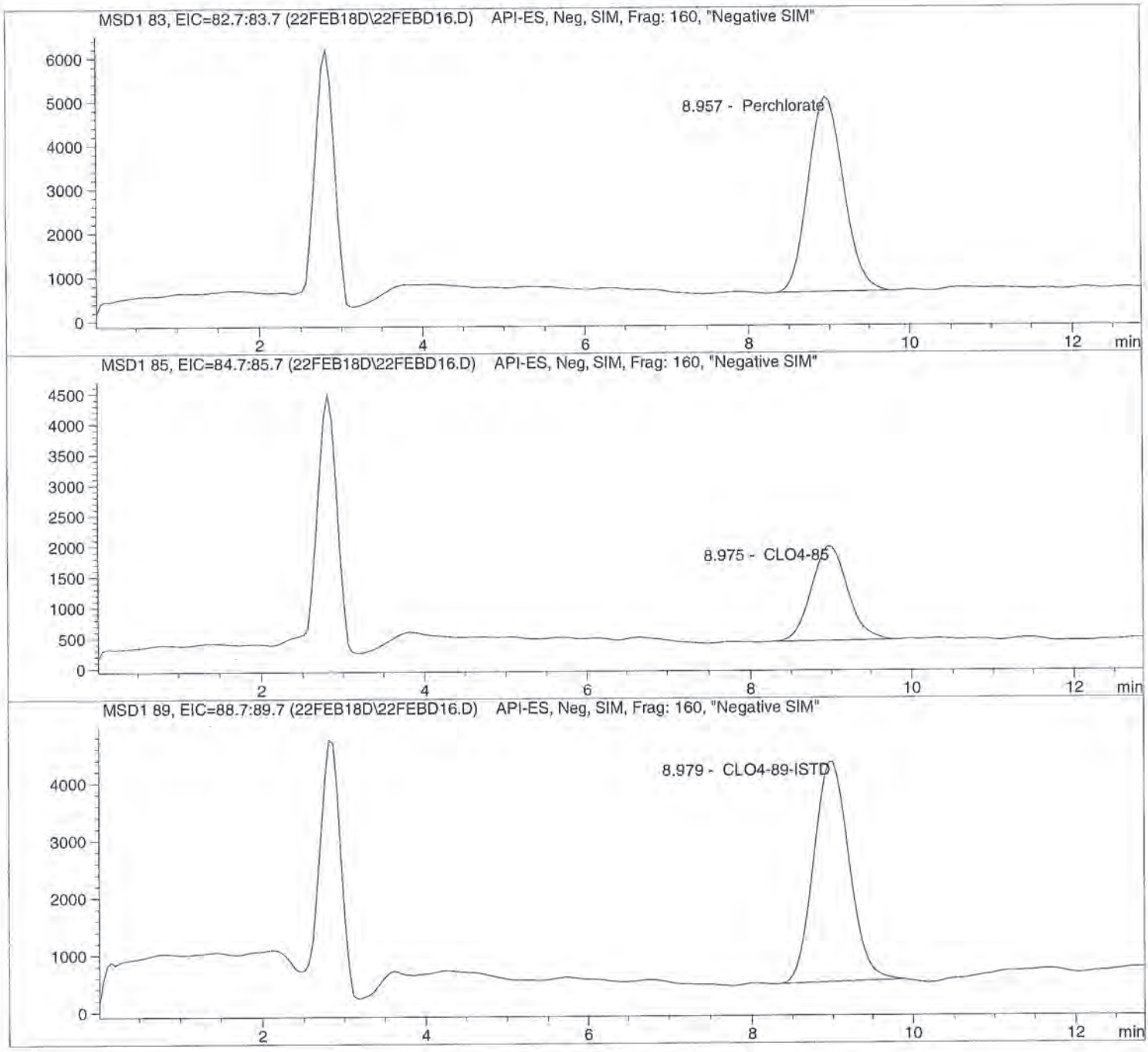
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD16.D Sample Name: 588567 47631MS

Injection Date:	2/22/2018 18:34:02	Seq Line:	16
Sample Name:	588567 47631MS	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD16.D Sample Name: 588567 47631MS

Injection Date:	2/22/2018 18:34:02	Seq Line:	16
Sample Name:	588567 47631MS	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.957	PBA	134078.4	6.4144	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.975	PBA	47914.1	6.2865	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.979	PBA	116801.2	5.0000	CLO4-89-ISTD

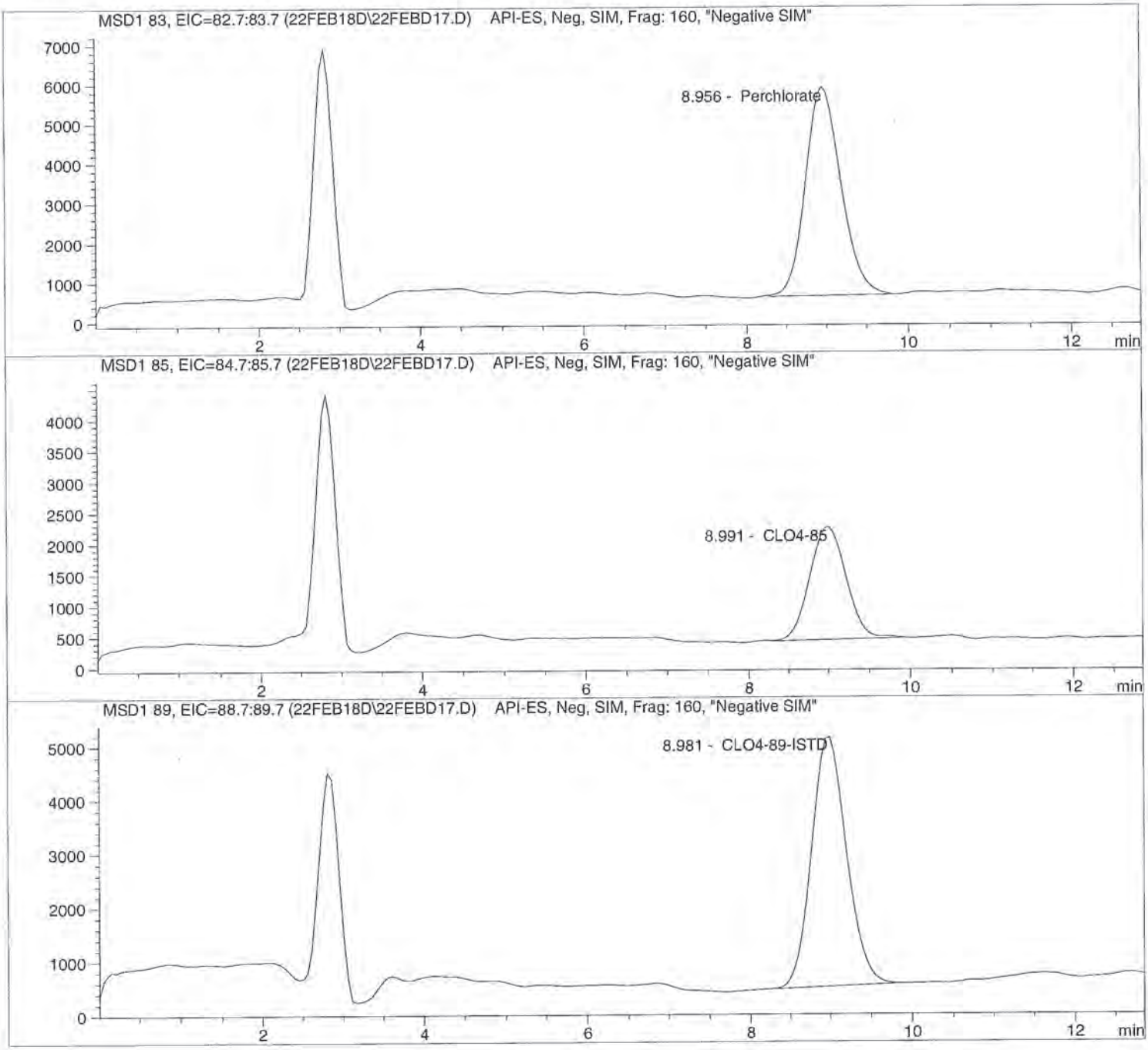
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD17.D Sample Name: 588568 47631SD

Injection Date:	2/22/2018 18:48:40	Seq Line:	17
Sample Name:	588568 47631SD	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD17.D Sample Name: 588568 47631SD

Injection Date:	2/22/2018 18:48:40	Seq Line:	17
Sample Name:	588568 47631SD	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.956	BBA	160865.3	6.4317	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.991	BBA	56950.5	6.2453	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.981	BBA	139742.8	5.0000	CLO4-89-ISTD

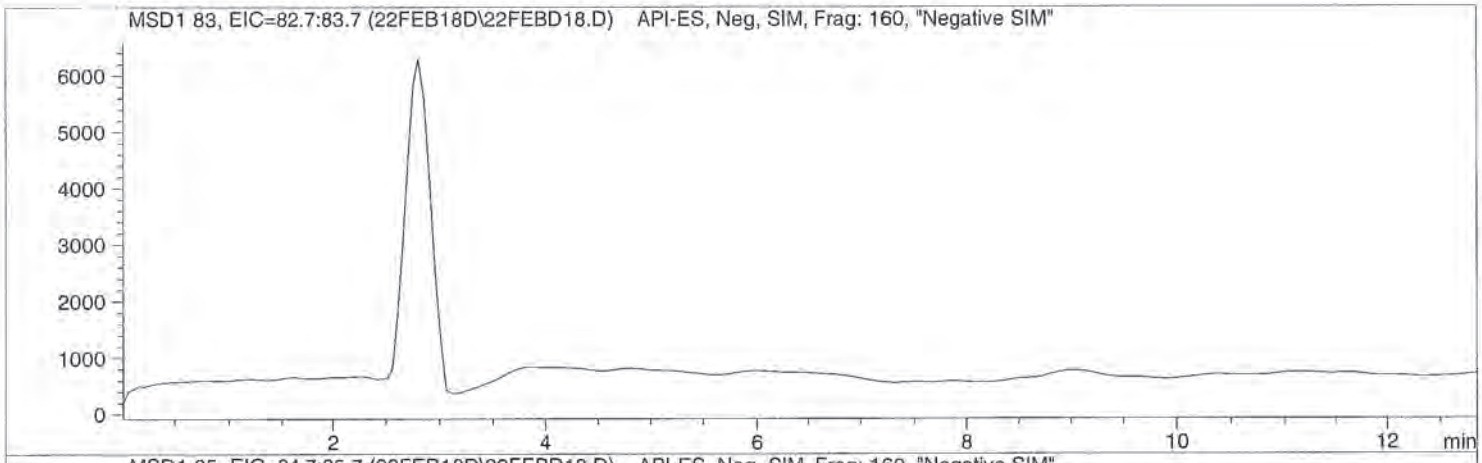
*** End of Report ***

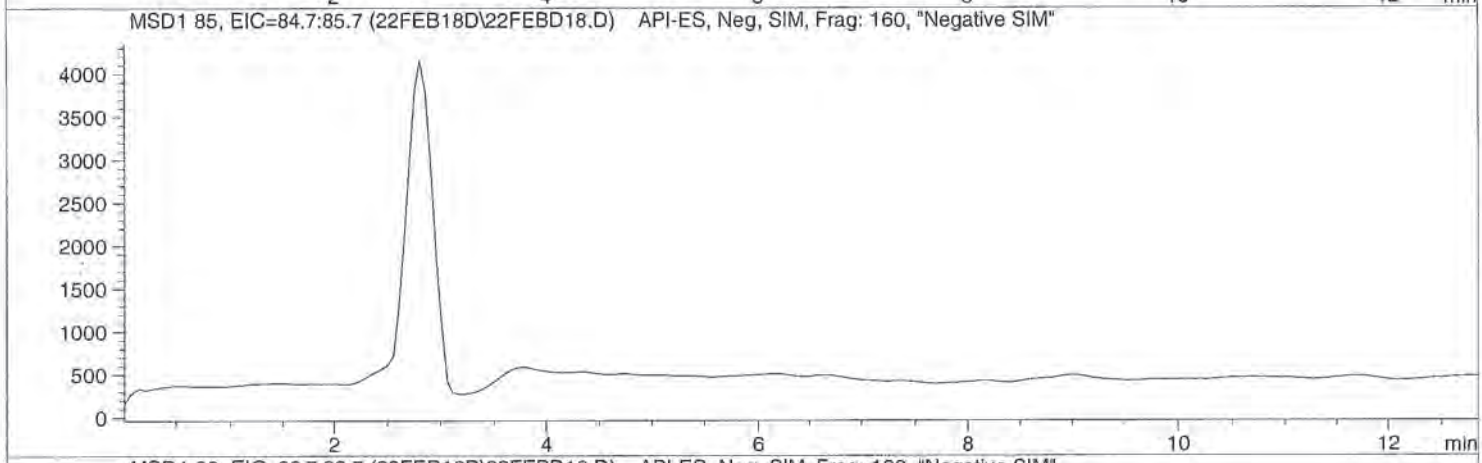
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD18.D Sample Name: 1804764001

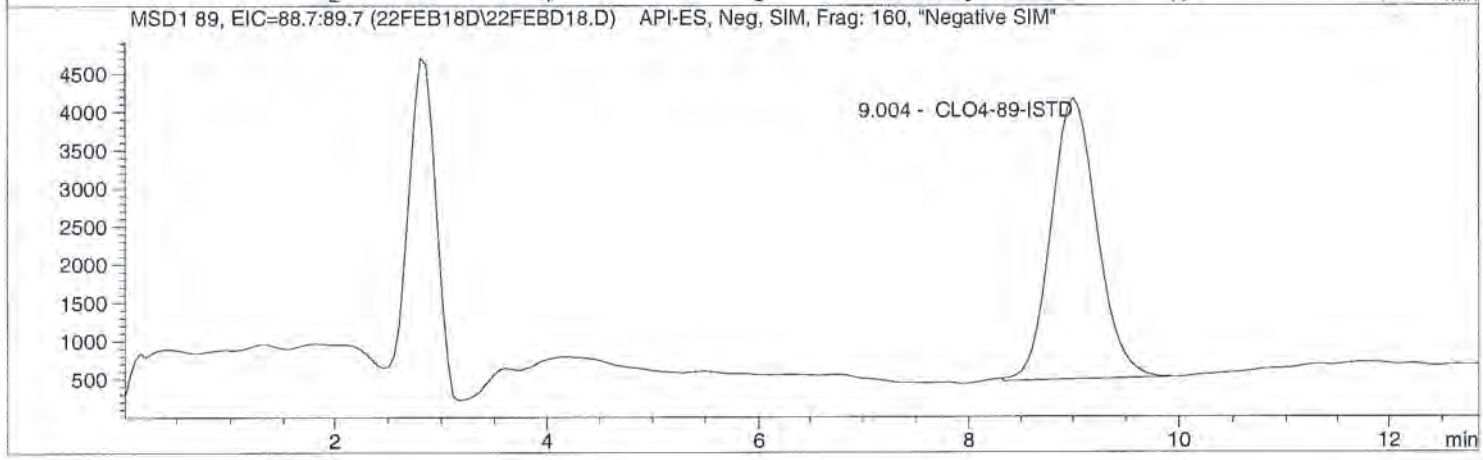
Injection Date:	2/22/2018 19:03:17	Seq Line:	18
Sample Name:	1804764001	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD18.D Sample Name: 1804764001

Injection Date:	2/22/2018 19:03:17	Seq Line:	18
Sample Name:	1804764001	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.004	BBA	112690.1	5.0000	CLO4-89-ISTD

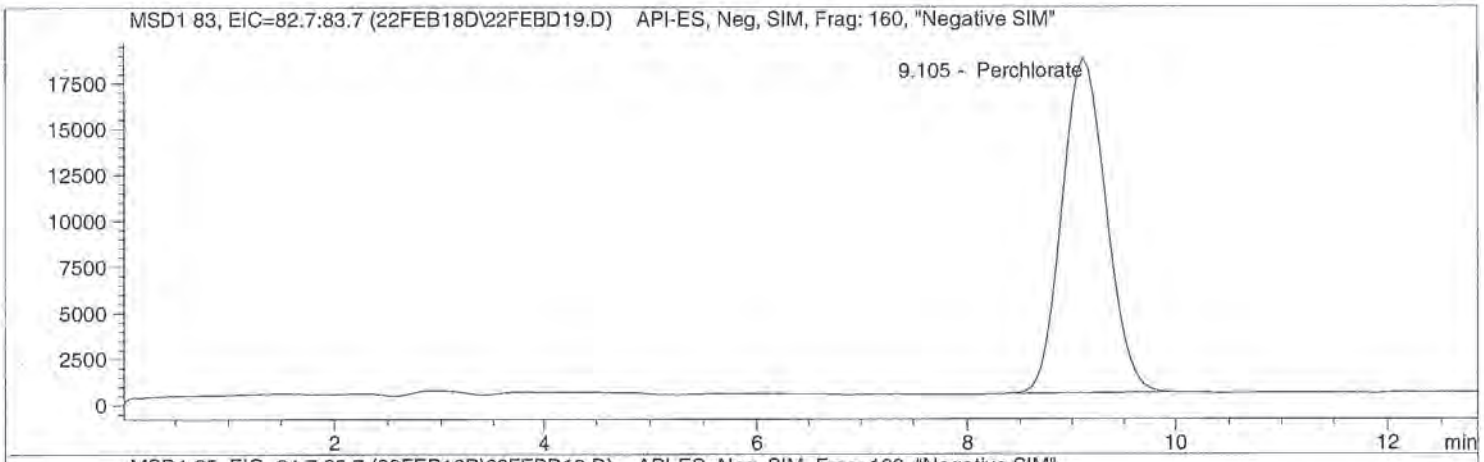
*** End of Report ***

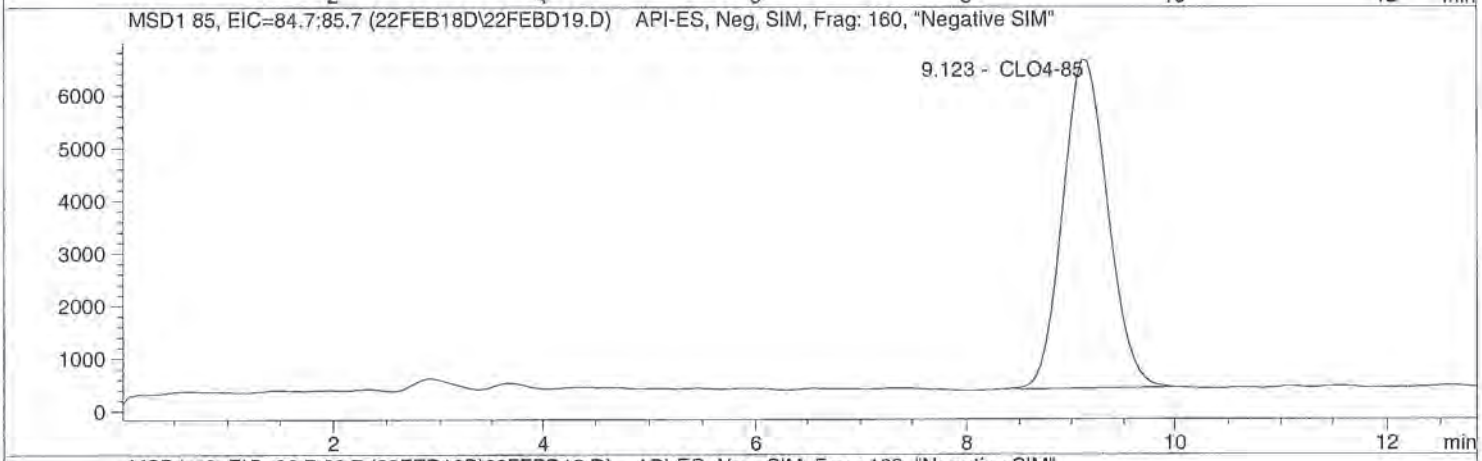
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD19.D Sample Name: 1804765001 1K

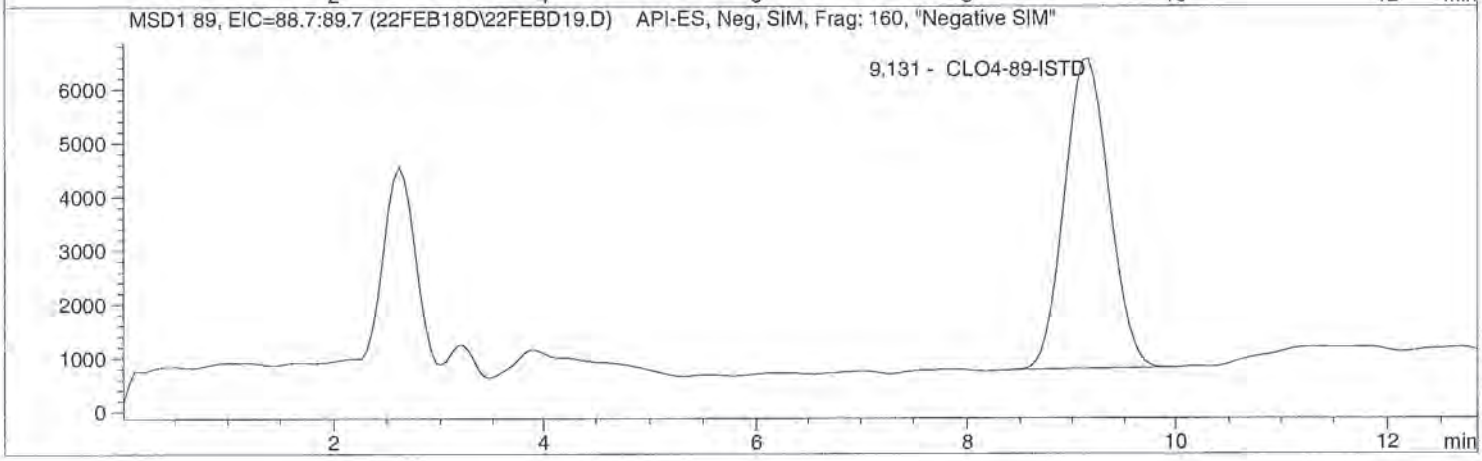
Injection Date:	2/22/2018 19:17:57	Seq Line:	19
Sample Name:	1804765001 1K	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD19.D Sample Name: 1804765001 1K

Injection Date:	2/22/2018 19:17:57	Seq Line:	19
Sample Name:	1804765001 1K	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1000.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.105	BBA	532467.6	16452.1306	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.123	BBA	186758.3	16387.1248	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.131	PBA	170954.6	5000.0000	CLO4-89-ISTD

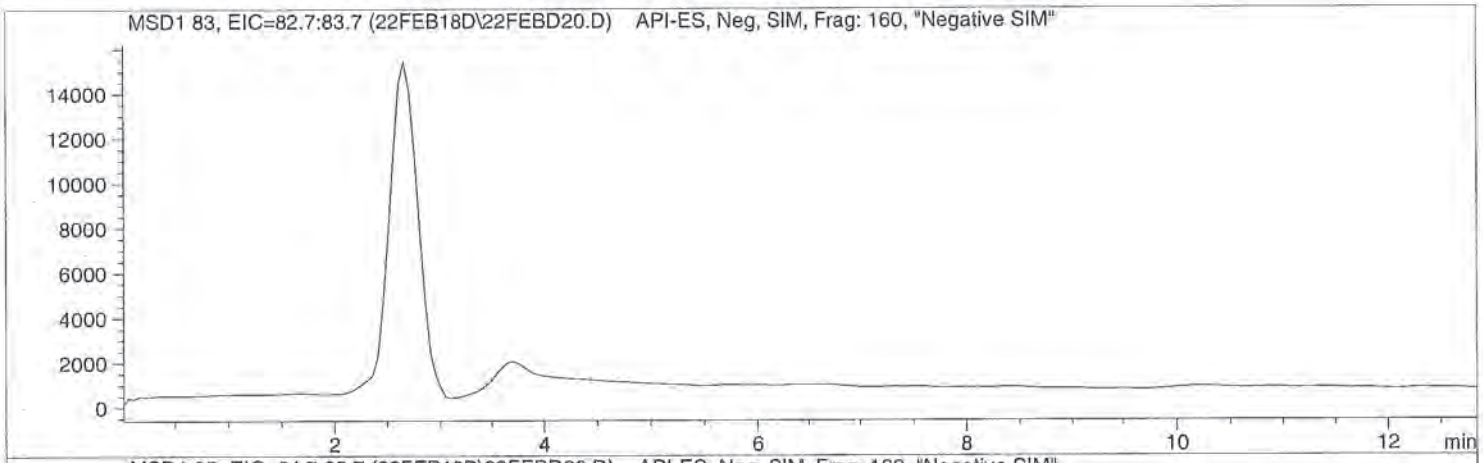
*** End of Report ***

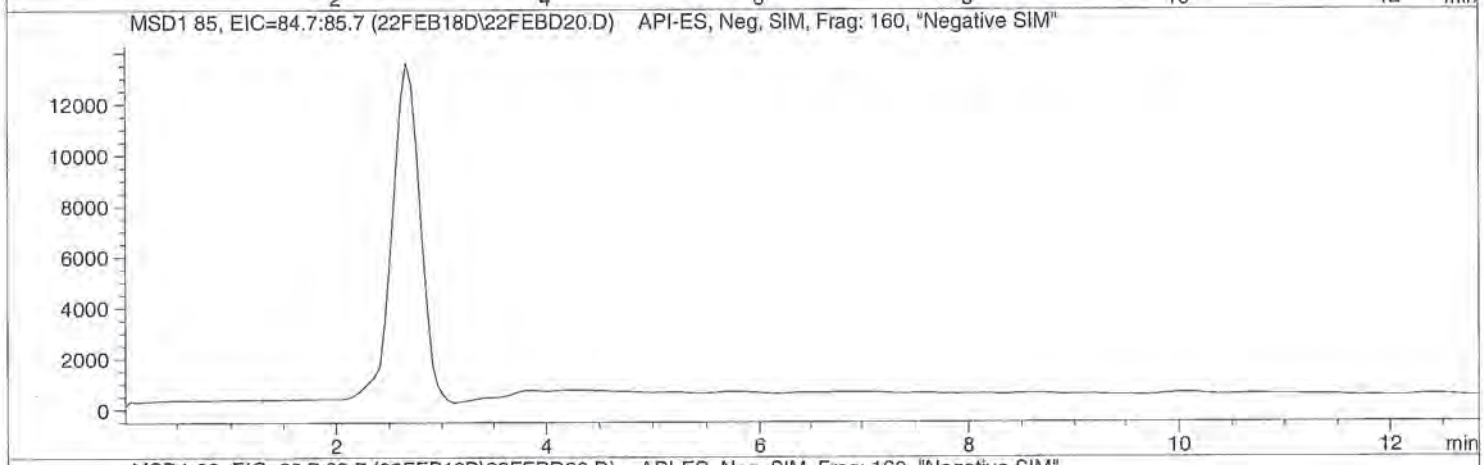
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD20.D Sample Name: 1805239001

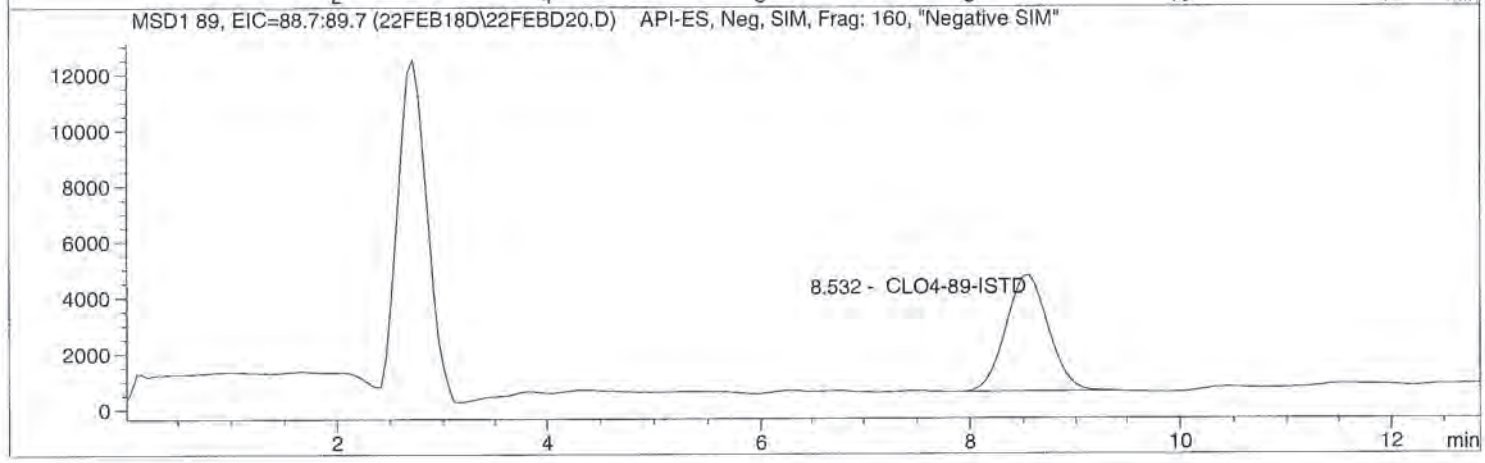
Injection Date:	2/22/2018 19:32:40	Seq Line:	20
Sample Name:	1805239001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD20.D Sample Name: 1805239001

Injection Date:	2/22/2018 19:32:40	Seq Line:	20
Sample Name:	1805239001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.532	PBA	115041.0	5.0000	CLO4-89-ISTD

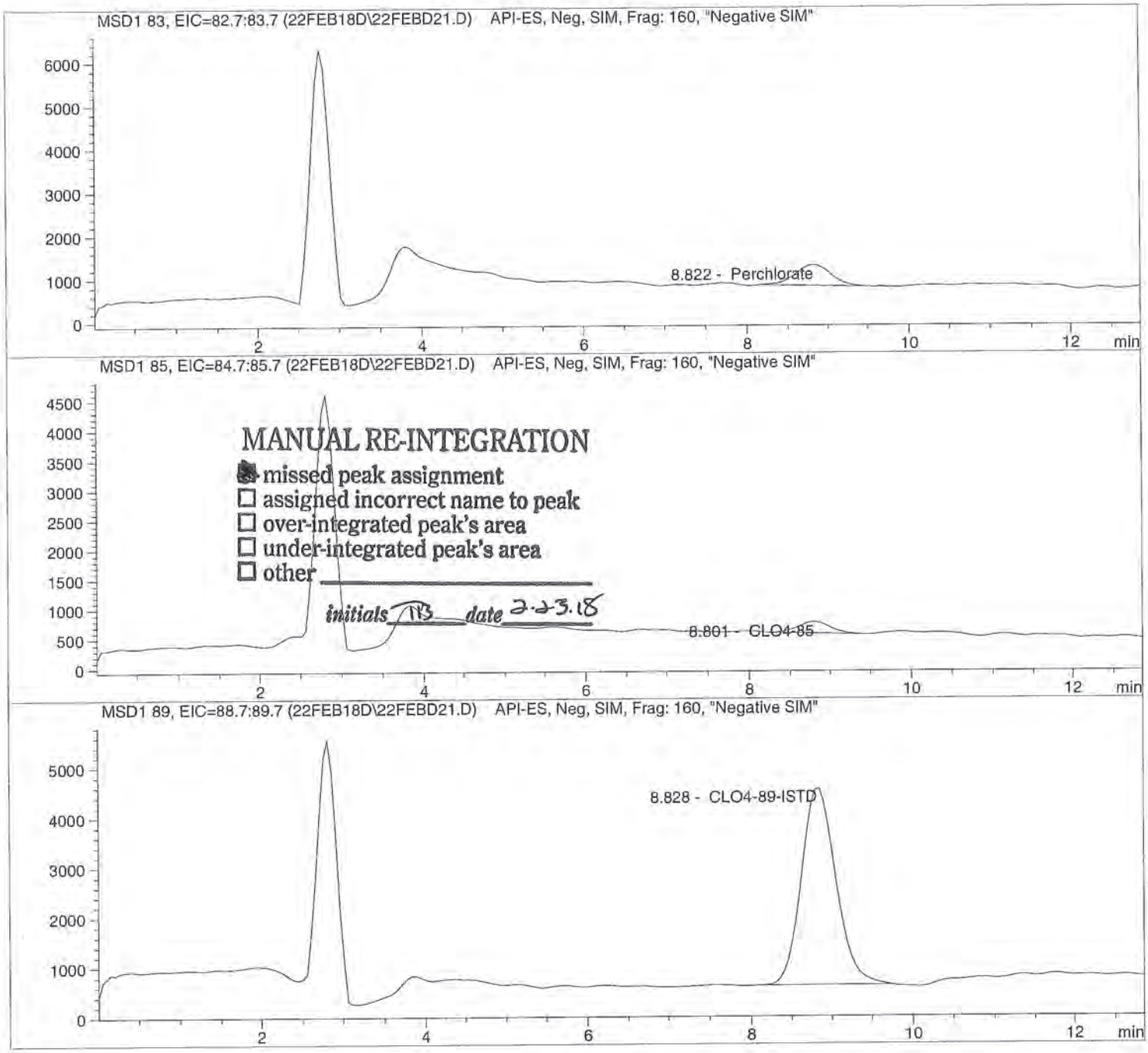
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD21.D Sample Name: 1805240001

Injection Date:	2/22/2018 19:47:20	Seq Line:	21
Sample Name:	1805240001	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD21.D Sample Name: 1805240001

Injection Date:	2/22/2018 19:47:20	Seq Line:	21
Sample Name:	1805240001	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.822	PBA	14977.1	0.7915	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.801	MM	5355.9	0.5519	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.828	BBA	118047.1	5.0000	CLO4-89-ISTD

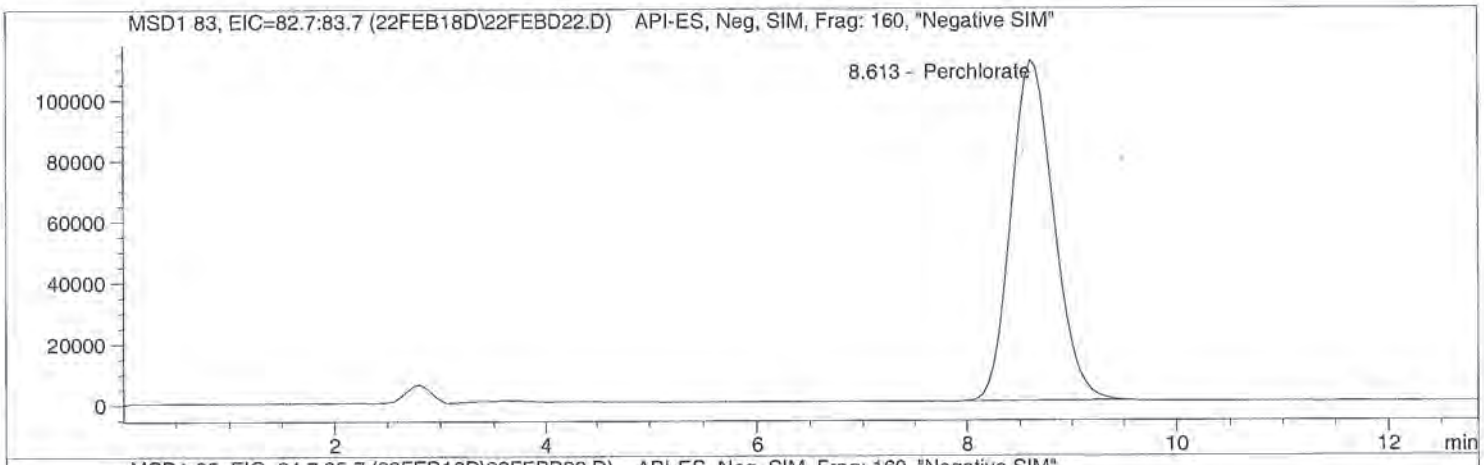
*** End of Report ***

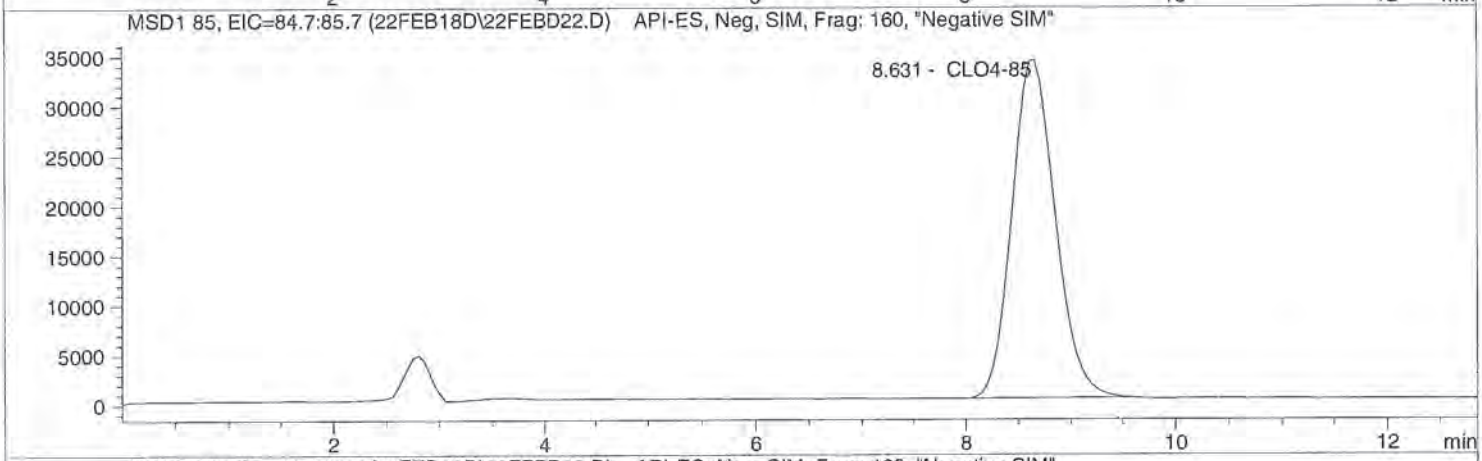
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD22.D Sample Name: 1805310001

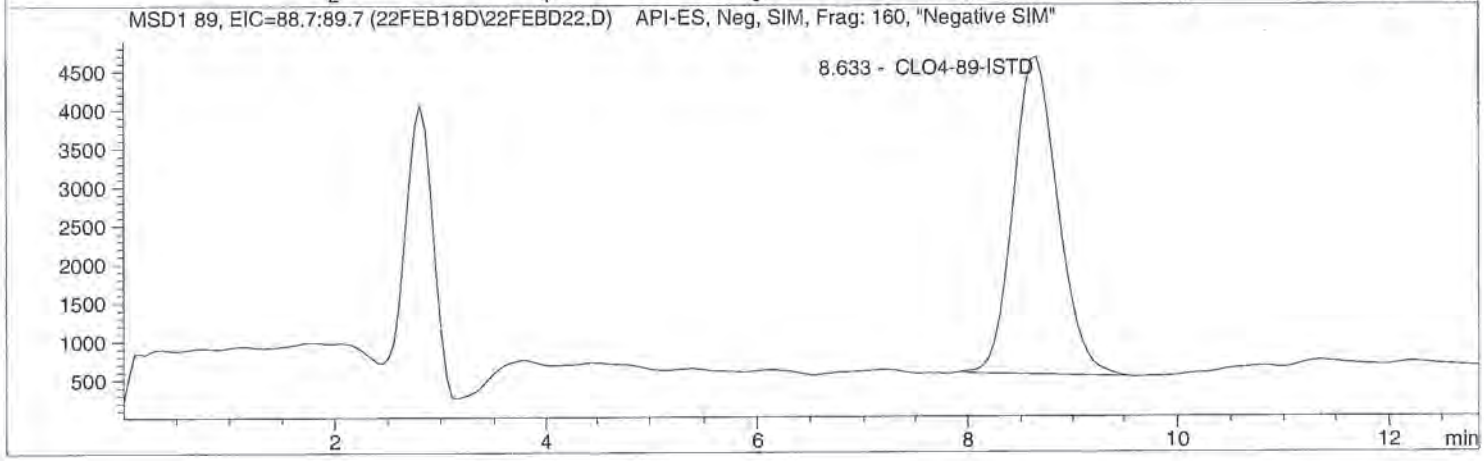
Injection Date:	2/22/2018 20:02:00	Seq Line:	22
Sample Name:	1805310001	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD22.D Sample Name: 1805310001

Injection Date:	2/22/2018 20:02:00	Seq Line:	22
Sample Name:	1805310001	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.613	PBA	3163817.5	98.1138	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.631	PBA	979094.6	94.1725	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.633	BBA	121795.0	5.0000	CLO4-89-ISTD

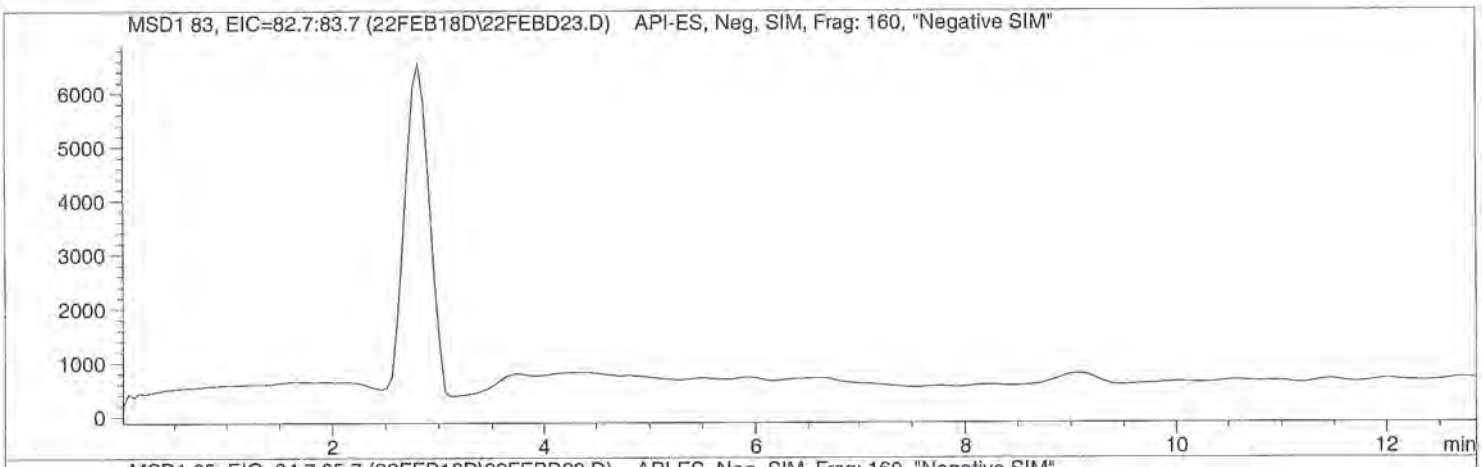
*** End of Report ***

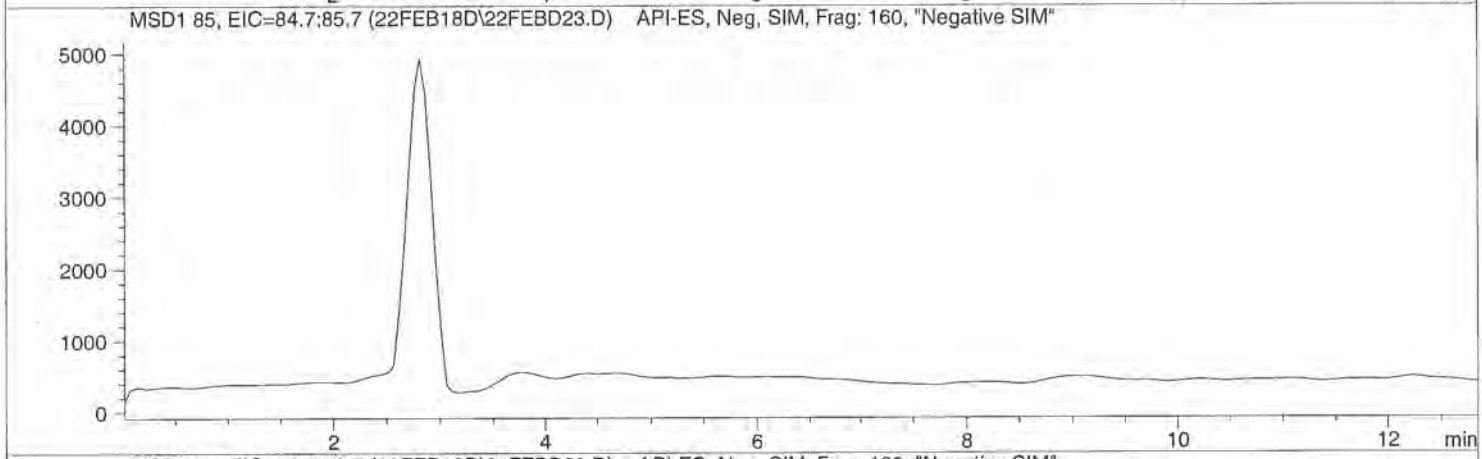
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD23.D Sample Name: 1805310002

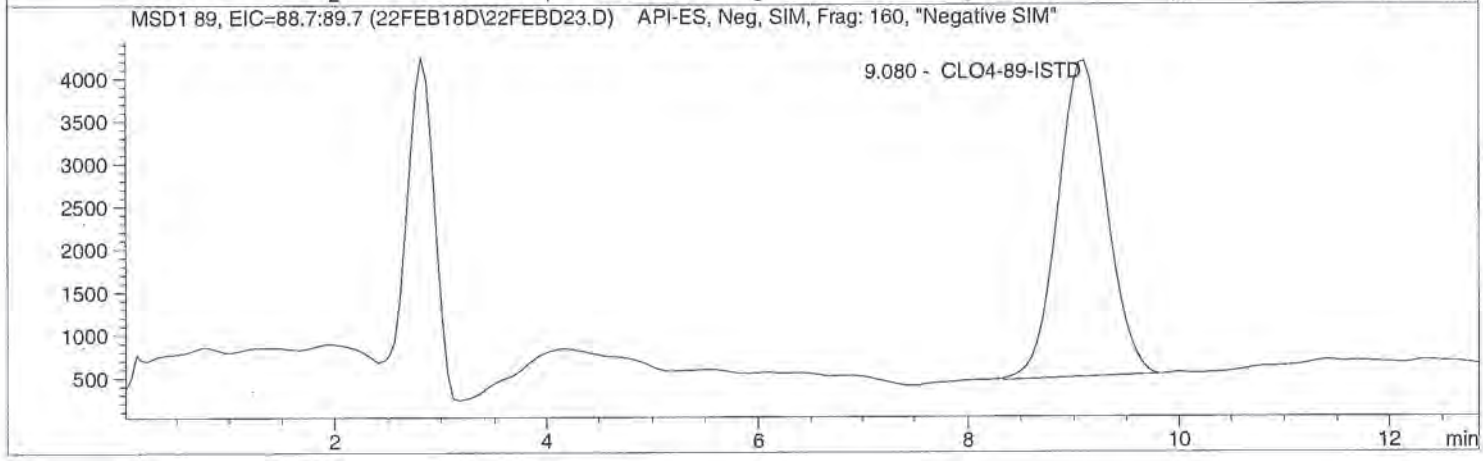
Injection Date:	2/22/2018 20:16:37	Seq Line:	23
Sample Name:	1805310002	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD23.D Sample Name: 1805310002

Injection Date:	2/22/2018 20:16:37	Seq Line:	23
Sample Name:	1805310002	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.080	BBA	118358.9	5.0000	CLO4-89-ISTD

*** End of Report ***

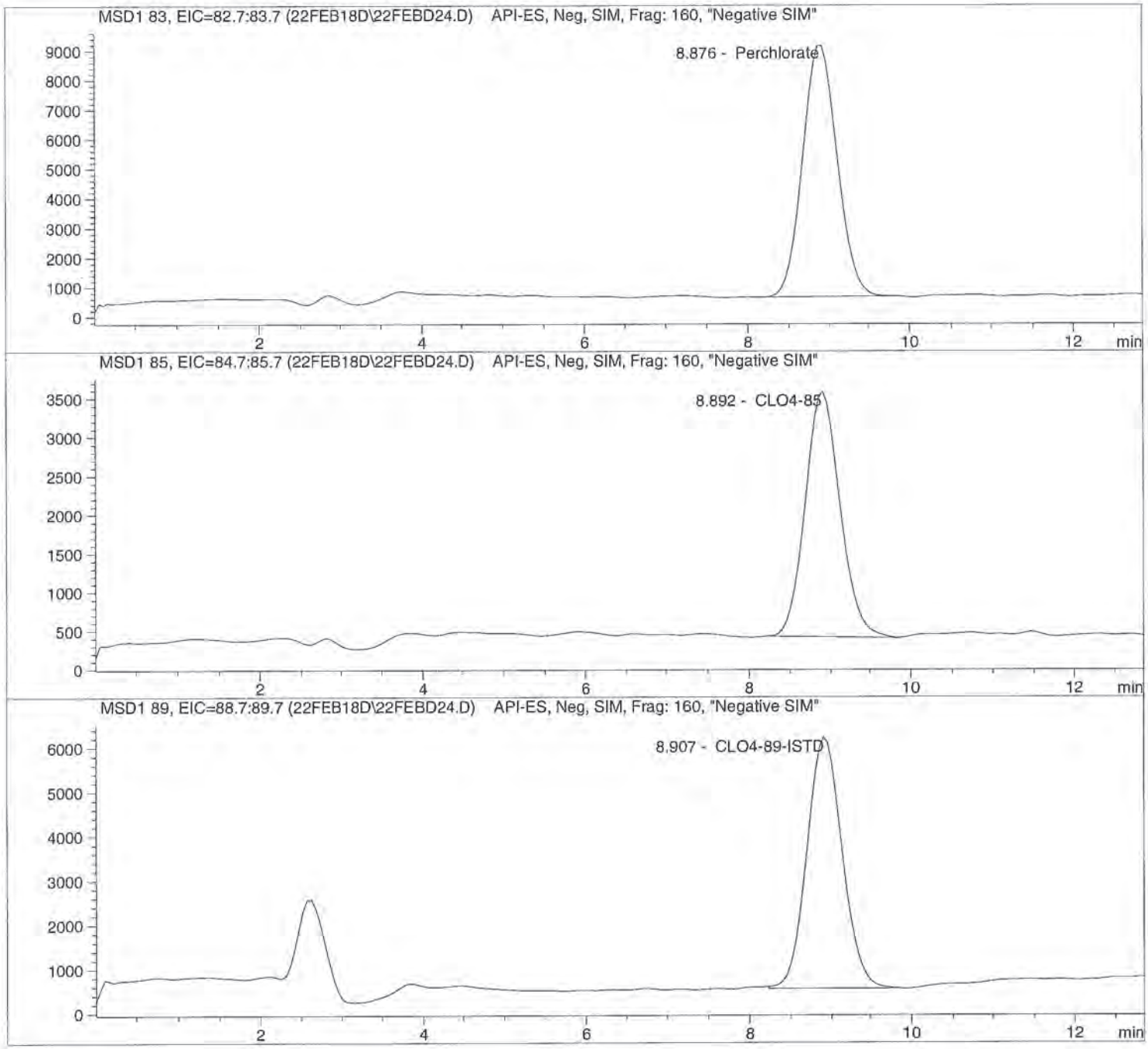
00883685

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD24.D Sample Name: 1805310001 10X

Injection Date:	2/22/2018 20:31:18	Seq Line:	24
Sample Name:	1805310001 10X	Location:	Vial 93
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD24.D Sample Name: 1805310001 10X

Injection Date:	2/22/2018 20:31:18	Seq Line:	24
Sample Name:	1805310001 10X	Location:	Vial 93
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	10.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.876	PBA	255270.7	80.6160	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.892	PBA	96329.9	84.2125	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.907	BBA	175083.1	50.0000	CLO4-89-ISTD

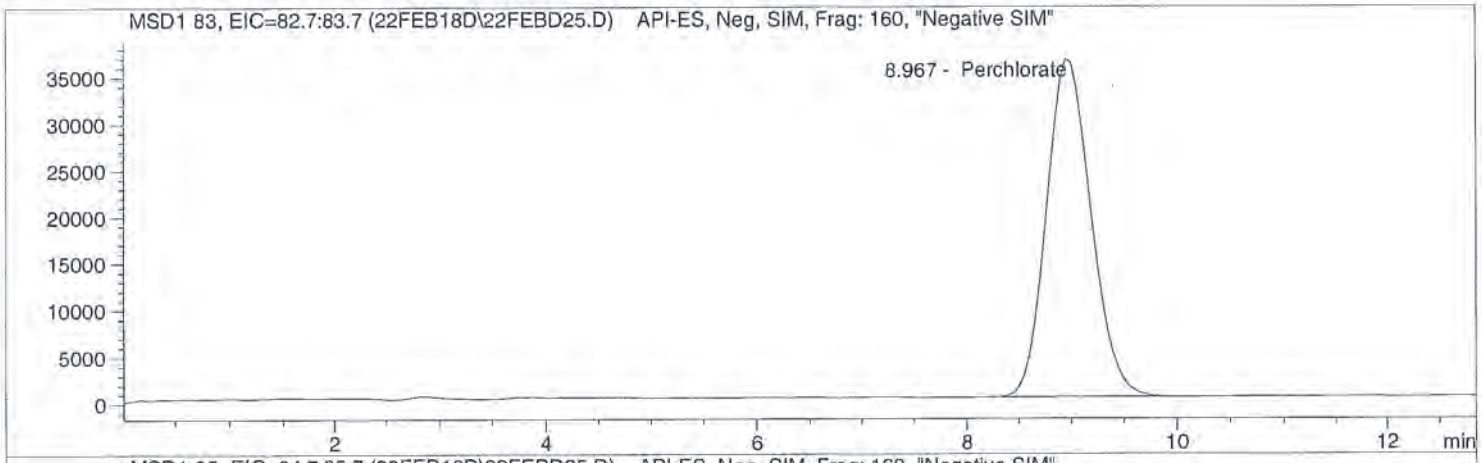
*** End of Report ***

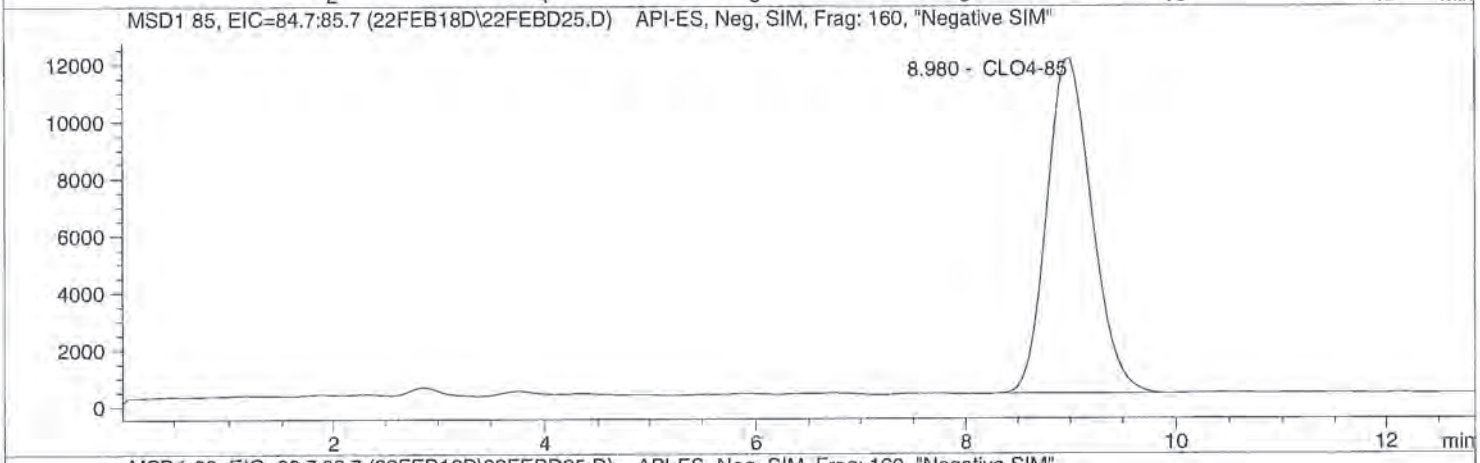
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD25.D Sample Name: 588569 CCV@25

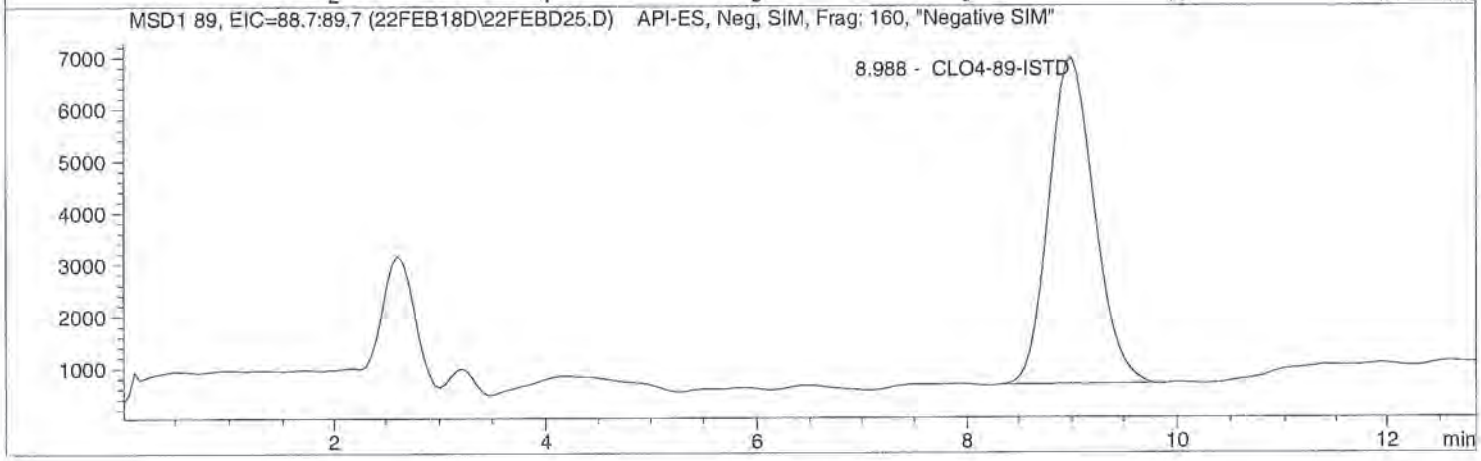
Injection Date:	2/22/2018 20:46:01	Seq Line:	25
Sample Name:	588569 CCV@25	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD25.D Sample Name: 588569 CCV@25

Injection Date:	2/22/2018 20:46:01	Seq Line:	25
Sample Name:	588569 CCV@25	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.967	BBA	1064375.0	28.1103	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.980	BBA	349696.7	26.8173	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.988	PBA	189030.9	5.0000	CLO4-89-ISTD

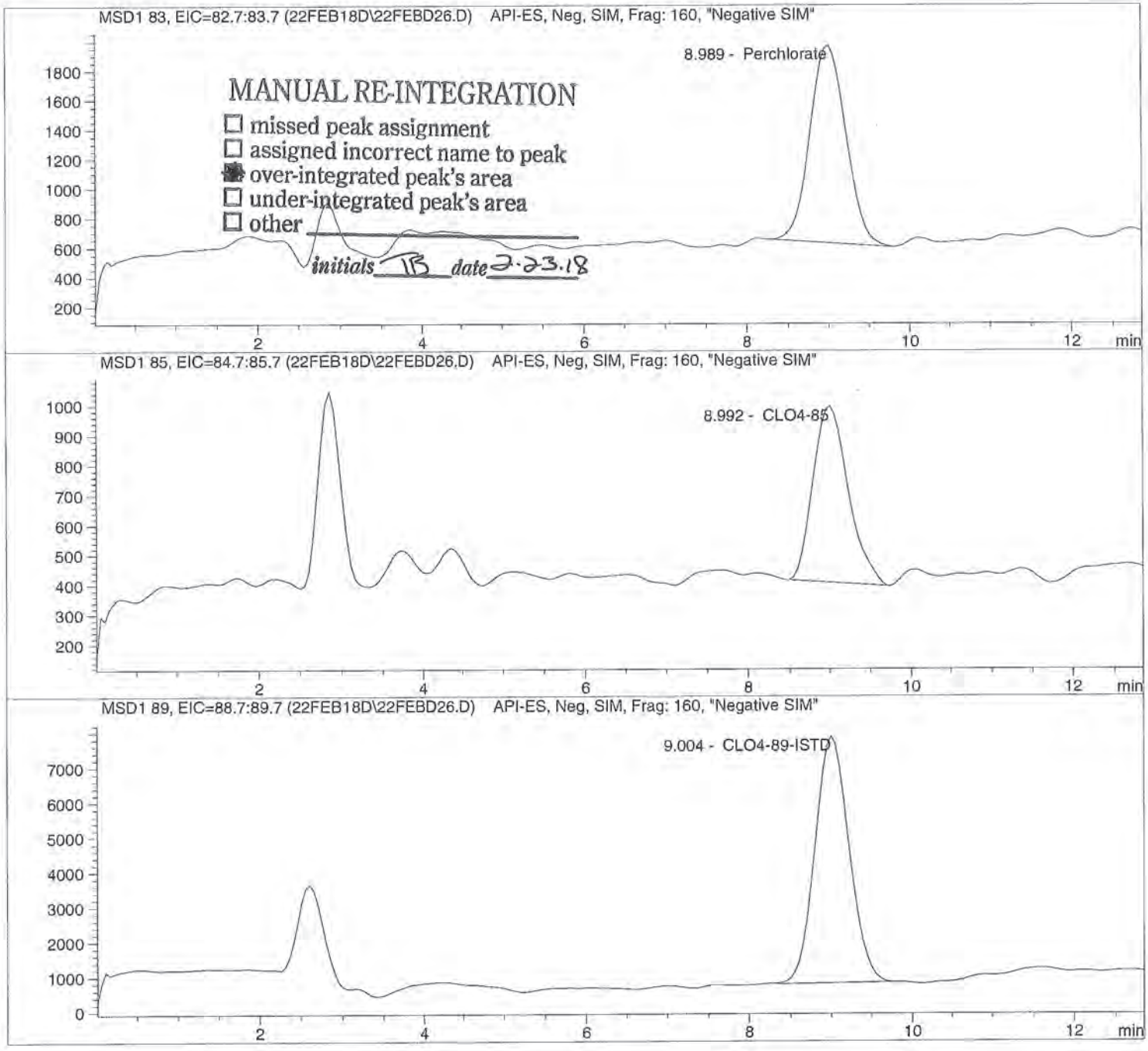
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD26.D Sample Name: 588570 LODV@1.

Injection Date:	2/22/2018 21:00:41	Seq Line:	26
Sample Name:	588570 LODV@1.	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD26.D Sample Name: 588570 LODV@1.

Injection Date:	2/22/2018 21:00:41	Seq Line:	26
Sample Name:	588570 LODV@1.	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.989	MM	41174.9	1.1967	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.992	PBA	17834.8	1.2032	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.004	BBA	207413.0	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\FEB\22FEB18D.S

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	ICAL1@ 1.0ug/L	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	ICAL2@ 2.0ug/L	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	ICAL3@ 5.0ug/L	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	ICAL4@ 10.ug/L	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	ICAL5@ 25.ug/L	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	ICAL6@ 50.ug/L	CLO4-DOD	1	Ctrl Samp		
7	Vial 77	ICAL7@ 75.ug/L	CLO4-DOD	1	Ctrl Samp		

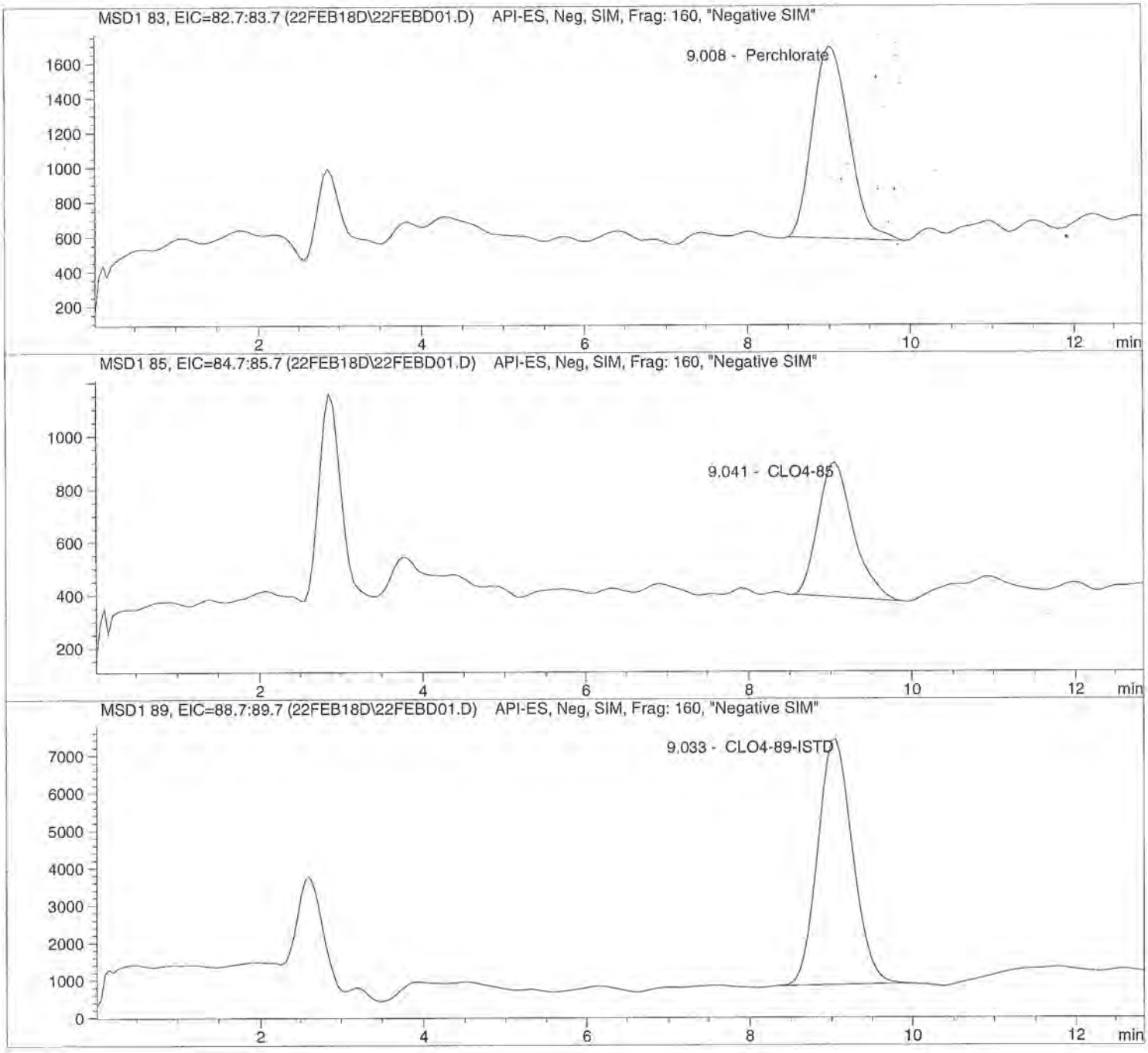
00883693

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	2/22/2018 14:54:12	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	2/22/2018 14:54:12	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.008	PBA	34739.2	1.0774	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.041	PBA	15405.9	1.0861	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.033	BBA	195838.1	5.0000	CLO4-89-ISTD

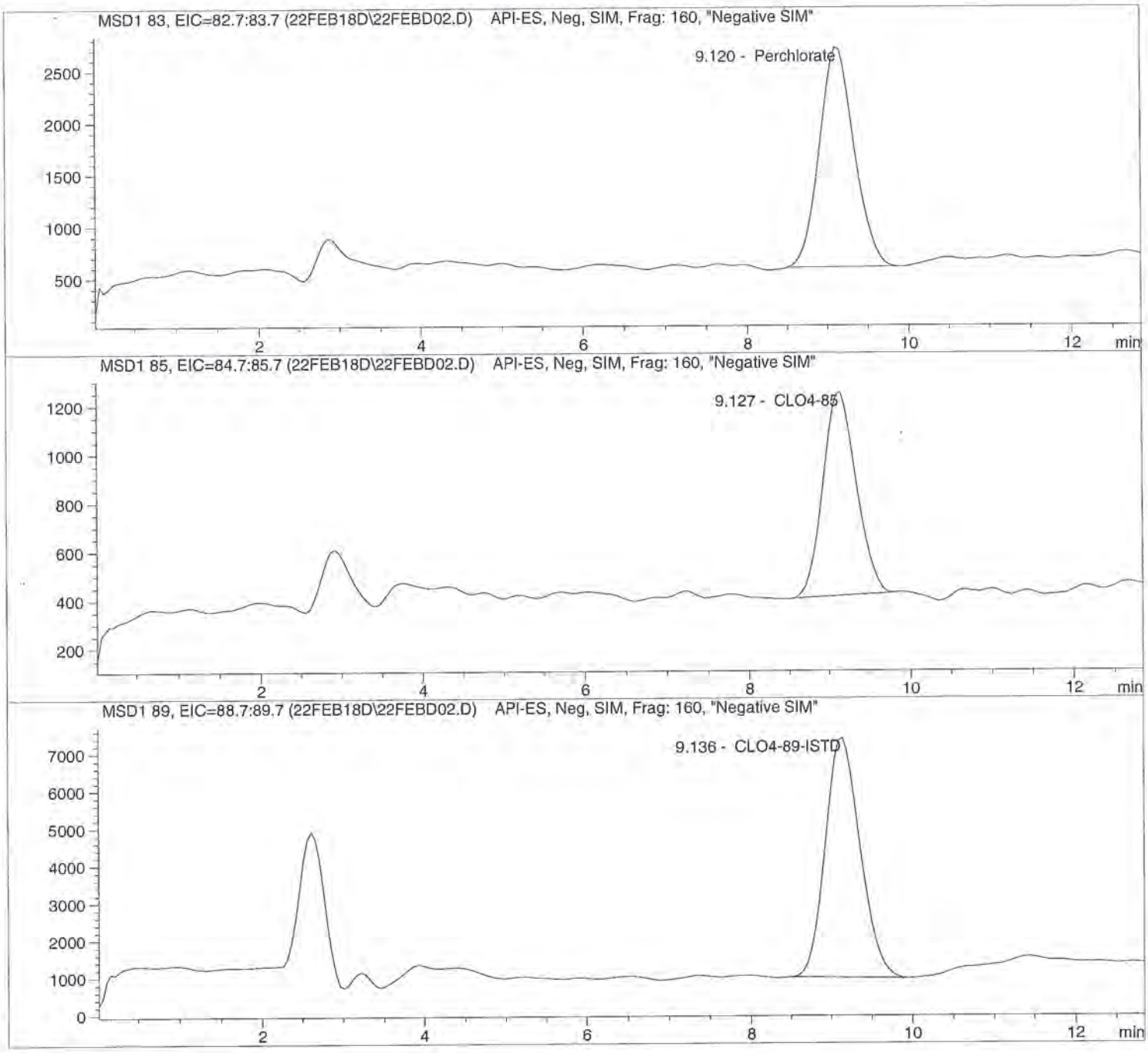
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	2/22/2018 15:08:51	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	2/22/2018 15:08:51	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.120	PBA	63769.3	1.9422	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.127	PBA	24214.8	1.8373	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.136	PBA	192591.0	5.0000	CLO4-89-ISTD

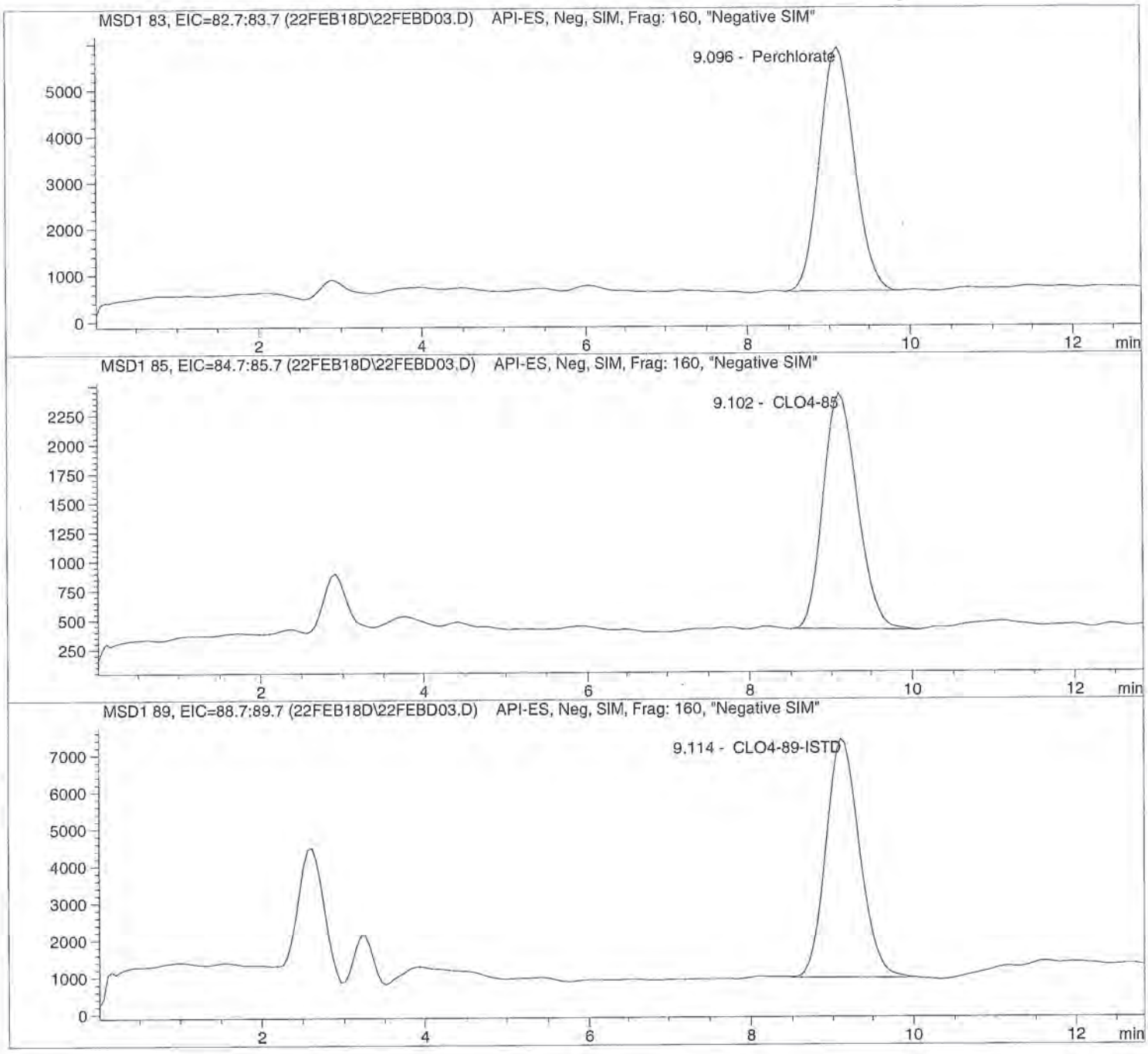
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	2/22/2018 15:23:33	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	2/22/2018 15:23:33	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.096	BBA	157724.6	4.7230	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.102	PBA	60231.1	4.8726	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.114	BBA	188961.0	5.0000	CLO4-89-ISTD

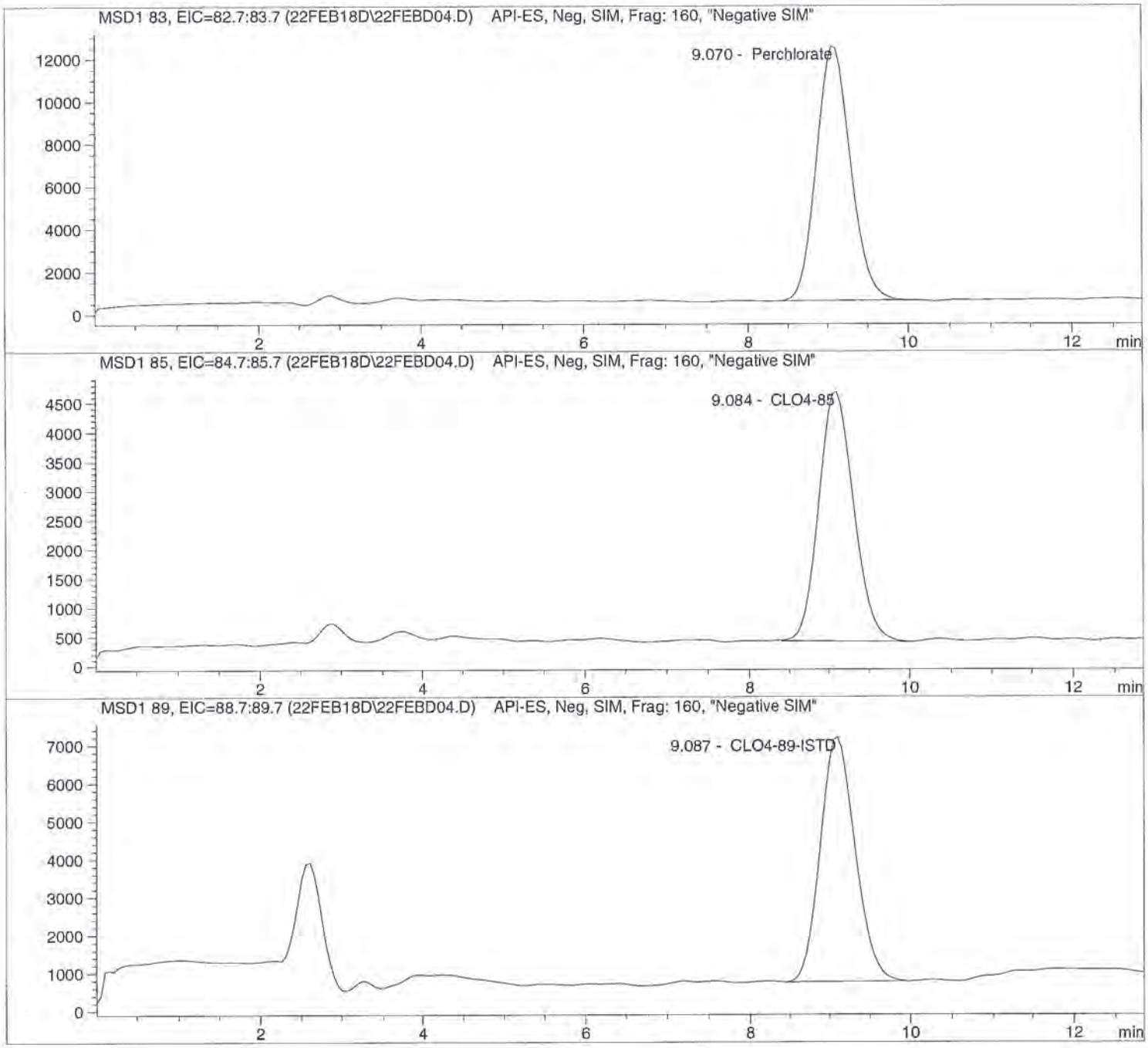
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	2/22/2018 15:38:15	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	2/22/2018 15:38:15	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.070	PBA	352920.1	9.9550	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.084	BBA	128900.4	10.1462	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.087	PBA	193850.7	5.0000	CLO4-89-ISTD

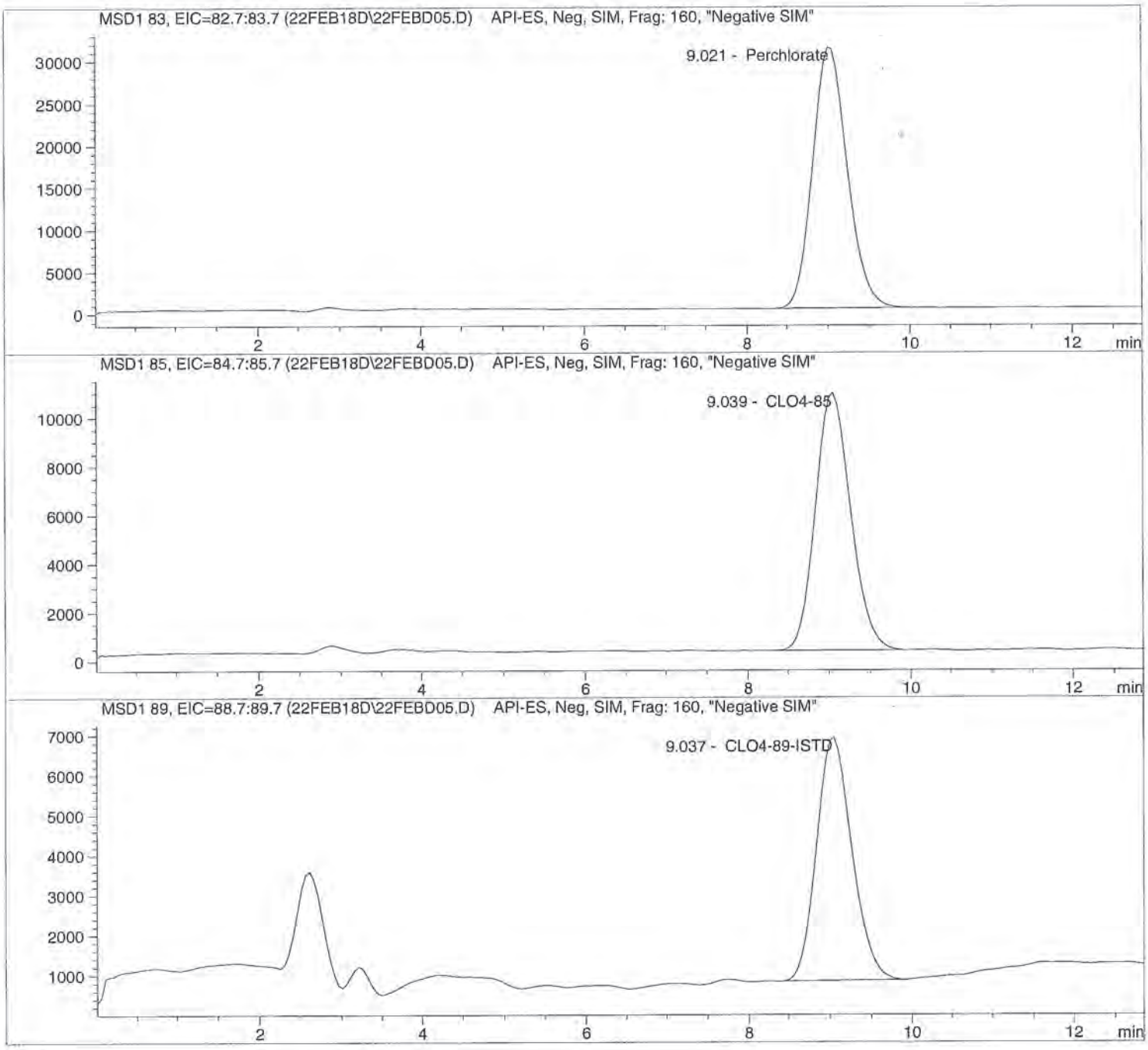
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	2/22/2018 15:52:55	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	2/22/2018 15:52:55	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.021	PBA	910406.6	25.2509	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.039	PBA	316579.0	25.2862	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.037	PBA	182426.5	5.0000	CLO4-89-ISTD

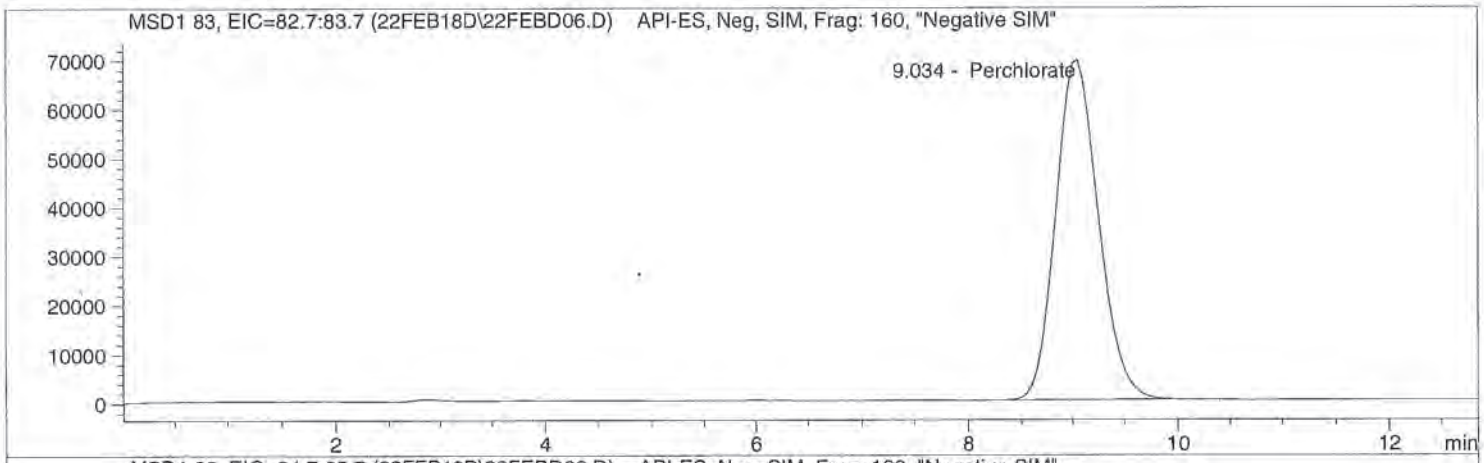
*** End of Report ***

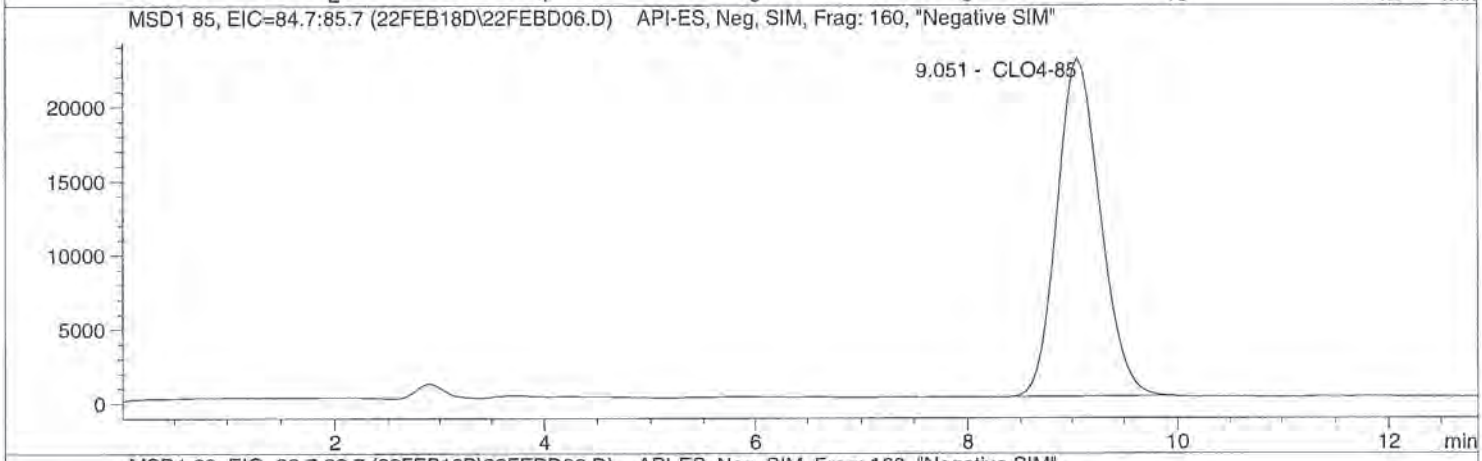
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD06.D Sample Name: ICAL6@ 50.ug/L

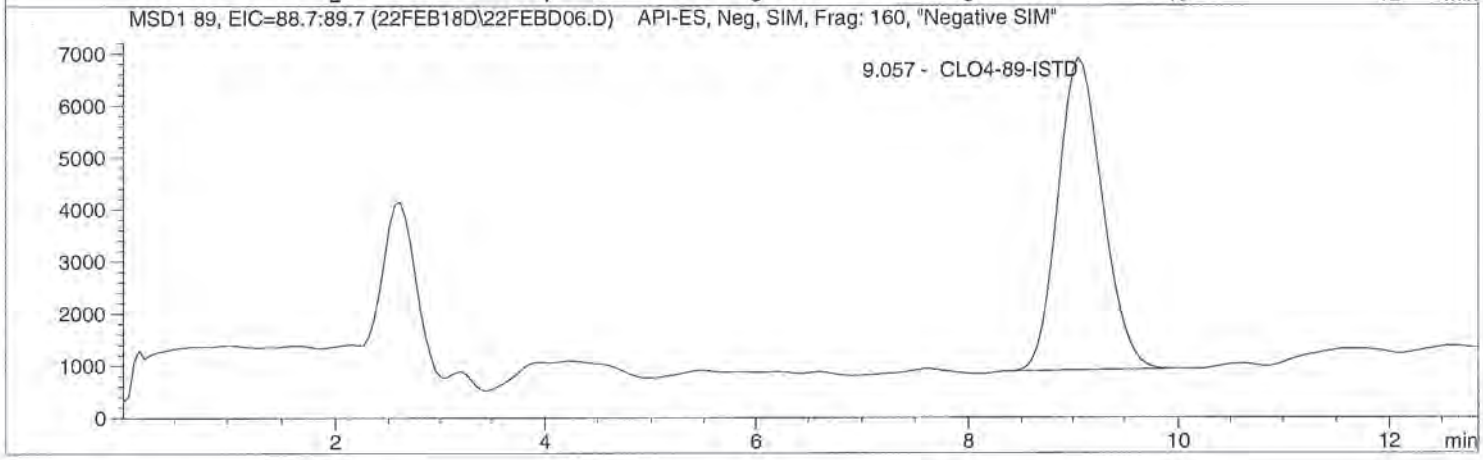
Injection Date:	2/22/2018 16:07:34	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	2/22/2018 16:07:34	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	50.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.034	BBA	2003735.4	50.1645	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.051	PBA	668806.8	49.6412	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.057	PBA	180979.9	5.0000	CLO4-89-ISTD

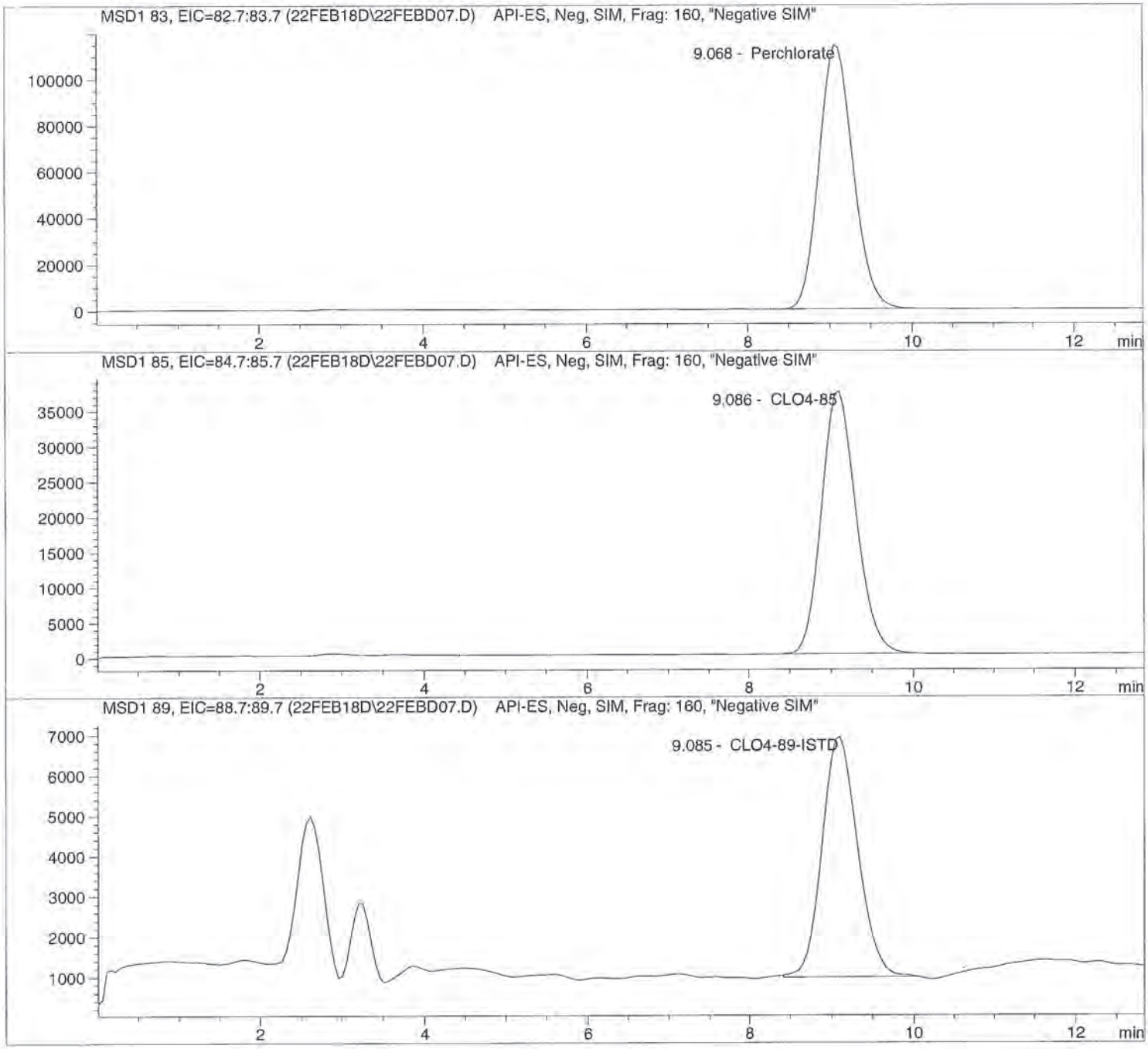
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	2/22/2018 16:22:14	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	2/22/2018 16:22:14	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	75.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.068	PBA	3285625.5	74.8620	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.086	BBA	1092927.6	75.1318	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.085	BBA	180304.9	5.0000	CLO4-89-ISTD

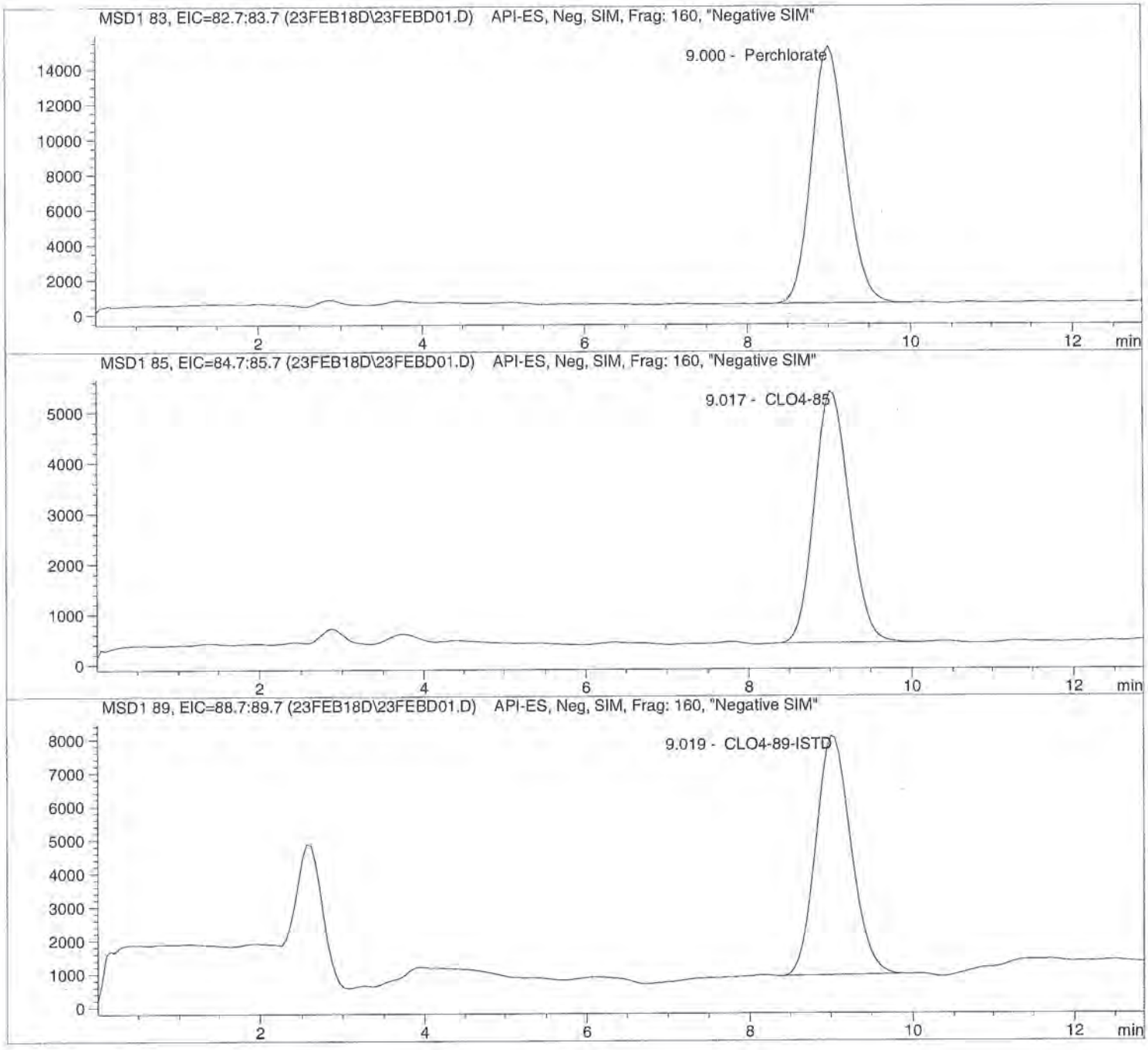
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\23FEB18D\23FEBD01.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/23/2018 09:02:40	Seq Line:	1
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 61
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\23FEB18D\23FEBD01.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/23/2018 09:02:40	Seq Line:	1
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 61
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.000	BBA	429408.2	10.9016	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.017	PBA	149052.4	10.6049	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.019	PBA	214244.2	5.0000	CLO4-89-ISTD

*** End of Report ***



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

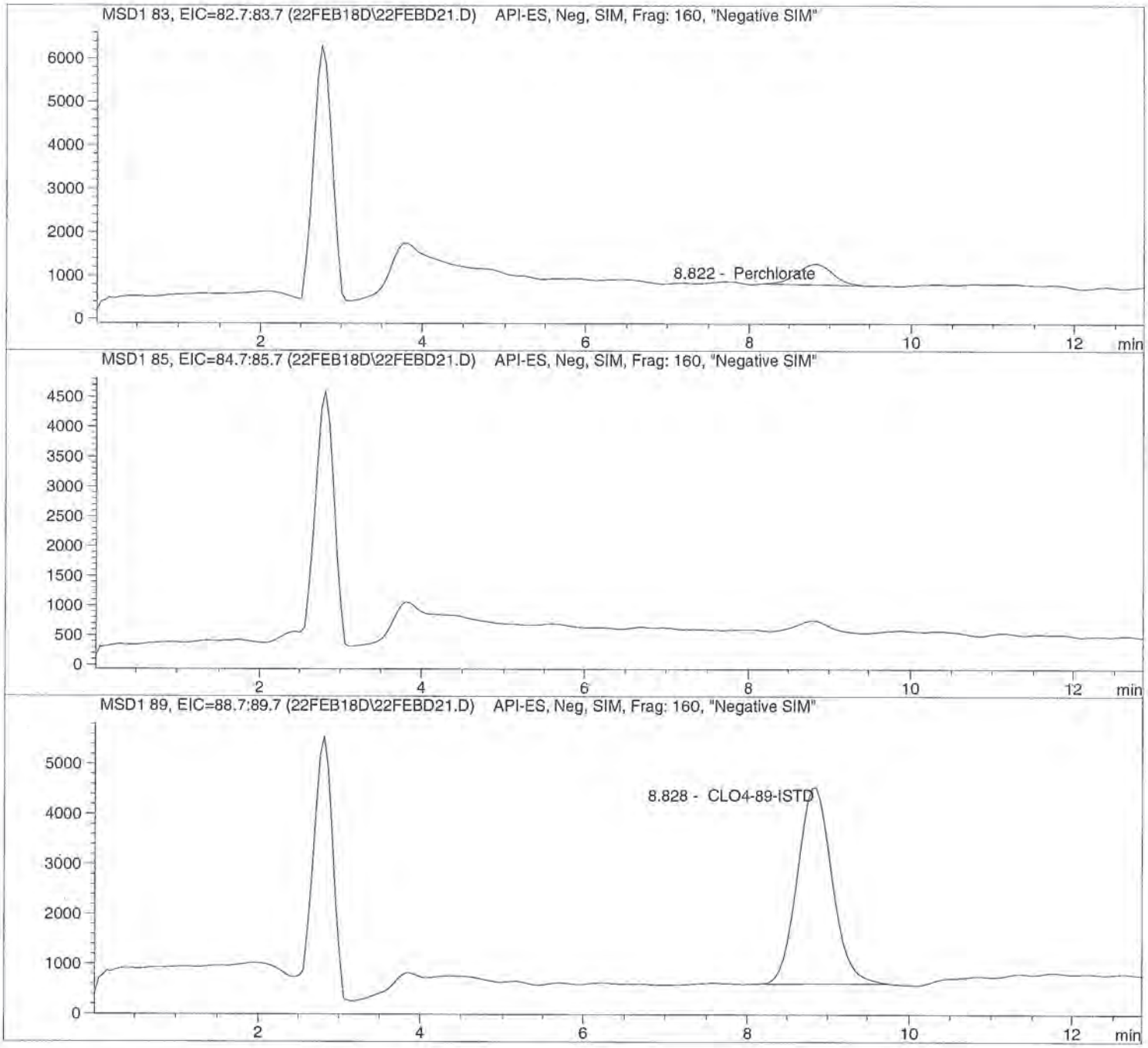
Unmodified

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD21.D Sample Name: 1805240001

Injection Date:	2/22/2018 19:47:20	Seq Line:	21
Sample Name:	1805240001	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-PR4.M
Last Changed: 2/9/2018 10:11:12

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD21.D Sample Name: 1805240001

Injection Date:	2/22/2018 19:47:20	Seq Line:	21
Sample Name:	1805240001	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-PR4.M
Last Changed: 2/9/2018 10:11:12

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Fri, 9. Feb. 2018, 09:52:58 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.822	PBA	14883.9	0.7568	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.828	BBA	118047.1	5.0000	CLO4-89-ISTD

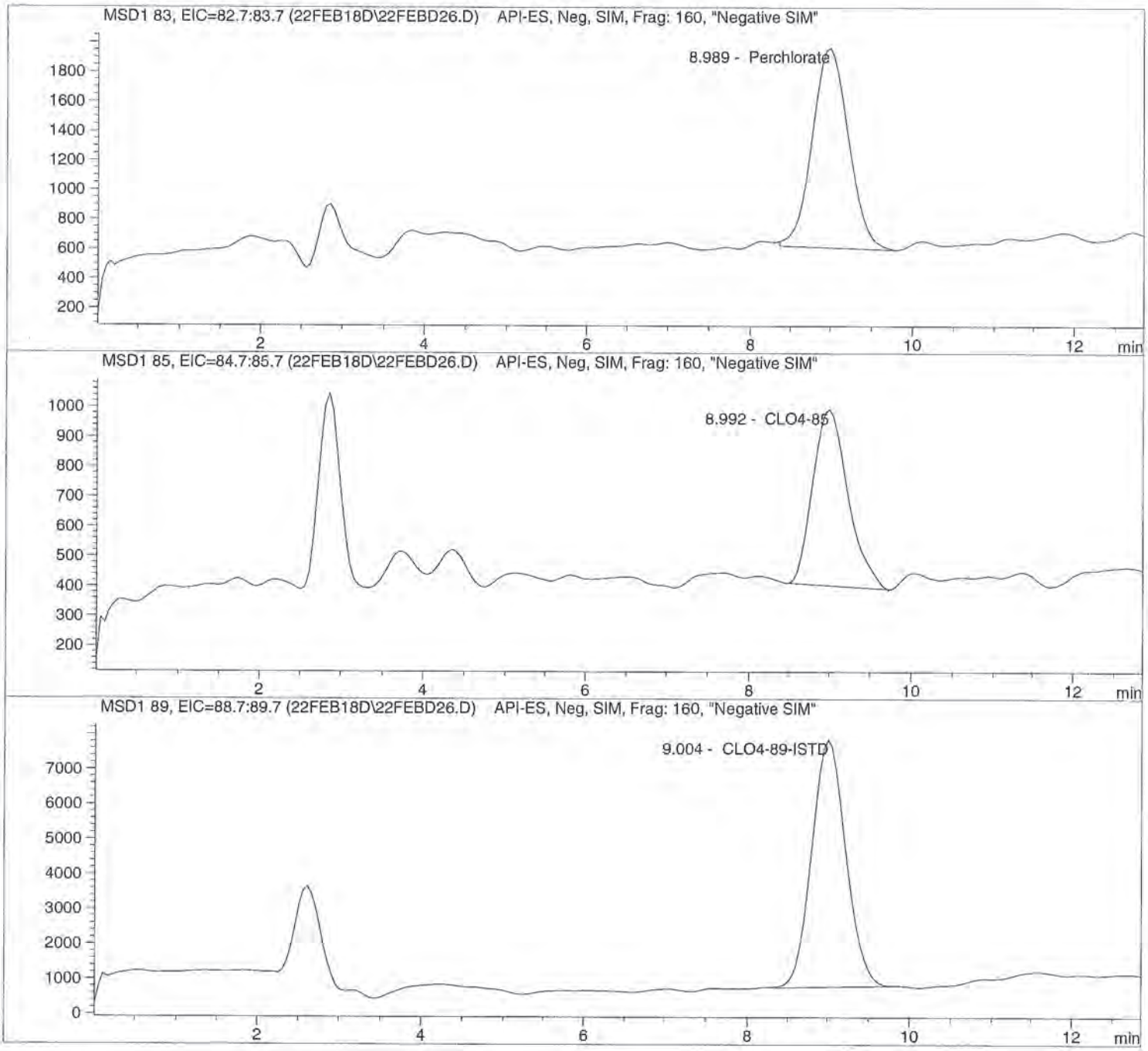
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD26.D Sample Name: 588570 LODV@1.

Injection Date:	2/22/2018 21:00:41	Seq Line:	26
Sample Name:	588570 LODV@1.	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-PR4.M
Last Changed: 2/9/2018 10:11:12

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD26.D Sample Name: 588570 LODV@1.

Injection Date:	2/22/2018 21:00:41	Seq Line:	26
Sample Name:	588570 LODV@1.	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-PR4.M
Last Changed: 2/9/2018 10:11:12

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 9. Feb. 2018, 09:52:58 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.989	BBA	42123.0	1.2141	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.992	PBA	17834.8	1.3669	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.004	BBA	207413.0	5.0000	CLO4-89-ISTD

*** End of Report ***

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1806736; 1806586; 1806588; 1806590

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2058 (209974)

General Set Information: There were five field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: NA

Method QC data: The method blank (LMB 590393) was less than 1/2 the CRDL. The recovery for the LCS (590394) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1806736001 (Client ID: INF Pond-Inlet_030718). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 590391). These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 08MARD04.

Thomas Bosch March 09, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: March 09, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1806736**
Project ID: Longhorn Army Ammn 030718
Purchase Order: NWO13120150.016.0001
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
INF Pond-Inlet_030718	1806736001	03/07/18	03/08/18	Longhorn Army
INF Pond-Outlet_030718	1806736002	03/07/18	03/08/18	Longhorn Army

ANALYTICAL REPORT

Workorder: 34-1806736
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **INF Pond-Inlet_030718** | Sampling Site: Longhorn Army | Collected: 03/07/2018
Lab ID: 1806736001 | Media: 125 mL Nalgene | Received: 03/08/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2058 (HBN: 209974) | **Percent Solid:** NA
Analyzed: 03/08/2018 15:15 | **Report Basis:** Wet

Analyte	Result (ug/L)	MDL (ug/L)	CRDL (ug/L)	Dilution	Qual
Perchlorate	1.8	1.0	4.0	1	J

Sample ID: **INF Pond-Outlet_030718** | Sampling Site: Longhorn Army | Collected: 03/07/2018
Lab ID: 1806736002 | Media: 125 mL Nalgene | Received: 03/08/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2058 (HBN: 209974) | **Percent Solid:** NA
Analyzed: 03/08/2018 15:58 | **Report Basis:** Wet

Analyte	Result (ug/L)	MDL (ug/L)	CRDL (ug/L)	Dilution	Qual
Perchlorate	1.9	1.0	4.0	1	J

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 03/09/2018 11:30	/S/ Stephen Brose 03/09/2018 13:36

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1806736
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ANAB (DoD ELAP)	ADE-1420	http://www.anab.org/accredited-organizations/
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
	Kansas	E-10416	http://www.kdheks.gov/lipo/index.html
Industrial Hygiene	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
Lead Testing:			
CPSC	ANAB (ISO 17025, CPSC)	ADE-1420	http://www.anab.org/accredited-organizations/
Soil, Dust, Paint ,Air	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

Workorder: 34-1806736
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1806736

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2058 (HBN: 209974)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 590393
Analyzed: 03/08/2018 14:46
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 590394
Analyzed: 03/08/2018 15:00
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.38	5.00	108	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1806736001	**MS:** 590395	**MSD:** 590396
Analyzed: 03/08/2018 15:15	**Analyzed:** 03/08/2018 15:29	**Analyzed:** 03/08/2018 15:44
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	1.80	7.01	5	105	78.8	123.8	7.16	108	2.11	0.0	20.0

Continuing Calibration Verification

CCV: 590390	**CCV:** 590397
Analyzed: 03/08/2018 14:02	**Analyzed:** 03/08/2018 17:09
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	26.4	25.0	105	27.6	25.0	111

Interference Check Sample

ICSA: 590392
Analyzed: 03/08/2018 14:32
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.967	1.00	96.7

Limit of Detection Verification

LODV: 590391	**LODV:** 590398
Analyzed: 03/08/2018 14:17	**Analyzed:** 03/08/2018 17:23
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.13	1.00	113	1.10	1.00	110

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1806736

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2058 (HBN: 209974)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
03/09/2018 11:30	03/09/2018 13:36

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◆ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

00883722

1806736

18698/#4

1806736

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: PERCHLORATE	Remarks (Preservatives, etc.)	Lab I.D.#
INF Pond - Inlet_030718	Water	03/07/18 / 07:30		1	X	NONE	
INF Pond – Outlet_030718	Water	03/07/18 / 07:30		1	X		

Additional Remarks: 24 HOUR TAT

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/07/18	14:30	Julie Worth	3/8/18	0947						

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
Julie Worth	3/8/18	0947		Julie Worth	3/8/18	0947	6°C		Good

Remarks:

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: NWO13120150.016.000	Split:	Workorder ID: 1806736	Level: ENV_LVL4
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly
Comments:			Preservatives: COOL

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	03/07/2018 07:30	INF Pond-Inlet_030718	1806736001		Water	A	1	A
2	03/07/2018 07:30	INF Pond-Outlet_030718	1806736002		Water	A	1	A
3								
4								
5								
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	03/08/2018 09:47	ALS Sample Receiving	Sample Login
Julie Warath 3/8/18 1125		14B	Storage
R.33.1 3.8.18/11:50		T. Burd	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00883723

00883724

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: Houston Lab BHHE Environment — Project/Task/Site: 1806736

Date/Time of Receipt: 3/8/18 0947 — Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 -7917	6 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Julie Warath (Signature) — Julie Warath (Printed Name) — 3/8/18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

FedEx Express Package US Airbill

FedEx Tracking Number 8106 9579 7880

Form ID No. 0200

Recipient's Copy

1 From

Date 3/7/18 [redacted]

Sender's Name Scott Bessinger Phone 903 930-6193

Company BHHTG Environmental

Address 1203-B E. Grand Ave. PMB 202 Dept./Floor/Suite/Room

City Marshall State TX. ZIP 75670

2 Your Internal Billing Reference NWO1312.0150

3 To

Recipient's Name Kevin Griffiths / Sample Receiving Phone 801 266-7700

Company ALS Environmental

Address 960 West Levoy Drive Dept./Floor/Suite/Room

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address

Use this line for the HOLD location address or for continuation of your shipping address.

City Salt Lake City State UT. ZIP 84123

☐ Hold Weekday FedEx location address REQUIRED. NOT available for FedEx First Overnight.

☒ Hold Saturday FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

8106 9579 7880

4 Express Package Service * To most locations.

Packages up to 150 lbs. *For packages over 150 lbs., use the FedEx Express Freight US Airbill.*

Next Business Day

☐ FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless Saturday Delivery is selected.

☒ FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless Saturday Delivery is selected.

☐ FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

☐ FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.

☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless Saturday Delivery is selected.

☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

☐ FedEx Envelope* ☐ FedEx Pak* ☐ FedEx Box ☐ FedEx Tube ☒ Other

6 Special Handling and Delivery Signature Options Fees may apply. See the FedEx Servi

☐ Saturday Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

☒ No Signature Required — Package may be left without obtaining a signature for delivery.

☐ Direct Signature — Someone at recipient's address may sign for delivery.

☐ Indirect Signa — If no one is available address, someone at address may sign for de residential deliveries only.

Does this shipment contain dangerous goods?

One box must be checked.

☐ No ☐ Yes — As per attached Shipper's Declaration. ☐ Yes — Shipper's Declaration not required. ☐ Dry Ice — Dry ice, 9, UN 1845 ____ x ____ kg

Restrictions apply for dangerous goods — see the current FedEx Service Guide.

☐ Cargo Aircraft Only

7 Payment *Bill to:*

Enter FedEx Acct. No. or Credit Card No. below.

☒ Sender — Acct. No. in Section 1 will be billed. ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

Obtain recip. Acct. No. ☐

[redacted]

Total Packages ____ Total Weight ____ lbs. [redacted] Credit Card Auth. ____

...ability is limited to US$100 unless you declare a higher value. See the current FedEx Service Guide for details.

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Date 3/16 • Part #167002 • ©2012–2015 FedEx • PRINTED IN U.S.A. RRDA 00/00

fedex.com

00883725

Batch Worklist

Batch: ELMS/ 2058
Rule: EPA 6850, DoD QSM Water

Created: 3/8/2018 13:38
Analyst: T. Bosch

Instrument: LCMS04
Status: WP

HBN: 209974

Workorder: 1806586 [ENV_LVL4]
Workorder: 1806588 [ENV_LVL4]
Workorder: 1806590 [ENV_LVL4]
Workorder: 1806736 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	590390	CCV for HBN 209974 [ELMS/2058]				CCV	3		E685041C3Q	5311		3/9/2018	3/8/2018
2	590391	LODV for HBN 209974 [ELMS/2058				LODV	3		E6850..D3Q	5311		3/9/2018	3/8/2018
3	590392	ICS for HBN 209974 [ELMS/2058]				ICS	3		E6850..D3Q	5311		3/9/2018	3/8/2018
4	590393	LMB for HBN 209974 [ELMS/2058]				LMB	3		E6850Q413Q	5311		3/9/2018	3/8/2018
5	590394	LCS for HBN 209974 [ELMS/2058]				LCS	3		E6850Q413Q	5311		3/9/2018	3/8/2018
6	1806736001	INF Pond-Inlet_030718				SAMPLE	3	1806736001-A	E6850Q41.3	5480	4/4/2018	3/9/2018	3/8/2018
7	590395	INF Pond-Inle...(1806736001MS)				MS	3		E6850Q413Q	5311		3/9/2018	3/8/2018
8	590396	INF Pond-Inl...(1806736001MSD)				MSD	3		E6850Q413Q	5311		3/9/2018	3/8/2018
9	1806736002	INF Pond-Outlet_030718				SAMPLE	3	1806736002-A	E6850Q41.3	5480	4/4/2018	3/9/2018	3/8/2018
10	1806586001	LH18/24-SP650-022818				SAMPLE	3	1806586001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
11	1806588001	LH18/24-SP140_022818				SAMPLE	3	1806588001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
12	1806590001	LH18/25-SP650_022818				SAMPLE	3	1806590001-A	E6850Q41.3	5480	3/28/2018	3/16/2018	3/8/2018
13	590397	CCV for HBN 209974 [ELMS/2058]				CCV	3		E685041C3Q	5311		3/9/2018	3/8/2018
14	590398	LODV for HBN 209974 [ELMS/2058				LODV	3		E6850..D3Q	5311		3/9/2018	3/8/2018

00883726



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1806736 (001,02); 1806586 (001); 1806588 (001); 1806590 (001)
ELMS Batch/HBN ID: 2058 (209974)
Prep Date: 03/08/2018 Analysis Date: 03/08/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAR\08MAR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 590394; Target = 5.0µg/L. ASTM type II water was used for LMB 590393.

MS/MSD: MS/MSD was performed on sample 1806736001 (Client ID: INF Pond-Inlet_030718). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters. The ion ratio of m/z 83 to 85 may fail at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 590391).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafile 08MARD04.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\209974-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: T. Bosch
Create Date: 5/11/2017
Lab Lot: CLO4 QC STOCK

Amount: 100 mL
Expires: 3/31/2020
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 38780	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 10/09/2017 01:10PM	Expires: 10/09/2018
MFG Lot: TNB: 10/09/17	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

00883740

125 Market Street
New Haven, CT 06513
USA

AccuStandard,® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes



Signal Word: Warning

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

** For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Batch Report: C:\HPCHEM\1\DATA\08MAR18D\08MAR18D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
*	590390 CCV@25	Vial 71	1	Control	2	8.73208e5	8.691	26.36269
*	590391 LODV@1.	Vial 72	1	Control	3	3.27108e4	8.839	1.12559
*	590392 ICS@1.0	Vial 73	1	Control	4	2.00946e4	8.534	9.66532e-1
*	590393 LMB	Vial 74	1	Control	5	0.00000	0.000	0.00000
*	590394 QC@5	Vial 75	1	Control	6	1.51249e5	8.702	5.37954
*	1806736001	Vial 76	1	Sample	7	3.94288e4	8.571	1.76936
*	590395 67361MS	Vial 77	1	Control	8	1.71960e5	8.527	7.01129
*	590396 67361SD	Vial 78	1	Control	9	1.80889e5	8.530	7.16071
*	1806736002	Vial 79	1	Sample	10	4.33723e4	8.542	1.89278
*	1806586001	Vial 81	1	Sample	12	2.17476e6	8.269	73.23788
*	1806588001 1K	Vial 82	1	Sample	13	1.39825e5	8.802	5391.56478
*	1806590001	Vial 83	1	Sample	14	2.18576e6	8.310	71.37319
*	590397 CCV@25	Vial 71	1	Control	15	8.95835e5	8.697	27.64406
*	590398 LODV@1.	Vial 72	1	Control	16	3.27713e4	8.862	1.09728

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	590390 CCV@25	Vial 71	1	Control	2	1.66717e5	8.710	5.00000
*	590391 LODV@1.	Vial 72	1	Control	3	1.75943e5	8.868	5.00000
*	590392 ICS@1.0	Vial 73	1	Control	4	1.27359e5	8.554	5.00000
*	590393 LMB	Vial 74	1	Control	5	1.73517e5	8.829	5.00000
*	590394 QC@5	Vial 75	1	Control	6	1.58269e5	8.718	5.00000
*	1806736001	Vial 76	1	Sample	7	1.31309e5	8.585	5.00000
*	590395 67361MS	Vial 77	1	Control	8	1.36509e5	8.549	5.00000
*	590396 67361SD	Vial 78	1	Control	9	1.40465e5	8.552	5.00000
*	1806736002	Vial 79	1	Sample	10	1.34578e5	8.564	5.00000
*	1806586001	Vial 81	1	Sample	12	1.22743e5	8.291	5.00000
*	1806588001 1K	Vial 82	1	Sample	13	1.45975e5	8.817	5000.00000
*	1806590001	Vial 83	1	Sample	14	1.27489e5	8.333	5.00000
*	590397 CCV@25	Vial 71	1	Control	15	1.62134e5	8.714	5.00000
*	590398 LODV@1.	Vial 72	1	Control	16	1.81153e5	8.876	5.00000

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	590390 CCV@25	Vial 71	1	Control	2	2.85048e5	8.704	24.94188
*	590391 LODV@1.	Vial 72	1	Control	3	1.47744e4	8.855	1.17098
*	590392 ICS@1.0	Vial 73	1	Control	4	8572.70801	8.549	9.04153e-1
*	590393 LMB	Vial 74	1	Control	5	0.00000	0.000	0.00000
*	590394 QC@5	Vial 75	1	Control	6	5.41575e4	8.712	5.23635
*	1806736001	Vial 76	1	Sample	7	1.48240e4	8.584	1.63281
*	590395 67361MS	Vial 77	1	Control	8	5.79962e4	8.535	6.51132
*	590396 67361SD	Vial 78	1	Control	9	6.48483e4	8.542	7.07517
*	1806736002	Vial 79	1	Sample	10	1.48999e4	8.562	1.59808
*	1806586001	Vial 81	1	Sample	12	6.68414e5	8.285	68.81933
*	1806588001 1K	Vial 82	1	Sample	13	4.83826e4	8.819	5069.74362
*	1806590001	Vial 83	1	Sample	14	6.71320e5	8.326	66.93578
*	590397 CCV@25	Vial 71	1	Control	15	2.84483e5	8.706	25.54449
*	590398 LODV@1.	Vial 72	1	Control	16	1.30495e4	8.886	9.79870e-1

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

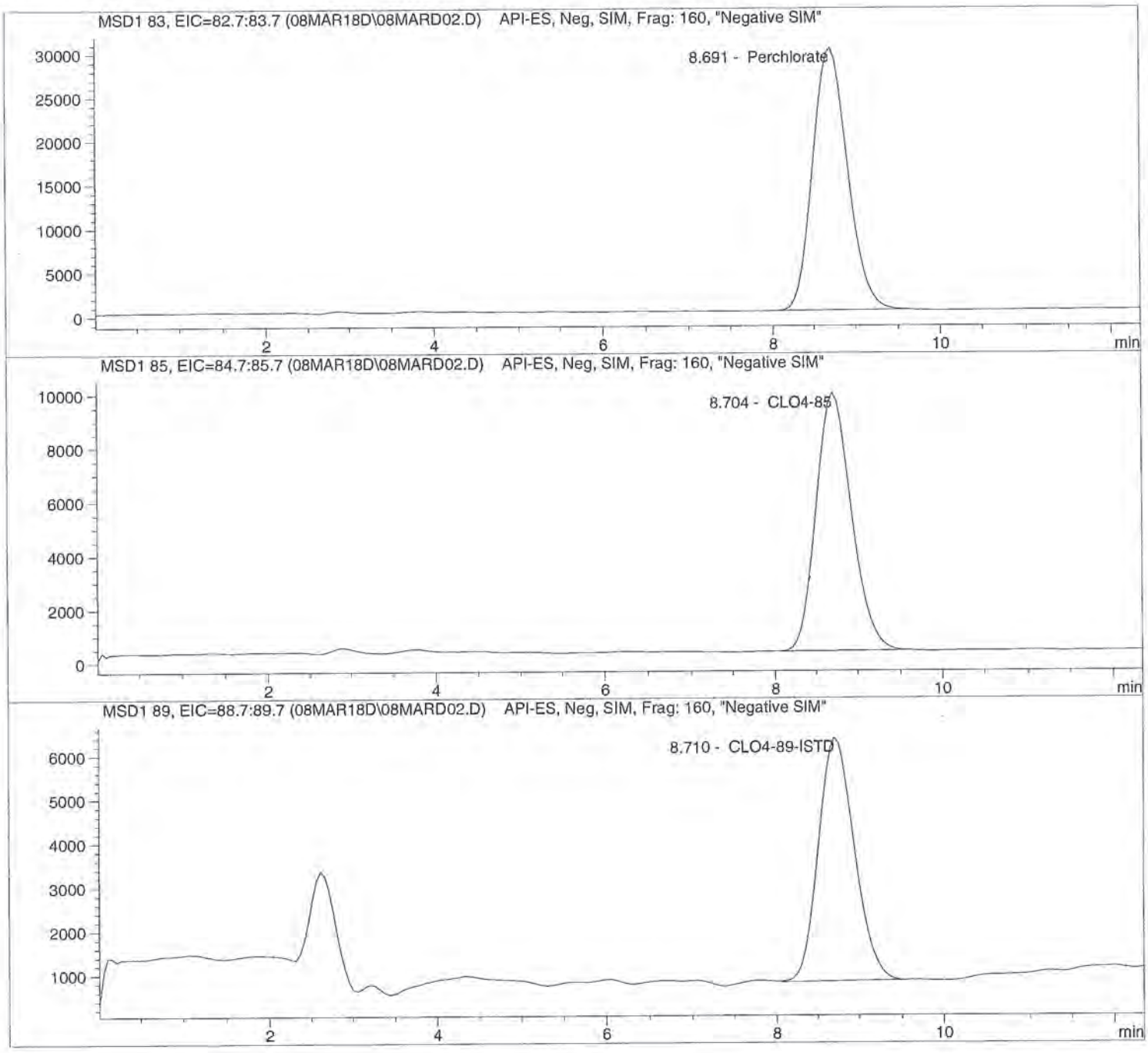
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	590390	CCV@25	CLO4-DOD	1	Ctrl Samp		
2	Vial 71	590390	CCV@25	CLO4-DOD	1	Ctrl Samp		
3	Vial 72	590391	LODV@1.	CLO4-DOD	1	Ctrl Samp		
4	Vial 73	590392	ICS@1.0	CLO4-DOD	1	Ctrl Samp		
5	Vial 74	590393	LMB	CLO4-DOD	1	Ctrl Samp		
6	Vial 75	590394	QC@5	CLO4-DOD	1	Ctrl Samp		
7	Vial 76	1806736001		CLO4-DOD	1	Sample		
8	Vial 77	590395	67361MS	CLO4-DOD	1	Ctrl Samp		
9	Vial 78	590396	67361SD	CLO4-DOD	1	Ctrl Samp		
10	Vial 79	1806736002		CLO4-DOD	1	Sample		
11	Vial 80	1806586001	10X	CLO4-DOD	1	Sample		
12	Vial 81	1806586001		CLO4-DOD	1	Sample		
13	Vial 82	1806588001	1K	CLO4-DOD	1	Sample		
14	Vial 83	1806590001		CLO4-DOD	1	Sample		
15	Vial 71	590397	CCV@25	CLO4-DOD	1	Ctrl Samp		
16	Vial 72	590398	LODV@1.	CLO4-DOD	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD02.D Sample Name: 590390 CCV@25

Injection Date:	3/08/2018 14:02:24	Seq Line:	2
Sample Name:	590390 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD02.D Sample Name: 590390 CCV@25

Injection Date:	3/08/2018 14:02:24	Seq Line:	2
Sample Name:	590390 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.691	PBA	873207.6	26.3627	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.704	BBA	285047.9	24.9419	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.710	BBA	166717.1	5.0000	CLO4-89-ISTD

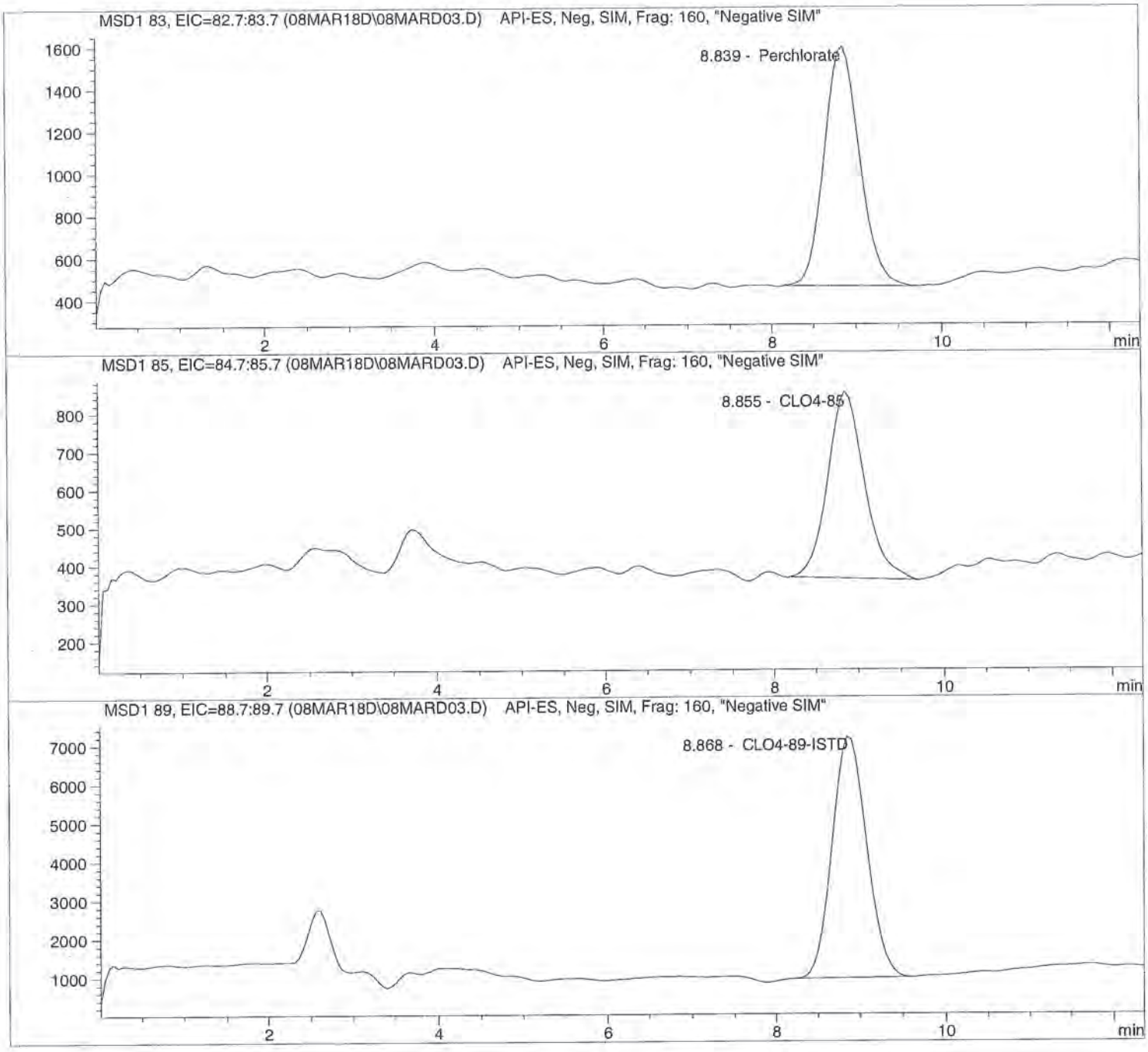
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD03.D Sample Name: 590391 LODV@1.

Injection Date:	3/08/2018 14:17:55	Seq Line:	3
Sample Name:	590391 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD03.D Sample Name: 590391 LODV@1.

Injection Date:	3/08/2018 14:17:55	Seq Line:	3
Sample Name:	590391 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.839	BBA	32710.8	1.1256	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.855	BBA	14774.4	1.1710	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.868	BBA	175942.9	5.0000	CLO4-89-ISTD

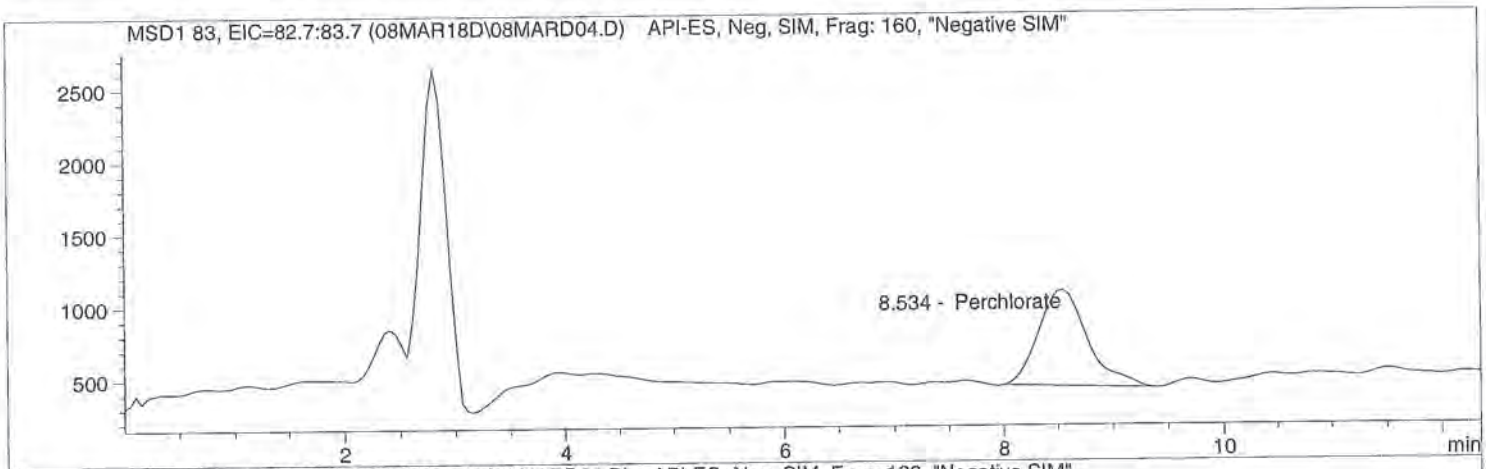
*** End of Report ***

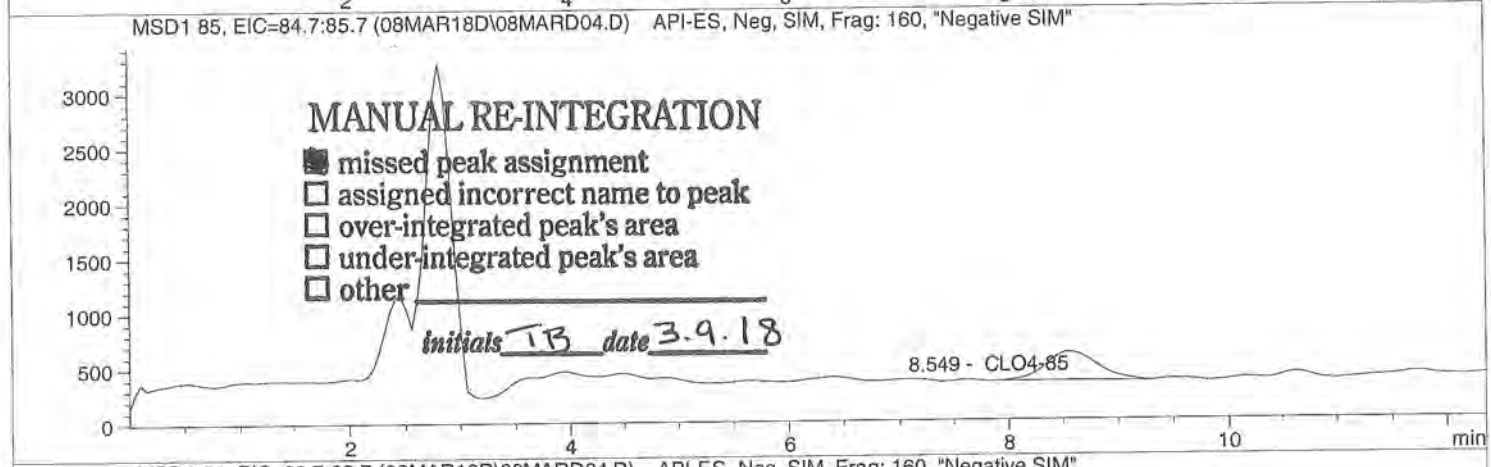
Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD04.D Sample Name: 590392 ICS@1.0

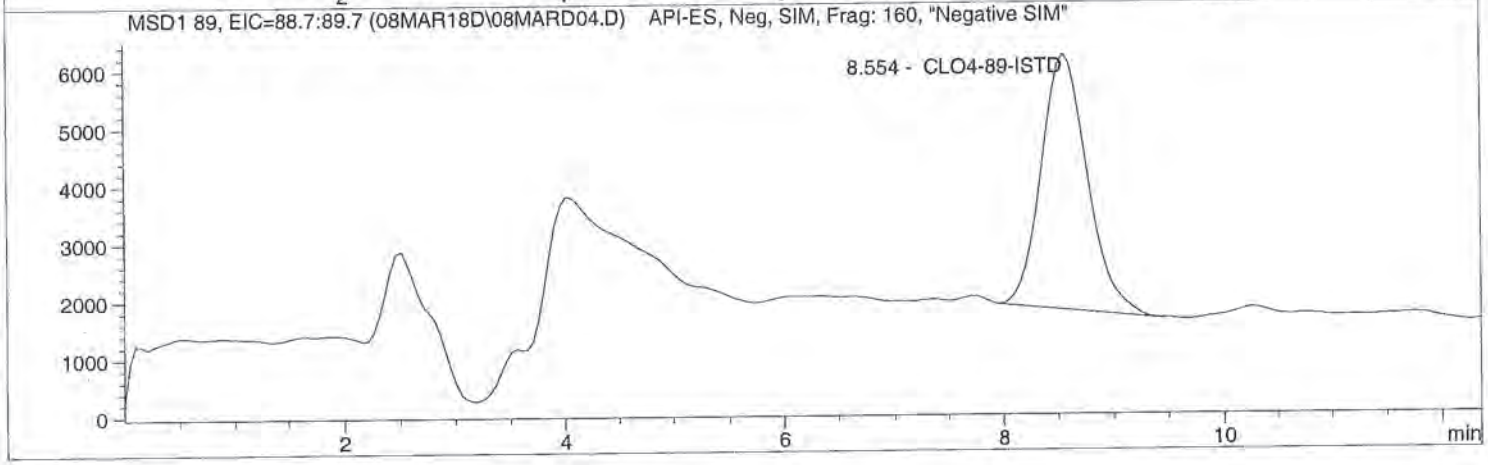
Injection Date:	3/08/2018 14:32:02	Seq Line:	4
Sample Name:	590392 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD04.D Sample Name: 590392 ICS@1.0

Injection Date:	3/08/2018 14:32:02	Seq Line:	4
Sample Name:	590392 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.534	PBA	20094.6	0.9665	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.549	MM	8572.7	0.9042	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.554	PBA	127359.1	5.0000	CLO4-89-ISTD

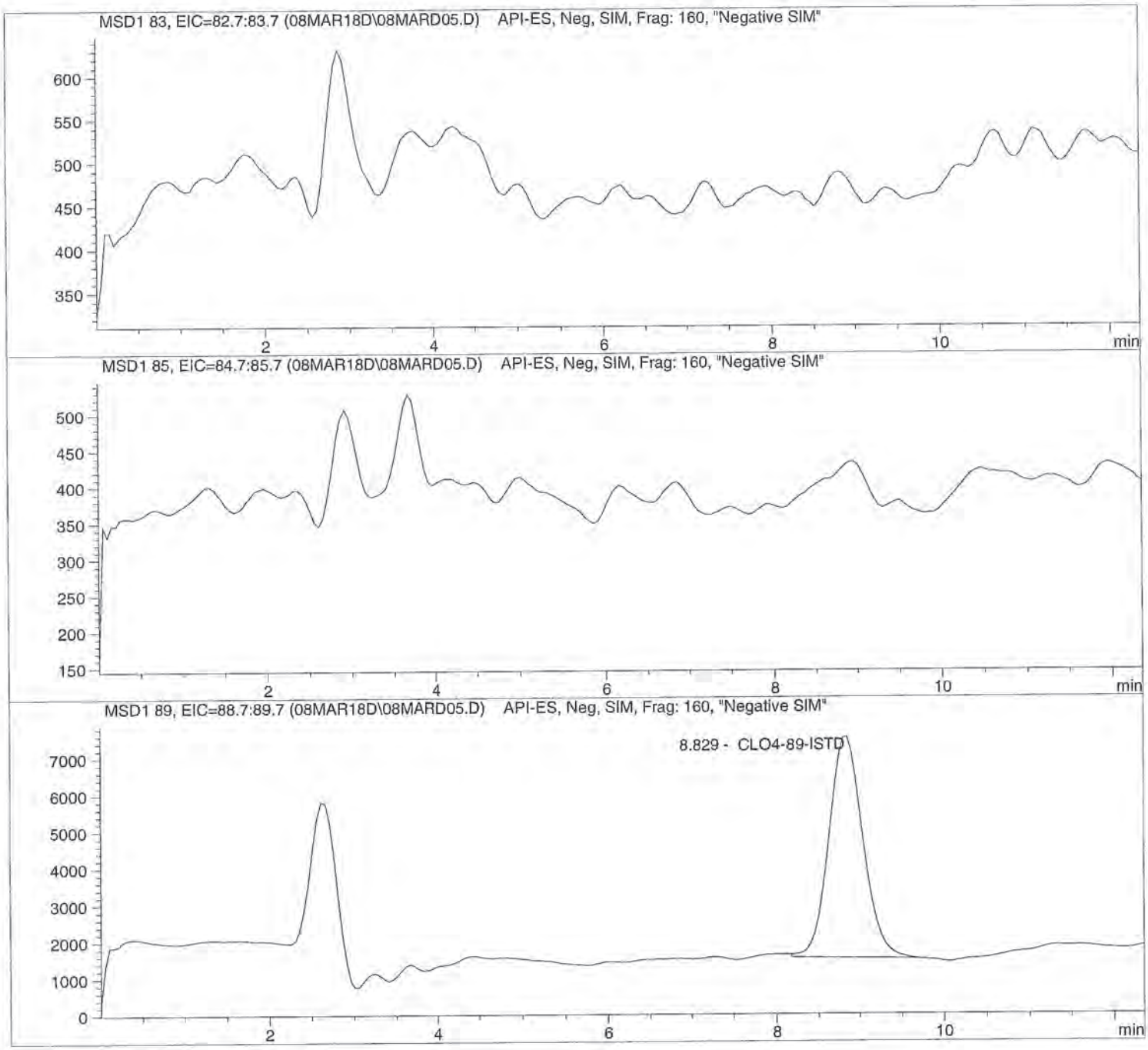
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD05.D Sample Name: 590393 LMB

Injection Date:	3/08/2018 14:46:14	Seq Line:	5
Sample Name:	590393 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD05.D Sample Name: 590393 LMB

Injection Date:	3/08/2018 14:46:14	Seq Line:	5
Sample Name:	590393 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.829	BBA	173516.7	5.0000	CLO4-89-ISTD

*** End of Report ***

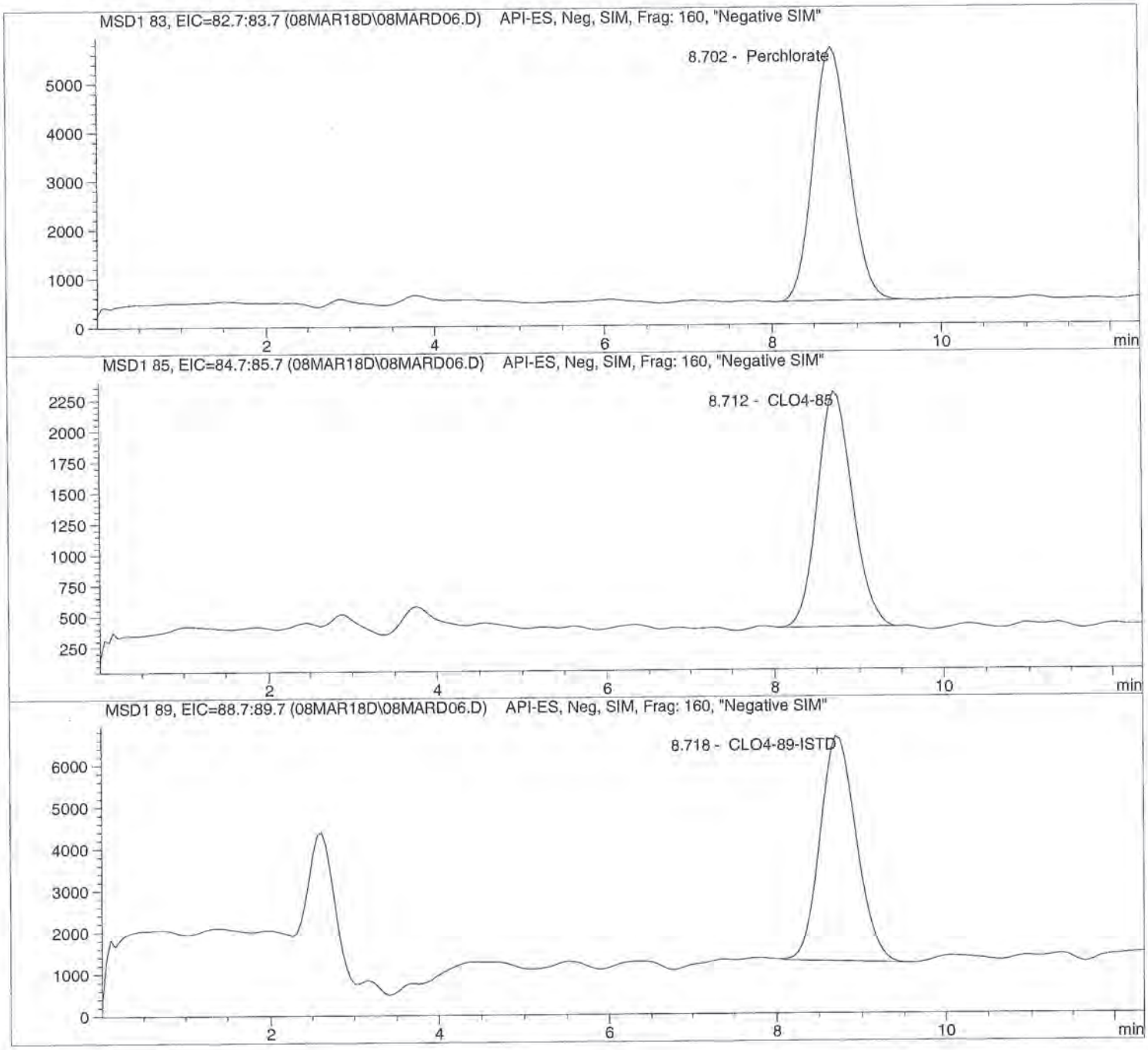
00883753

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD06.D Sample Name: 590394 QC@5

Injection Date:	3/08/2018 15:00:24	Seq Line:	6
Sample Name:	590394 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD06.D Sample Name: 590394 QC@5

Injection Date:	3/08/2018 15:00:24	Seq Line:	6
Sample Name:	590394 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.702	PBA	151248.9	5.3795	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.712	BBA	54157.5	5.2364	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.718	BBA	158268.7	5.0000	CLO4-89-ISTD

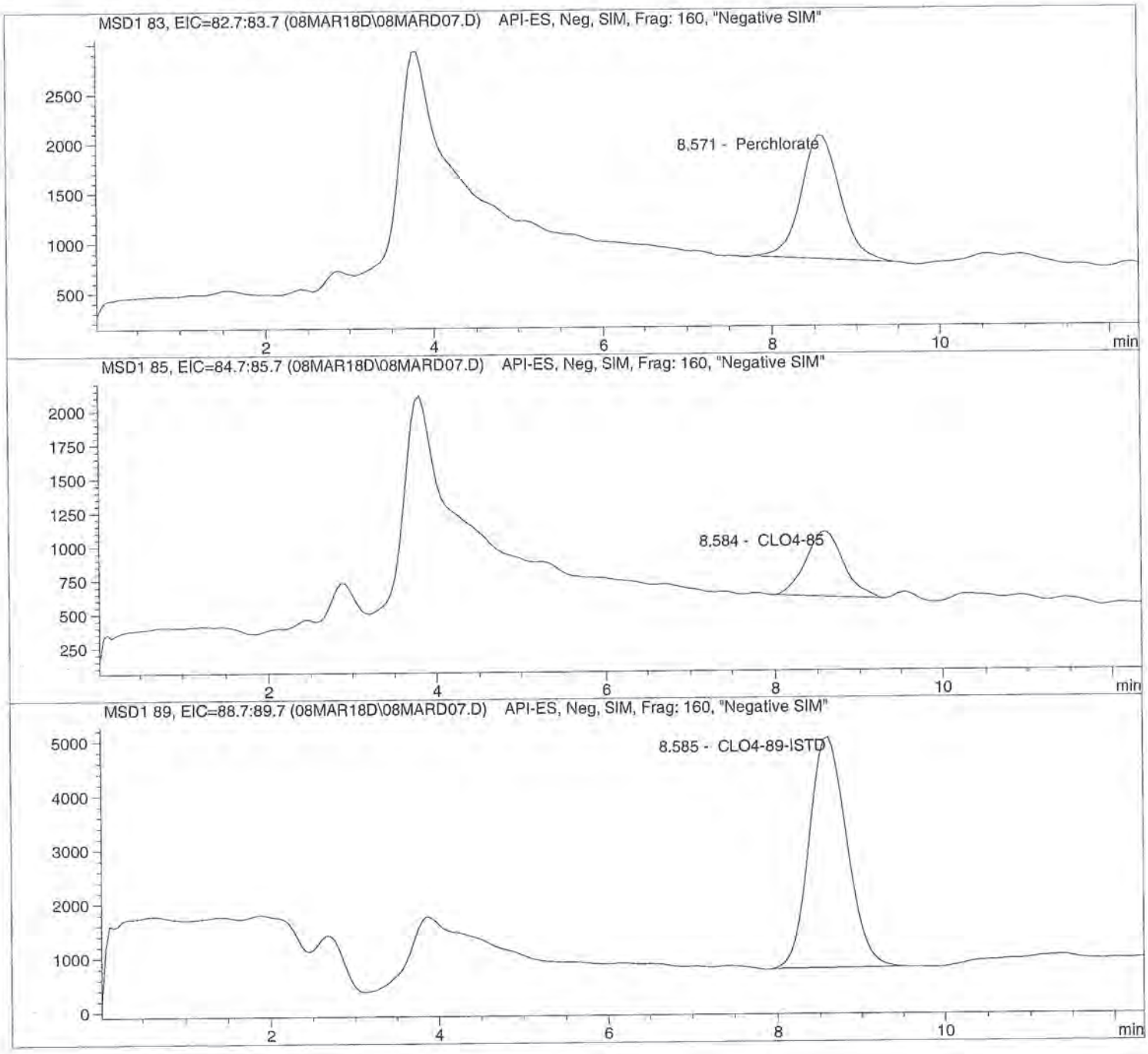
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD07.D Sample Name: 1806736001

Injection Date:	3/08/2018 15:15:43	Seq Line:	7
Sample Name:	1806736001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD07.D Sample Name: 1806736001

Injection Date:	3/08/2018 15:15:43	Seq Line:	7
Sample Name:	1806736001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.571	BBA	39428.8	1.7694	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.584	PBA	14824.0	1.6328	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.585	PBA	131309.2	5.0000	CLO4-89-ISTD

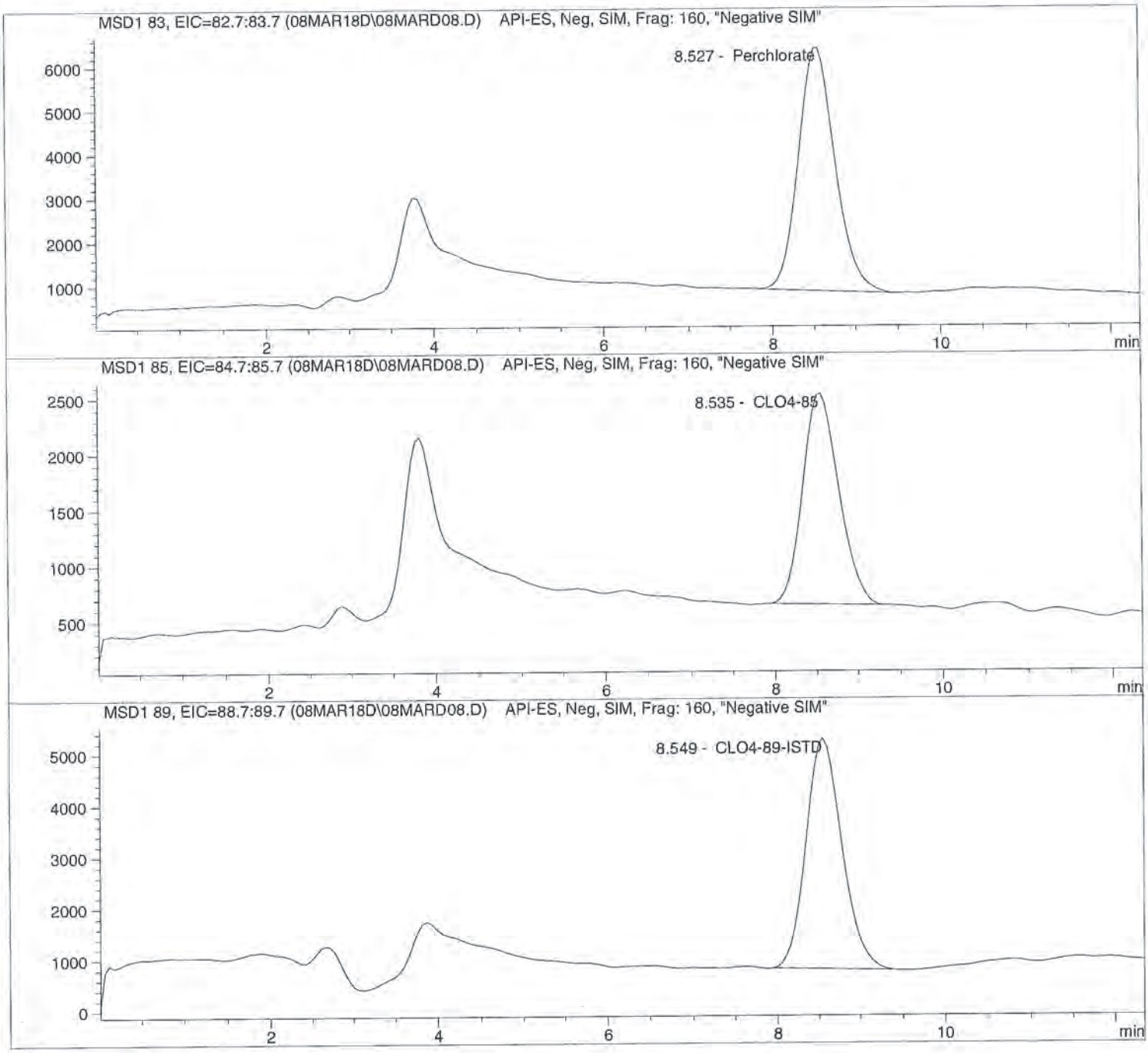
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD08.D Sample Name: 590395 67361MS

Injection Date:	3/08/2018 15:29:57	Seq Line:	8
Sample Name:	590395 67361MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD08.D Sample Name: 590395 67361MS

Injection Date:	3/08/2018 15:29:57	Seq Line:	8
Sample Name:	590395 67361MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.527	BBA	171960.3	7.0113	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.535	PBA	57996.2	6.5113	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.549	PBA	136508.6	5.0000	CLO4-89-ISTD

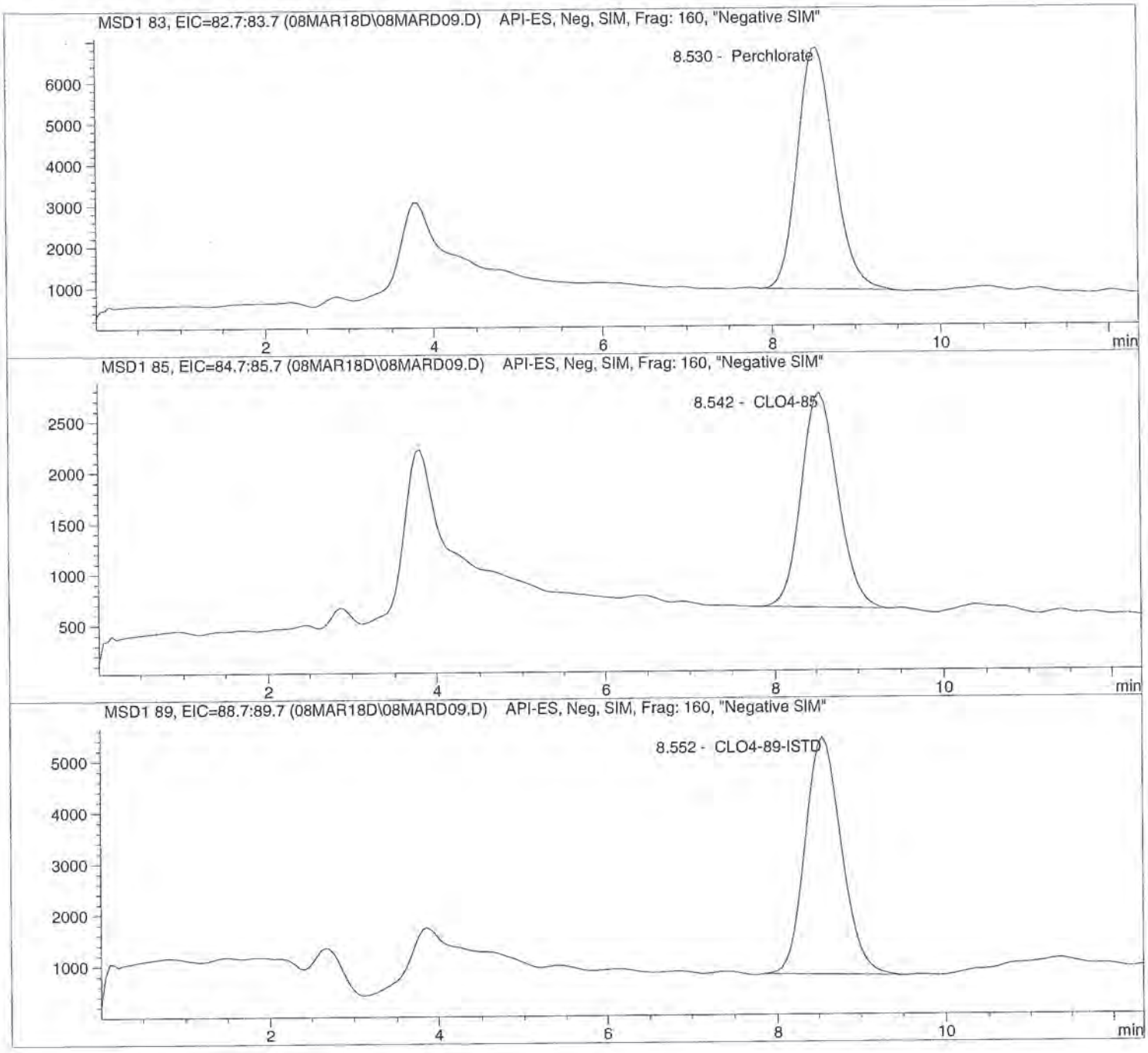
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD09.D Sample Name: 590396 67361SD

Injection Date:	3/08/2018 15:44:07	Seq Line:	9
Sample Name:	590396 67361SD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD09.D Sample Name: 590396 67361SD

Injection Date:	3/08/2018 15:44:07	Seq Line:	9
Sample Name:	590396 67361SD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.530	BBA	180889.5	7.1607	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.542	PBA	64848.3	7.0752	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.552	PBA	140465.0	5.0000	CLO4-89-ISTD

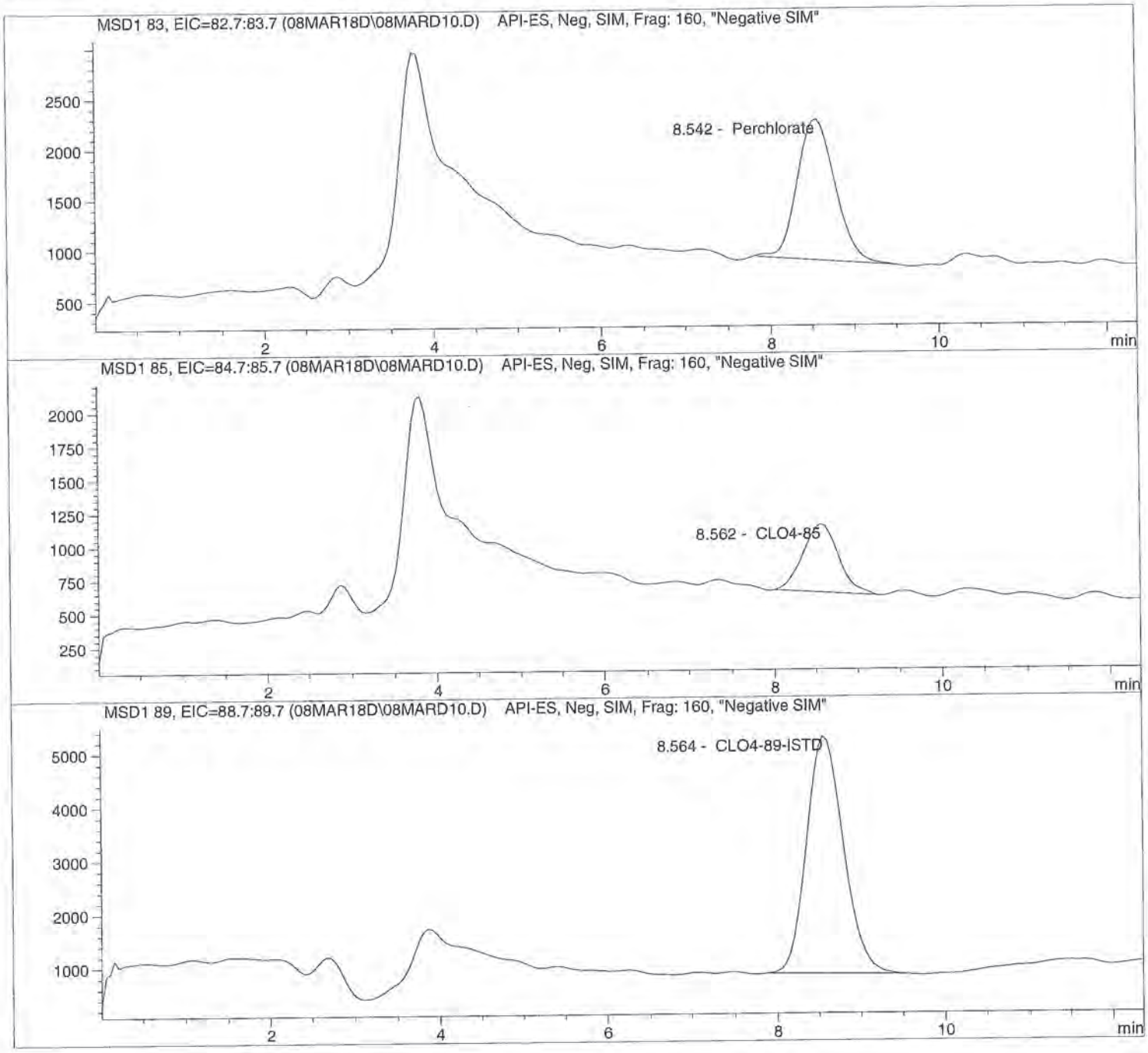
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD10.D Sample Name: 1806736002

Injection Date:	3/08/2018 15:58:16	Seq Line:	10
Sample Name:	1806736002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD10.D Sample Name: 1806736002

Injection Date:	3/08/2018 15:58:16	Seq Line:	10
Sample Name:	1806736002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.542	BBA	43372.3	1.8928	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.562	PBA	14899.9	1.5981	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.564	BBA	134577.6	5.0000	CLO4-89-ISTD

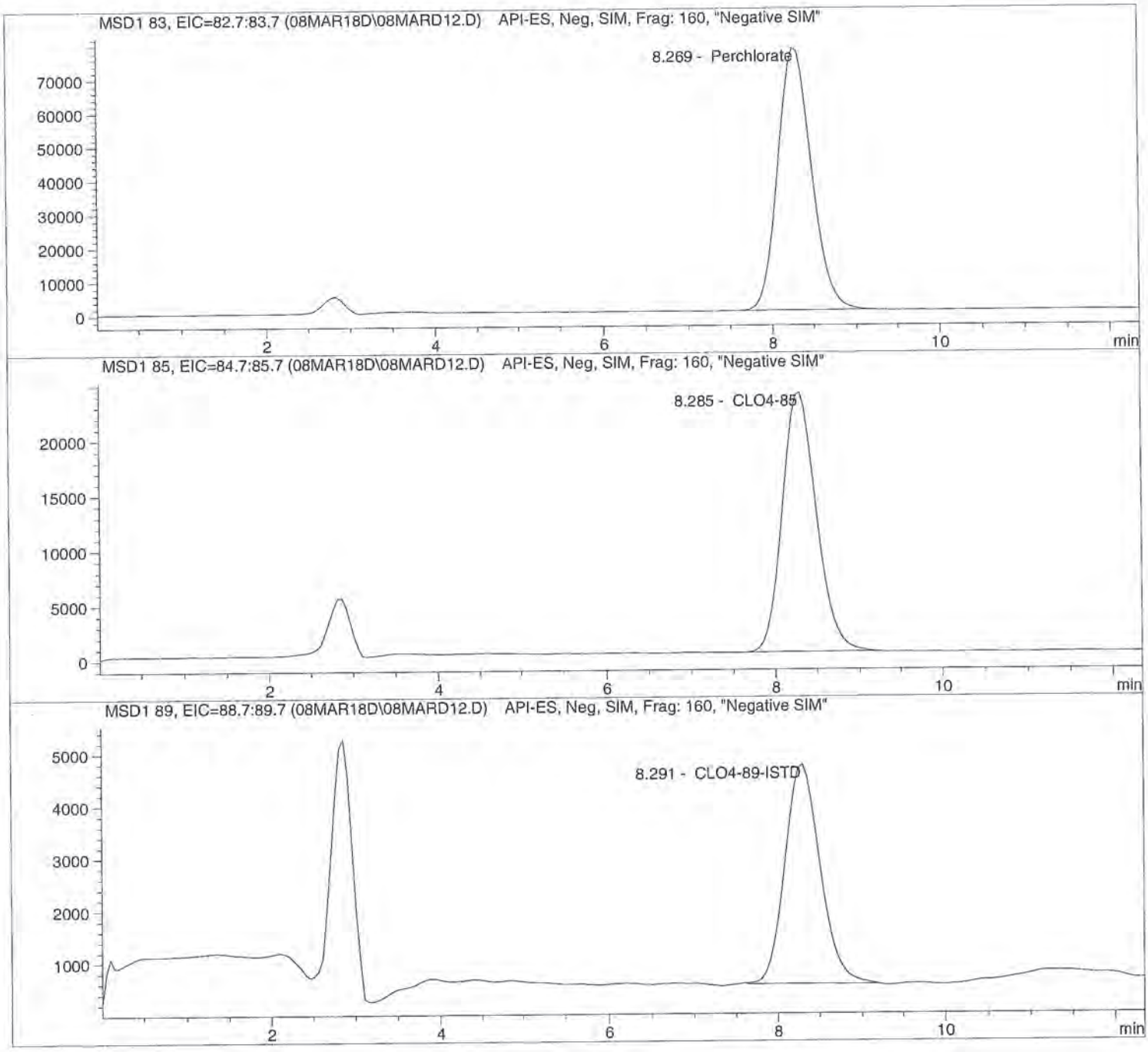
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD12.D Sample Name: 1806586001

Injection Date:	3/08/2018 16:26:38	Seq Line:	12
Sample Name:	1806586001	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD12.D Sample Name: 1806586001

Injection Date:	3/08/2018 16:26:38	Seq Line:	12
Sample Name:	1806586001	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.269	PBA	2174758.5	73.2379	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.285	PBA	668413.9	68.8193	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.291	BBA	122742.8	5.0000	CLO4-89-ISTD

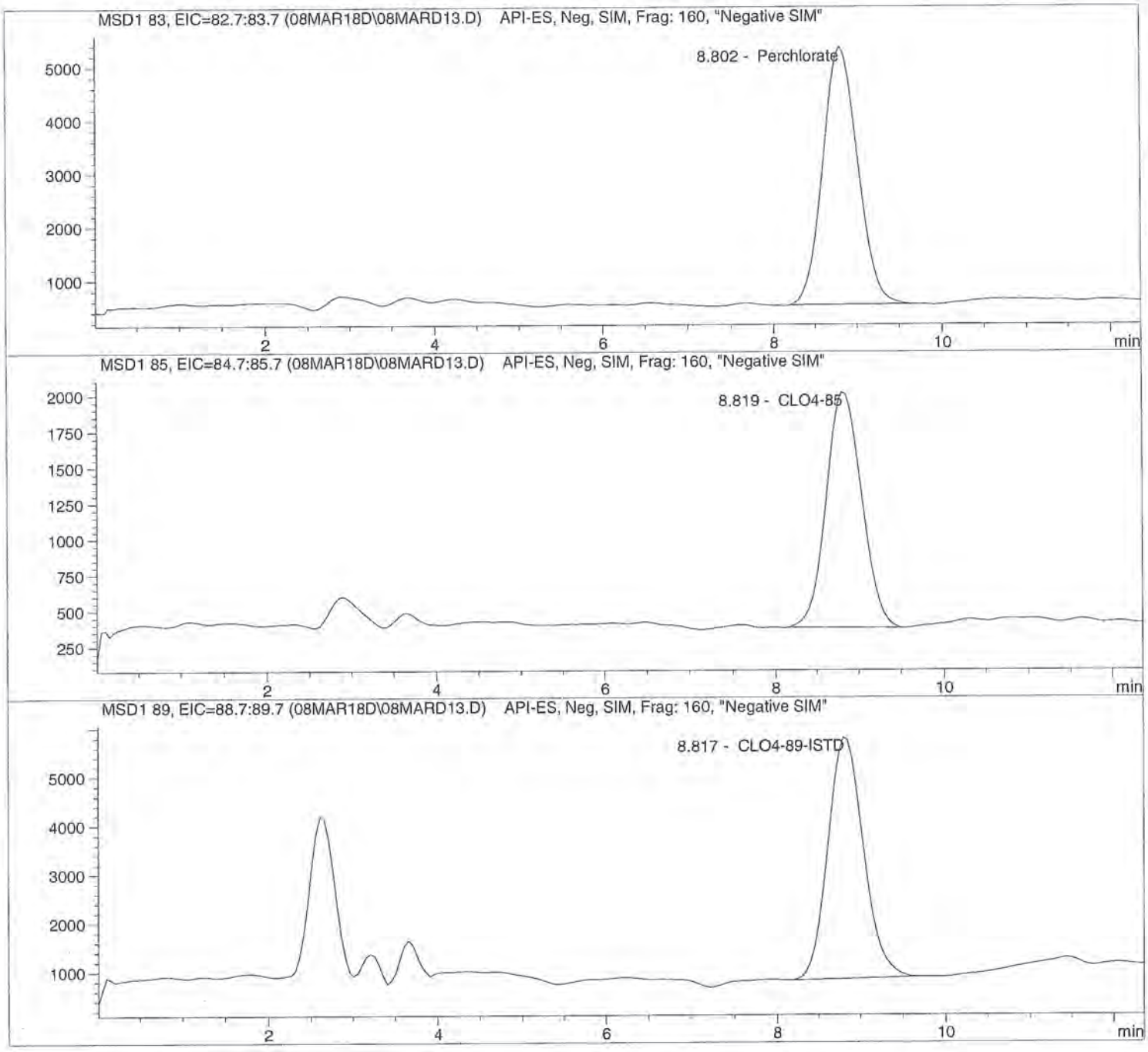
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD13.D Sample Name: 1806588001 1K

Injection Date:	3/08/2018 16:40:46	Seq Line:	13
Sample Name:	1806588001 1K	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD13.D Sample Name: 1806588001 1K

Injection Date:	3/08/2018 16:40:46	Seq Line:	13
Sample Name:	1806588001 1K	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1000.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.802	PBA	139825.2	5391.5648	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.819	PBA	48382.6	5069.7436	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.817	BBA	145975.2	5000.0000	CLO4-89-ISTD

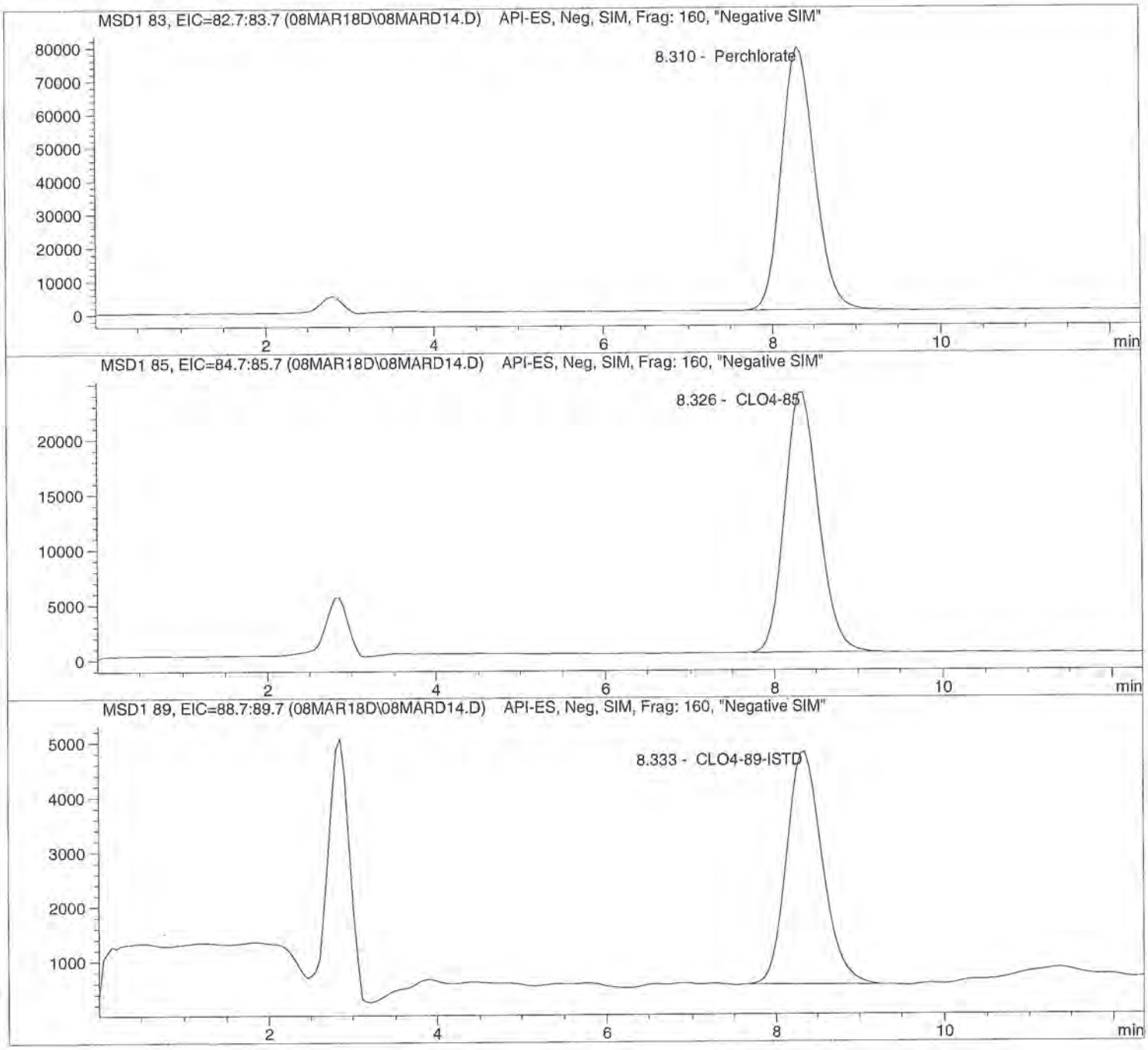
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD14.D Sample Name: 1806590001

Injection Date:	3/08/2018 16:54:54	Seq Line:	14
Sample Name:	1806590001	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD14.D Sample Name: 1806590001

Injection Date:	3/08/2018 16:54:54	Seq Line:	14
Sample Name:	1806590001	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.310	PBA	2185759.5	71.3732	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.326	PBA	671319.6	66.9358	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.333	PBA	127489.4	5.0000	CLO4-89-ISTD

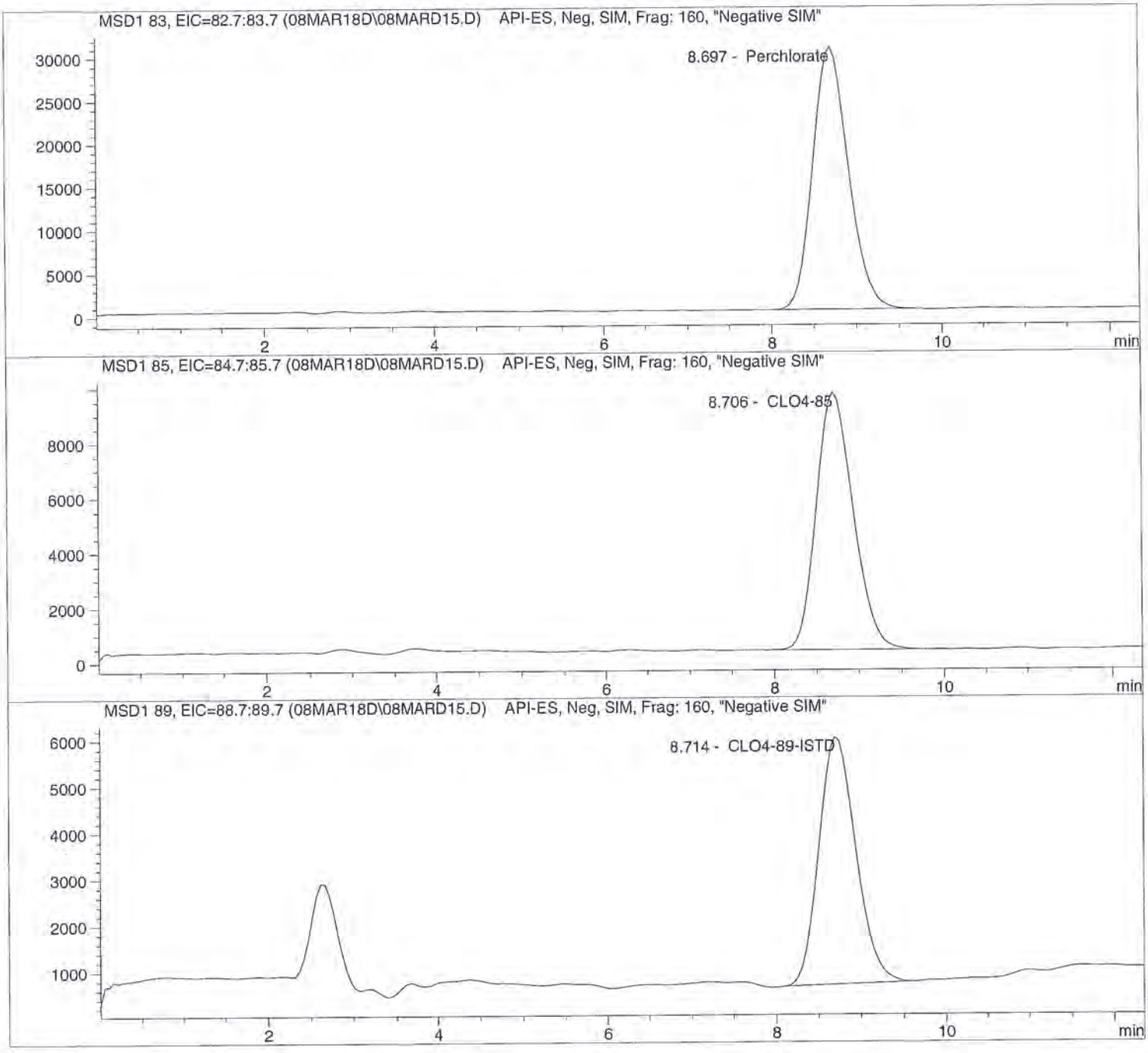
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD15.D Sample Name: 590397 CCV@25

Injection Date:	3/08/2018 17:09:02	Seq Line:	15
Sample Name:	590397 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD15.D Sample Name: 590397 CCV@25

Injection Date:	3/08/2018 17:09:02	Seq Line:	15
Sample Name:	590397 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.697	PBA	895835.4	27.6441	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.706	BBA	284483.2	25.5445	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.714	PBA	162133.6	5.0000	CLO4-89-ISTD

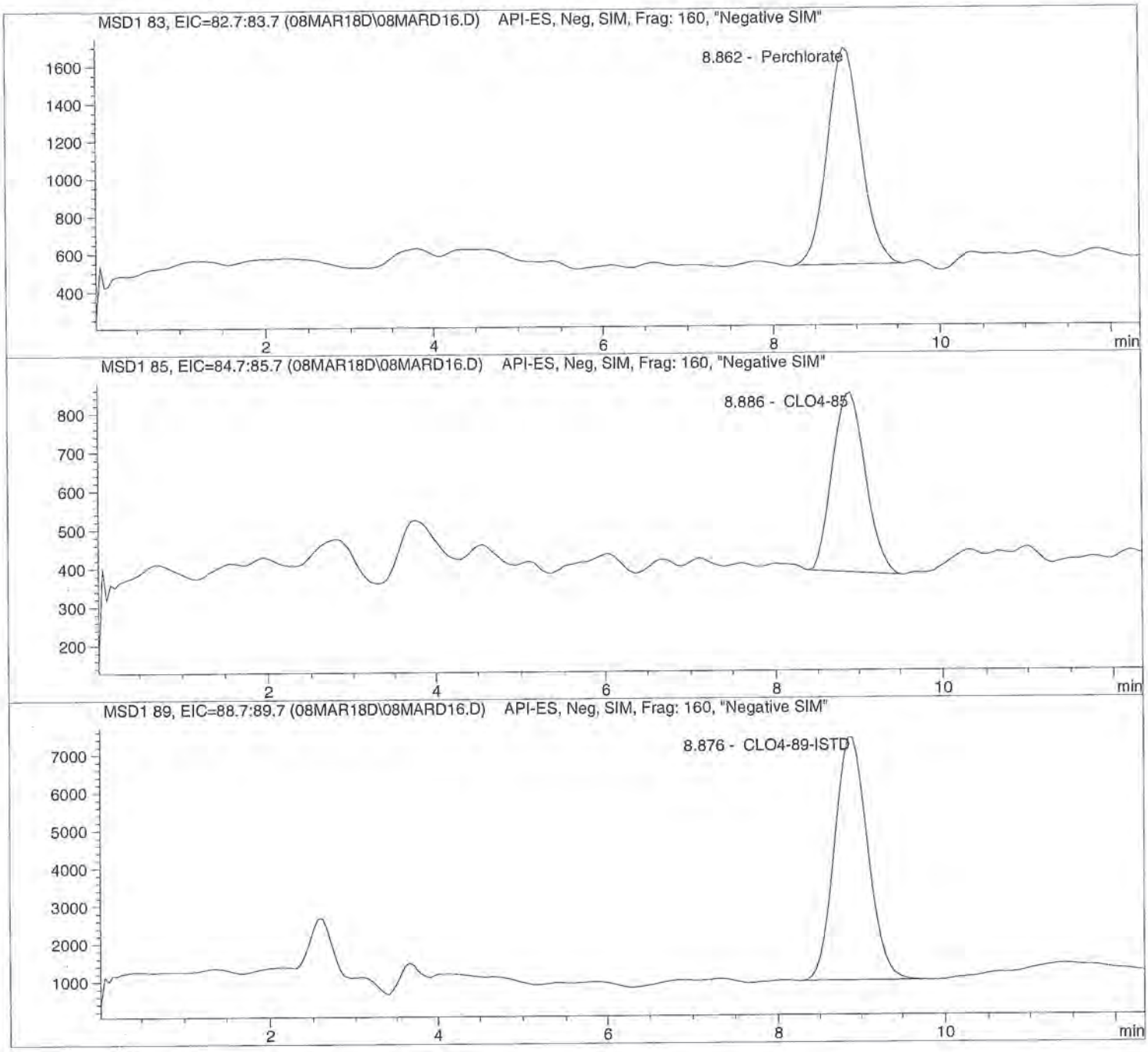
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD16.D Sample Name: 590398 LODV@1.

Injection Date:	3/08/2018 17:23:10	Seq Line:	16
Sample Name:	590398 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD16.D Sample Name: 590398 LODV@1.

Injection Date:	3/08/2018 17:23:10	Seq Line:	16
Sample Name:	590398 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.862	PBA	32771.3	1.0973	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.886	PBA	13049.5	0.9799	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.876	PBA	181152.9	5.0000	CLO4-89-ISTD

*** End of Report ***



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Sequence Table:

Method and Injection Info Part:

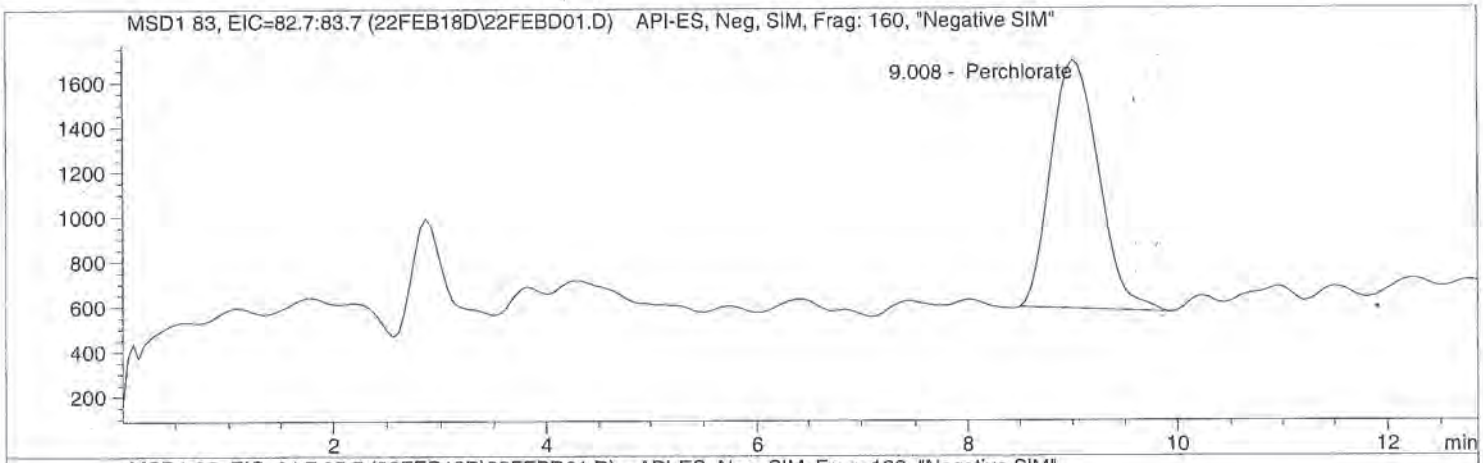
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	ICAL1@ 1.0ug/L	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	ICAL2@ 2.0ug/L	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	ICAL3@ 5.0ug/L	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	ICAL4@ 10.ug/L	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	ICAL5@ 25.ug/L	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	ICAL6@ 50.ug/L	CLO4-DOD	1	Ctrl Samp		
7	Vial 77	ICAL7@ 75.ug/L	CLO4-DOD	1	Ctrl Samp		

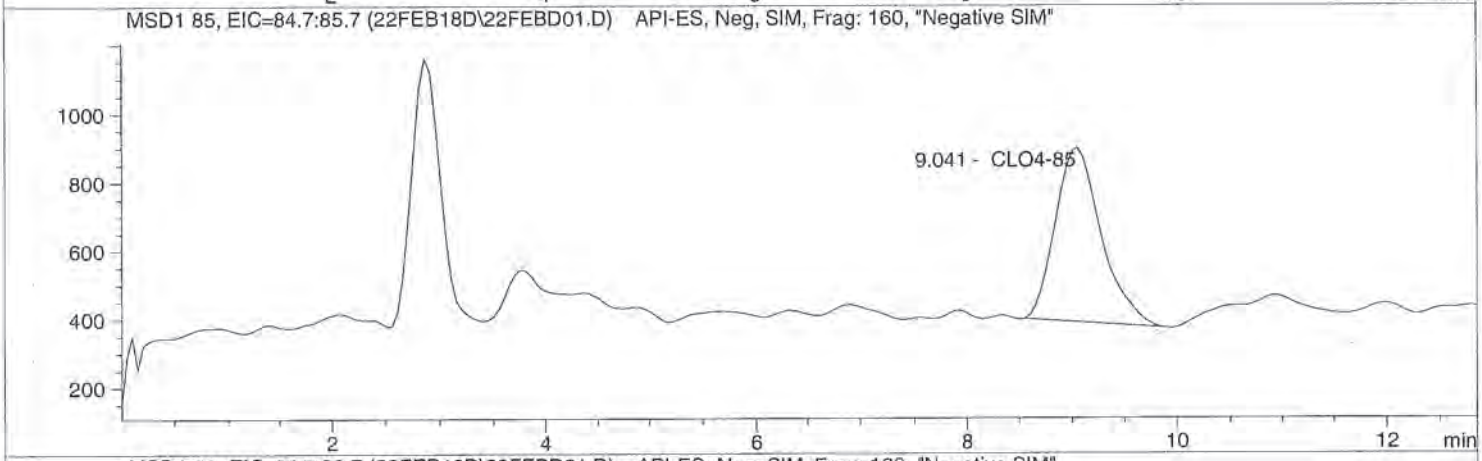
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD01.D Sample Name: ICAL1@ 1.0ug/L

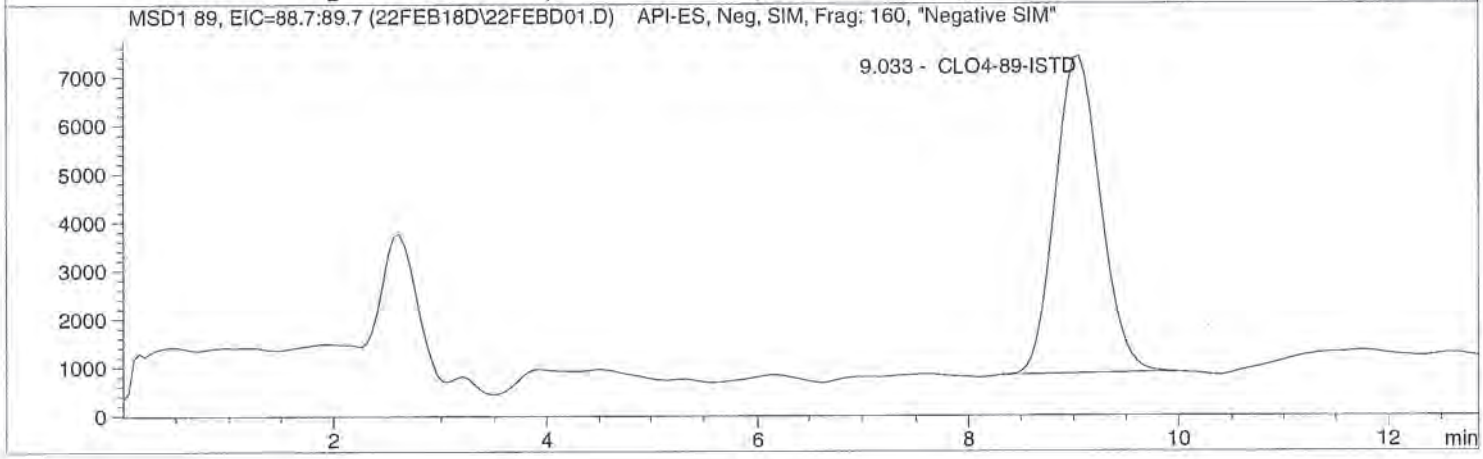
Injection Date:	2/22/2018 14:54:12	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	2/22/2018 14:54:12	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.008	PBA	34739.2	1.0774	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.041	PBA	15405.9	1.0861	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.033	BBA	195838.1	5.0000	CLO4-89-ISTD

*** End of Report ***

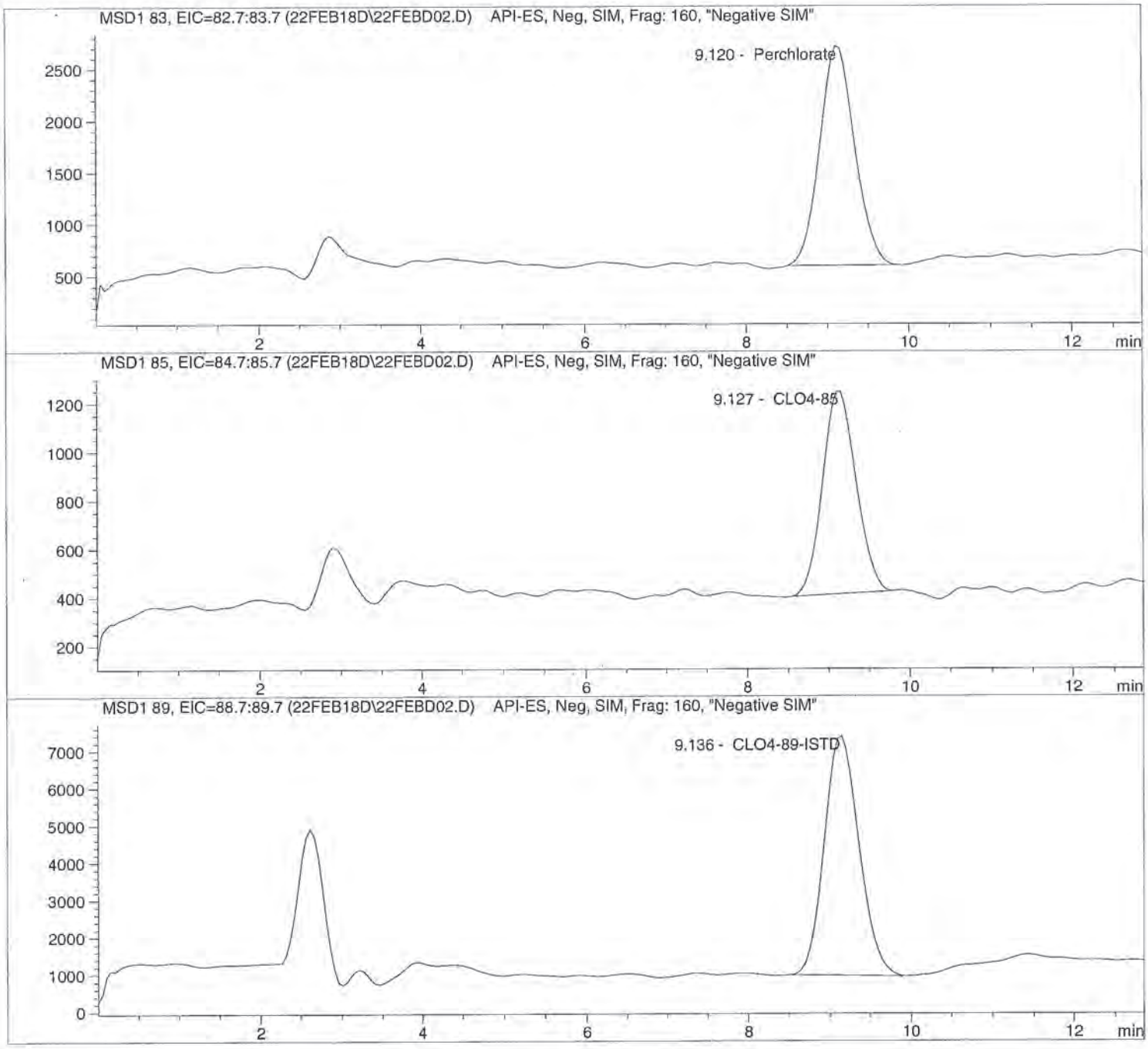
00883777

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	2/22/2018 15:08:51	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	2/22/2018 15:08:51	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.120	PBA	63769.3	1.9422	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.127	PBA	24214.8	1.8373	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.136	PBA	192591.0	5.0000	CLO4-89-ISTD

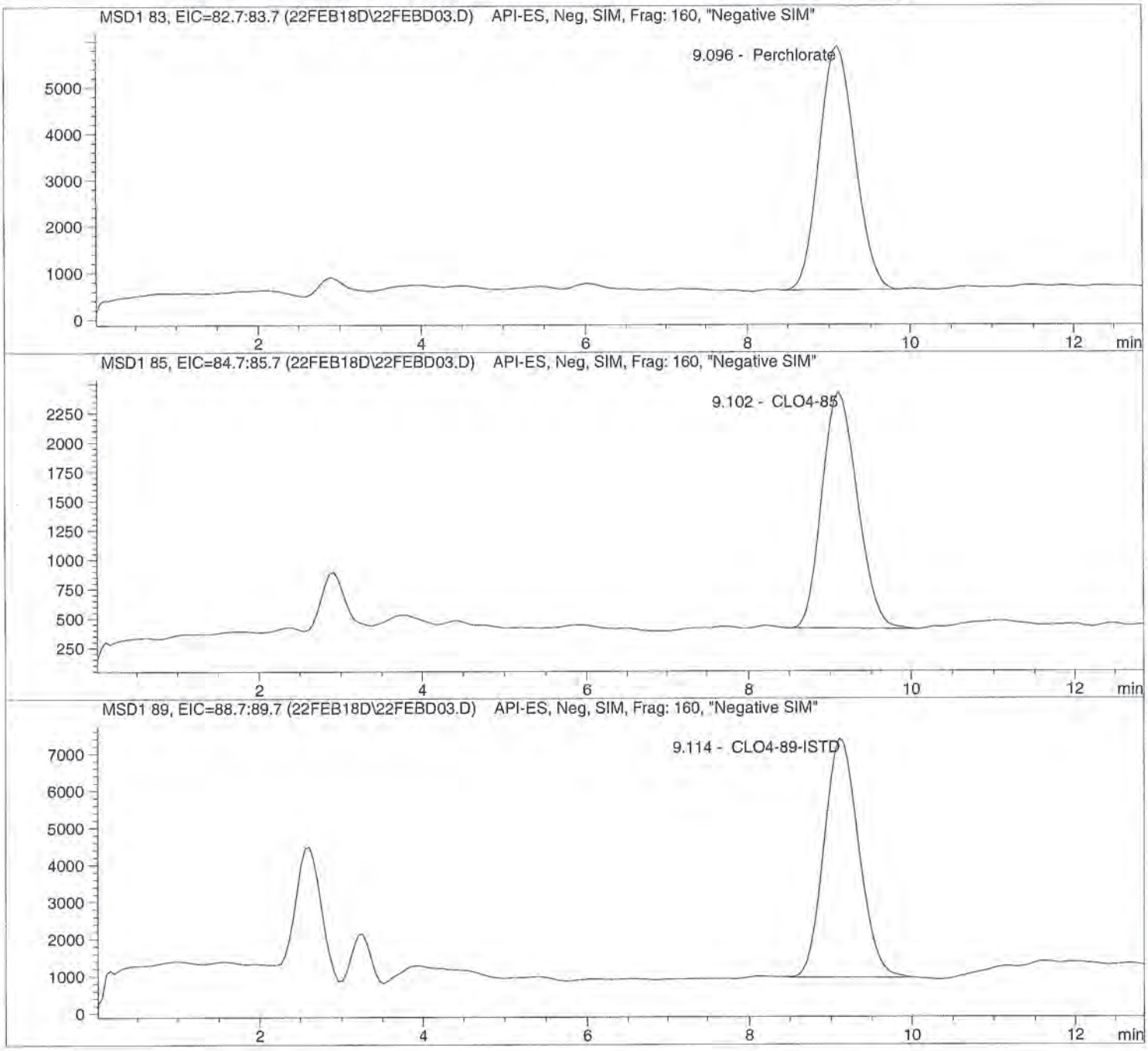
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	2/22/2018 15:23:33	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	2/22/2018 15:23:33	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.096	BBA	157724.6	4.7230	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.102	PBA	60231.1	4.8726	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.114	BBA	188961.0	5.0000	CLO4-89-ISTD

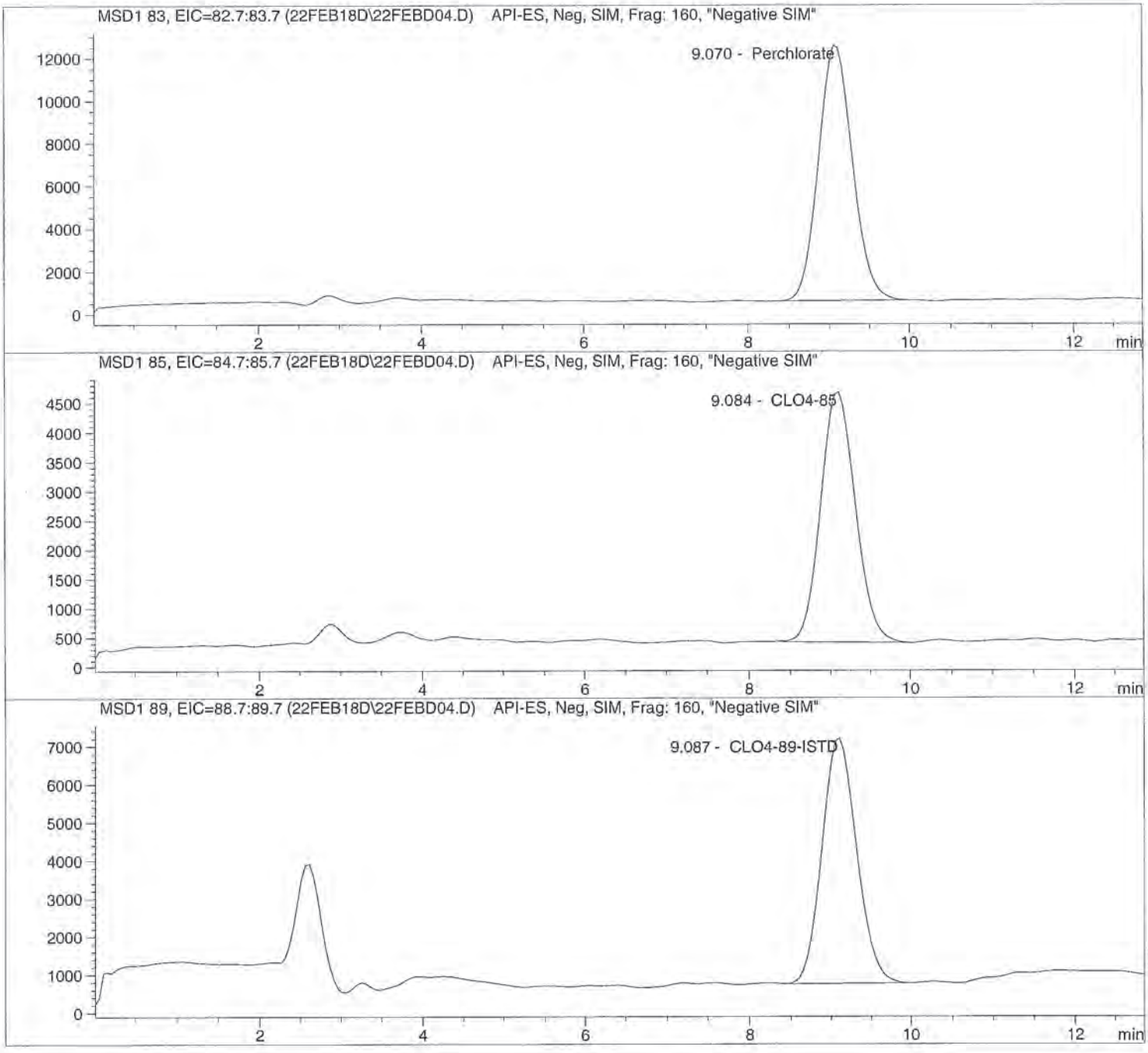
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	2/22/2018 15:38:15	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	2/22/2018 15:38:15	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.070	PBA	352920.1	9.9550	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.084	BBA	128900.4	10.1462	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.087	PBA	193850.7	5.0000	CLO4-89-ISTD

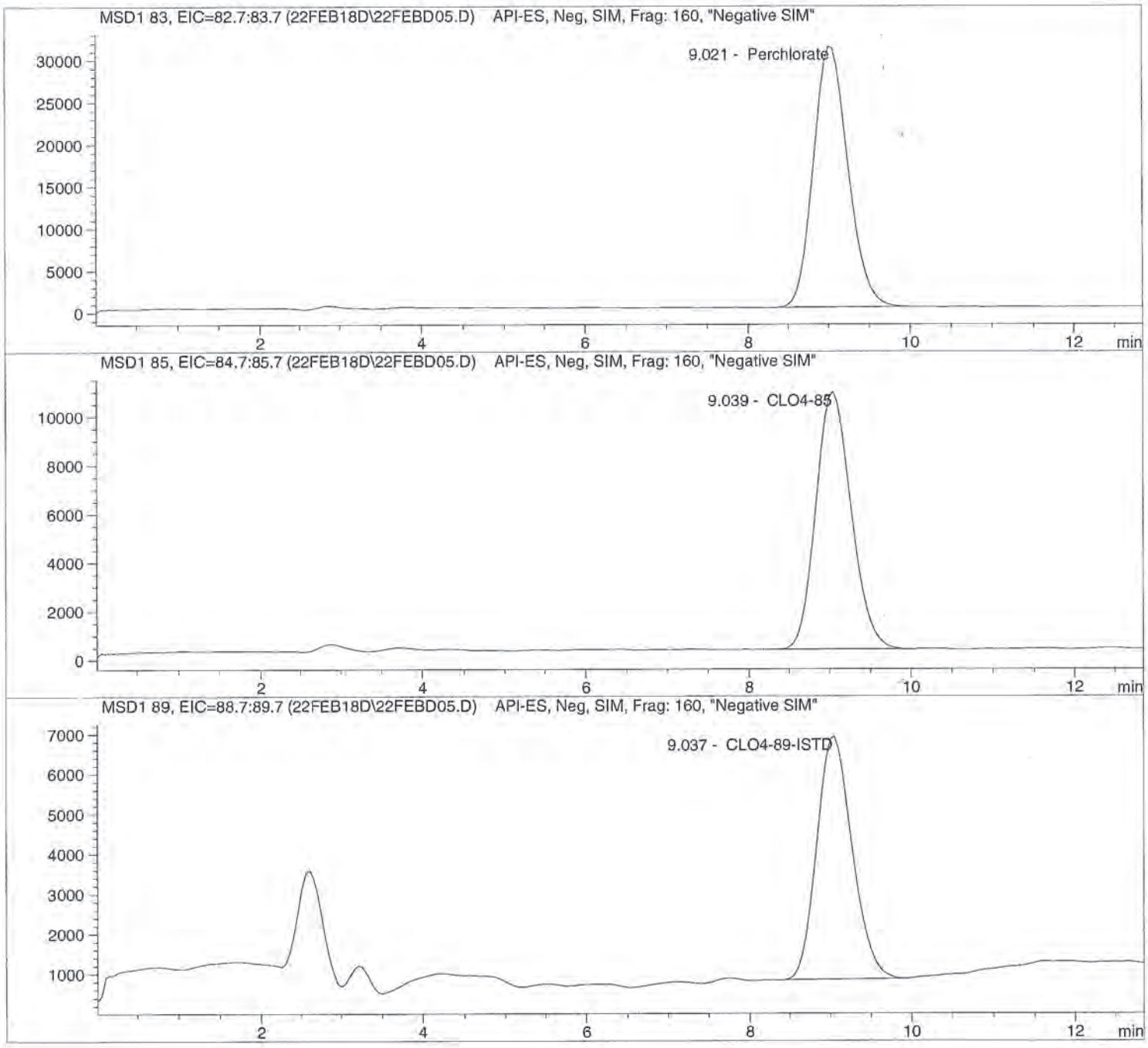
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	2/22/2018 15:52:55	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	2/22/2018 15:52:55	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.021	PBA	910406.6	25.2509	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.039	PBA	316579.0	25.2862	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.037	PBA	182426.5	5.0000	CLO4-89-ISTD

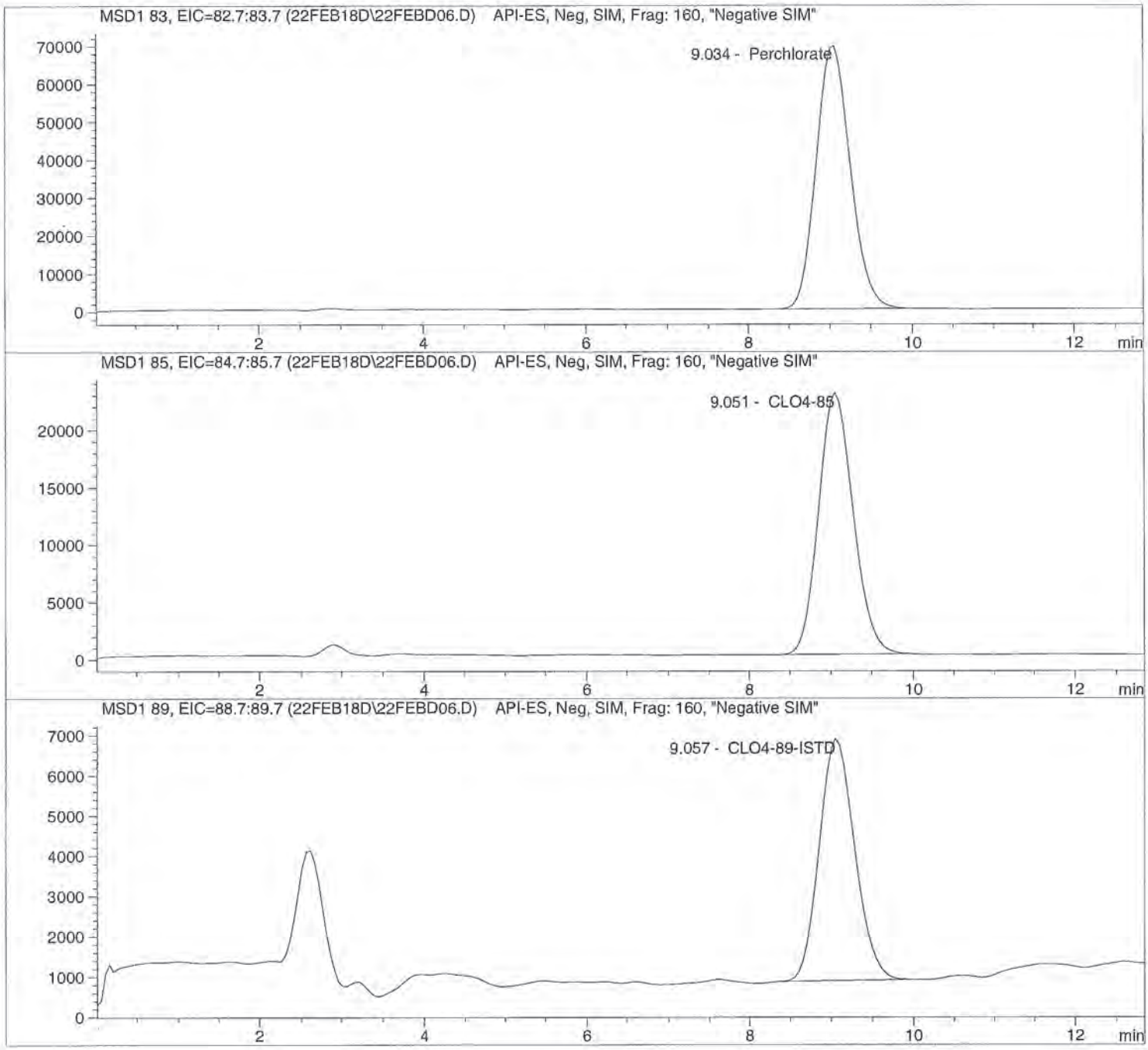
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	2/22/2018 16:07:34	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	2/22/2018 16:07:34	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	50.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.034	BBA	2003735.4	50.1645	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.051	PBA	668806.8	49.6412	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.057	PBA	180979.9	5.0000	CLO4-89-ISTD

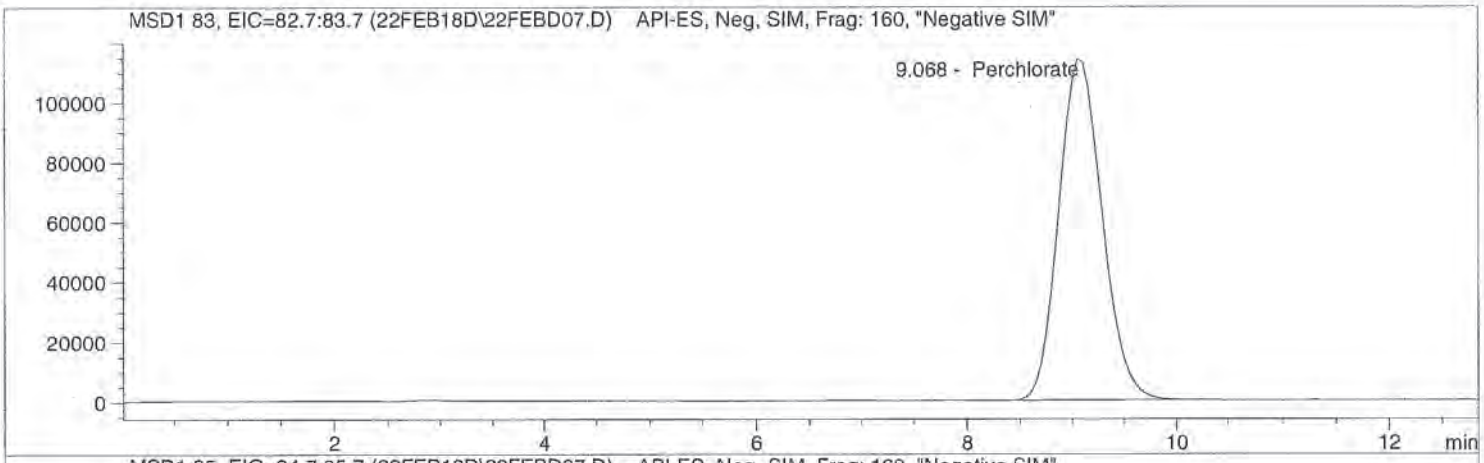
*** End of Report ***

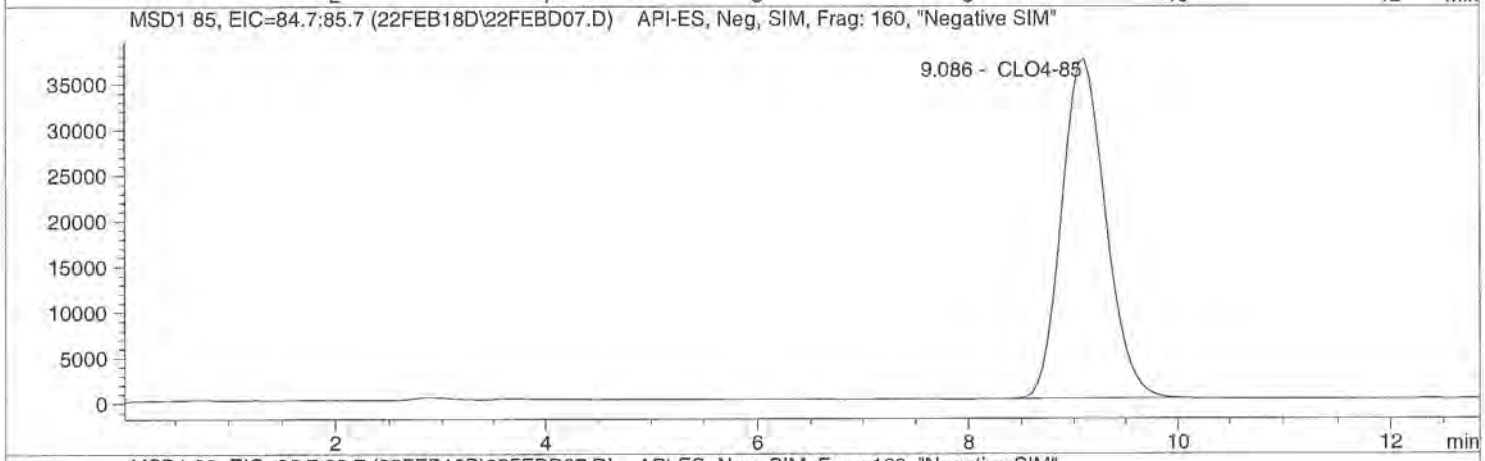
Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD07.D Sample Name: ICAL7@ 75.ug/L

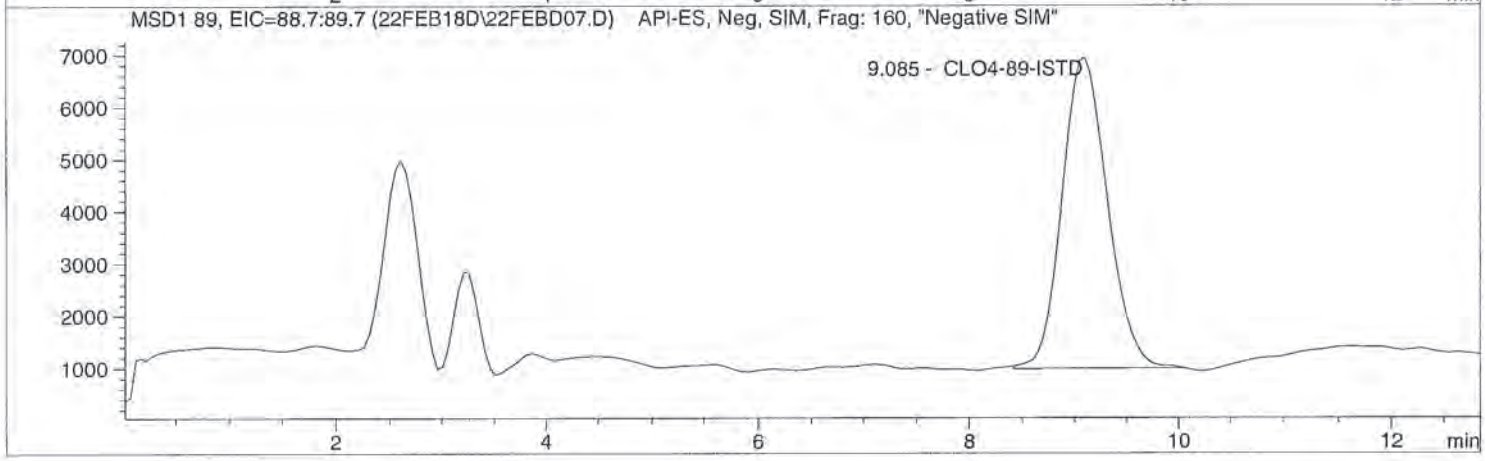
Injection Date:	2/22/2018 16:22:14	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\22FEB18D\22FEBD07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	2/22/2018 16:22:14	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	75.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.068	PBA	3285625.5	74.8620	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.086	BBA	1092927.6	75.1318	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.085	BBA	180304.9	5.0000	CLO4-89-ISTD

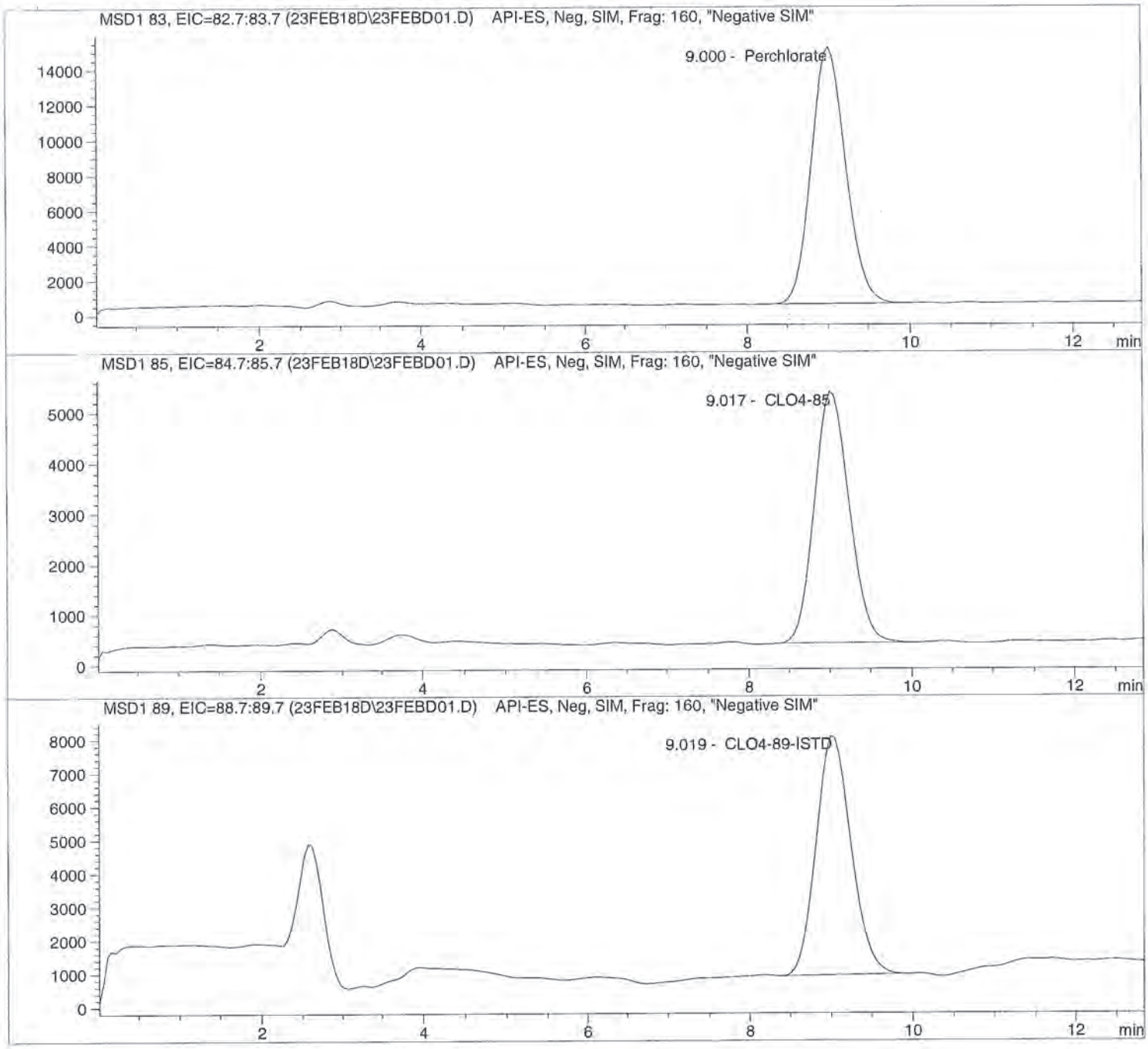
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\23FEB18D\23FEBD01.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/23/2018 09:02:40	Seq Line:	1
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 61
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\23FEB18D\23FEBD01.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/23/2018 09:02:40	Seq Line:	1
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 61
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.000	BBA	429408.2	10.9016	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.017	PBA	149052.4	10.6049	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.019	PBA	214244.2	5.0000	CLO4-89-ISTD

*** End of Report ***



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

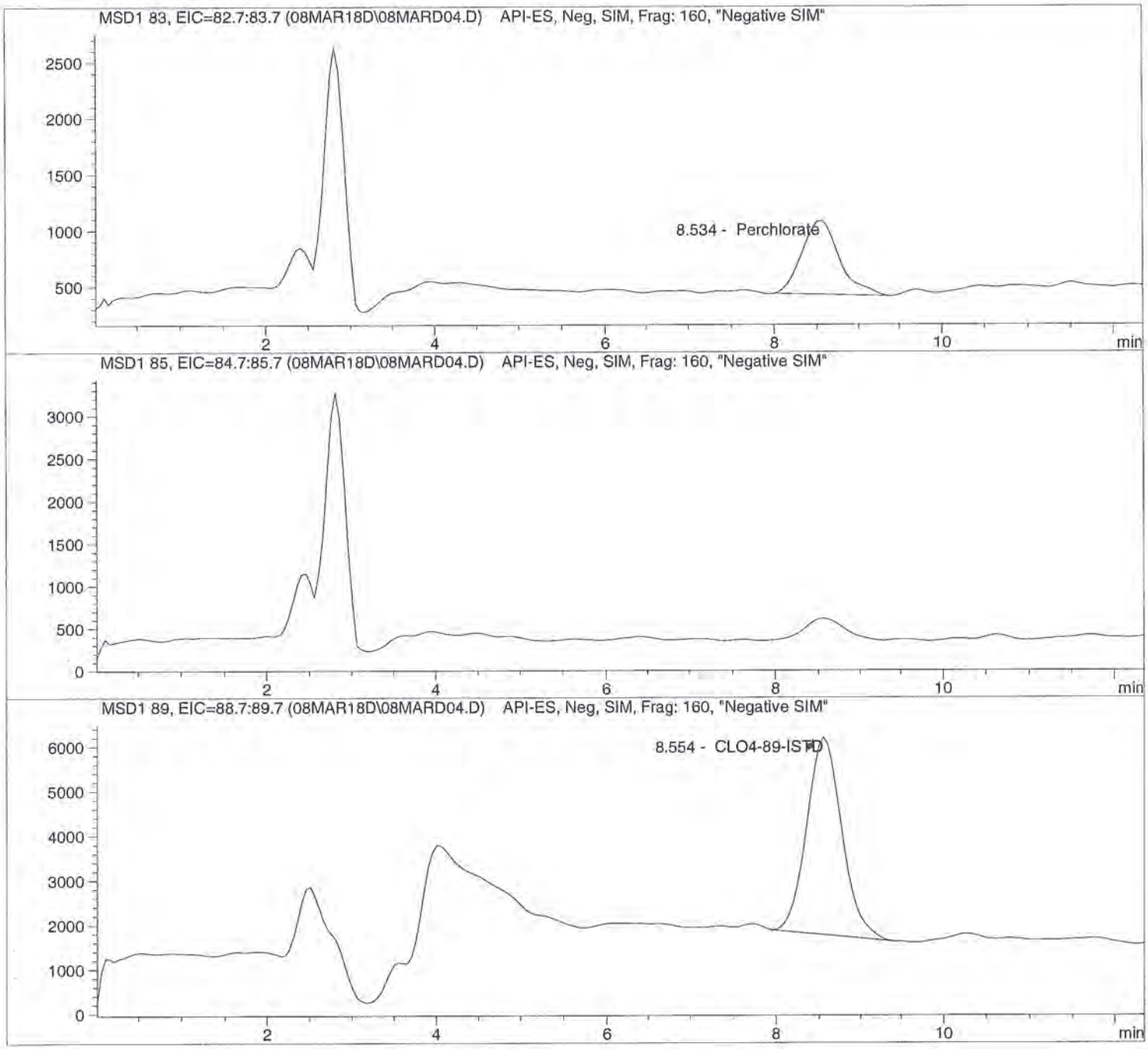
Unmodified

Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD04.D Sample Name: 590392 ICS@1.0

Injection Date:	3/08/2018 14:32:02	Seq Line:	4
Sample Name:	590392 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 2/23/2018 08:26:41

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08MAR18D\08MARD04.D Sample Name: 590392 ICS@1.0

Injection Date:	3/08/2018 14:32:02	Seq Line:	4
Sample Name:	590392 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	2/23/2018 08:26:41

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Fri, 23. Feb. 2018,08:02:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.534	PBA	20094.6	0.9665	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.554	PBA	127359.1	5.0000	CLO4-89-ISTD

*** End of Report ***

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 23, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18030369**

Laboratory Results for: **Longhorn GW Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Mar 08, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: DAYNA.FISHER
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order: HS18030369

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18030369-01	LH18/24-SP650_030718	Water		07-Mar-2018 14:00	08-Mar-2018 09:30	☐

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order:

Work Order Comments

- The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

WetChemistry by Method E415.1

Batch ID: R312878

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: R312465

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E350.3

Batch ID: R312364

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp

Date: 23-Mar-18

ANALYTICAL REPORT

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder:HS18030369
Sample ID: LH18/24-SP650_030718
Lab ID:HS18030369-01
Collection Date: 07-Mar-2018 14:00
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: SAP
Nitrogen, Ammonia (As N)	**10**		**0.20**	**0.10**	**0.20**	**mg/L**	1	13-Mar-2018 11:45
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**3.00**		**0.100**	**0.250**	**0.250**	**mg/L**	10	08-Mar-2018 17:00
TOTAL ORGANIC CARBON BY E415.1		**Method:E415.1**						Analyst: KMU
Organic Carbon, Total	**31.1**		**1.00**	**1.00**	**2.00**	**mg/L**	2	20-Mar-2018 21:15
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	22-Mar-2018 18:50

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030369

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R312364	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS18030369-01	LH18/24-SP650_030718	07 Mar 2018 14:00			13 Mar 2018 11:45	1
Batch ID R312465	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS18030369-01	LH18/24-SP650_030718	07 Mar 2018 14:00			08 Mar 2018 17:00	10
Batch ID R312878	**Test Name :** TOTAL ORGANIC CARBON BY E415.1			**Matrix:** Water		
HS18030369-01	LH18/24-SP650_030718	07 Mar 2018 14:00			20 Mar 2018 21:15	2
Batch ID R312987	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18030369-01	LH18/24-SP650_030718	07 Mar 2018 14:00			22 Mar 2018 18:50	1

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030369

QC BATCH REPORT

Batch ID: R312364 **Instrument: WetChem_HS** **Method: E350.3**

MBLK Sample ID: **MBLK-R312364** Units: **mg/L** Analysis Date: **13-Mar-2018 11:45**
Client ID: Run ID: **WetChem_HS_312364** SeqNo: **4471162** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.10	0.20								U

LCS Sample ID: **LCS-R312364** Units: **mg/L** Analysis Date: **13-Mar-2018 11:45**
Client ID: Run ID: **WetChem_HS_312364** SeqNo: **4471161** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.11	0.20	10	0	101	80 - 120				

MS Sample ID: **HS18030248-01MS** Units: **mg/L** Analysis Date: **13-Mar-2018 11:45**
Client ID: Run ID: **WetChem_HS_312364** SeqNo: **4471153** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.7	0.20	10	0.07451	106	80 - 120				

MSD Sample ID: **HS18030248-01MSD** Units: **mg/L** Analysis Date: **13-Mar-2018 11:45**
Client ID: Run ID: **WetChem_HS_312364** SeqNo: **4471154** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.32	0.20	10	0.07451	102	80 - 120	10.7	3.62	20	

The following samples were analyzed in this batch: HS18030369-01

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030369

QC BATCH REPORT

Batch ID: R312465 **Instrument: UV-2450** **Method: E365.3**

MBLK Sample ID: **MBLK-312465** Units: **mg/L** Analysis Date: **08-Mar-2018 17:00**
Client ID: Run ID: **UV-2450_312465** SeqNo: **4474513** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250								U

LCS Sample ID: **LCS-312465** Units: **mg/L** Analysis Date: **08-Mar-2018 17:00**
Client ID: Run ID: **UV-2450_312465** SeqNo: **4474514** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.25	0.0250	0.25	0	100	85 - 115				

MS Sample ID: **HS18030369-01MS** Units: **mg/L** Analysis Date: **08-Mar-2018 17:00**
Client ID: **LH18/24-SP650_030718** Run ID: **UV-2450_312465** SeqNo: **4474516** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	5.32	0.250	2.5	3	92.8	80 - 120				

MSD Sample ID: **HS18030369-01MSD** Units: **mg/L** Analysis Date: **08-Mar-2018 17:00**
Client ID: **LH18/24-SP650_030718** Run ID: **UV-2450_312465** SeqNo: **4474517** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	5.38	0.250	2.5	3	95.2	80 - 120	5.32	1.12	20	

The following samples were analyzed in this batch: HS18030369-01

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030369

QC BATCH REPORT

Batch ID: R312878 **Instrument: TOC_02** **Method: E415.1**

MBLK Sample ID: **WBLKW1-032018** Units: **mg/L** Analysis Date: **20-Mar-2018 19:47**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482712** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	0.500	1.00								U

LCS Sample ID: **WLCSW1-032018** Units: **mg/L** Analysis Date: **20-Mar-2018 20:03**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482713** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.15	1.00	10	0	102	80 - 120				

LCSD Sample ID: **WLCSDW1-032018** Units: **mg/L** Analysis Date: **20-Mar-2018 20:18**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482714** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.34	1.00	10	0	103	80 - 120	10.15	1.85	20	

MS Sample ID: **HS18030472-05MS** Units: **mg/L** Analysis Date: **20-Mar-2018 23:17**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482726** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.7	1.00	10	1.447	92.5	80 - 120				

The following samples were analyzed in this batch: HS18030369-01

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: **HS18030369**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group Houston, Corp Date: 23-Mar-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	17-027-0	27-Mar-2018
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

00883804

Date: 23-Mar-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Date/Time Received: **08-Mar-2018 09:30**
Work Order: HS18030369
Received by: **RPG**

Checklist completed by: *Jared R. Makan* eSignature — 8-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 8-Mar-2018 Date

Matrices: **Water**
Carrier name: **FedEx Priority Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.2c/1.6c UC/C	IR30	
Cooler(s)/Kit(s):	25524		
Date/Time sample(s) sent to storage:	03/08/2018 13:13		
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:

Corrective Action:

00883805

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: AMMONIA-N	TOTAL ORGANIC CARBON	ORTHO-PHOSPHATE	PERCHLORATE	Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_030718	Water	03/07/18 / 14:00		2	X	X			H2SO4	
LH18/24-SP650_030718	Water	03/07/18 / 14:00		2			X	X	NONE	

HS18030369

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant Weekly Samples

Additional Remarks: **Standard TAT on all parameters** cooler # 25524
temp: 1.2 IR30 CF +0.4

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/07/18	14:30	R Cruz	3/8/18	9:30						

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks:

00883806

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

25524

CUSTODY SEAL
Date: 3/7/18 Time: 1430
Name: Scott Beesinger
Company: BHATS

Seal Broken By: SM
Date: 03/08/18

25524 MAR 09 2018

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099

25524

(281) 530 5656
REF: ADDITIONAL COOLERS/TRIP/TEMP – RJ
RMA:

FedEx Express

E

TRK# 0221 7376 9752 7500

RETURNS MON–SAT
PRIORITY OVERNIGHT

THU – 08 MAR 10:30A '99
PRIORITY OVERNIGHT

FedEx TRK# 0221 7376 9752 7500

77099
TX-US
IAH

AB SGRA

FTD 162705 07MAR18 GGGA 546C1/07C5/8C8A

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1806818; 1807005; 1807616; 1807619; 1807622

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2063 (210594)

General Set Information: There were ten field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 591546) was less than 1/2 the CRDL. The recovery for the LCS (591547) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1806818001 (Client ID: HBW7_030618). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544). These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 19MARD02/03/13/19.

Thomas Bosch March 22, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: March 22, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1807005**
Project ID: HS18030369 030718
Purchase Order: HS18030369
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_030718	1807005001	03/07/18	03/09/18	

ANALYTICAL REPORT

Workorder: 34-1807005
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_030718**	Sampling Site: NA	Collected: 03/07/2018
Lab ID: 1807005001	Media: 125 mL Nalgene	Received: 03/09/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2063 (HBN: 210594)	**Percent Solid:** NA
	Analyzed: 03/19/2018 11:32	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**57**	1.0	2.0	4.0	1	

Comments

Quality Control: **EPA 6850, DoD QSM - (HBN: 210594)**

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 03/21/2018 14:03	/S/ Stephen Brose 03/22/2018 14:04

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1807005
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1807005

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2063 (HBN: 210594)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 591546
Analyzed: 03/19/2018 09:08
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 591547
Analyzed: 03/19/2018 09:23
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.26	5.00	105	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1806818001	**MS:** 591548	**MSD:** 591549
Analyzed: 03/19/2018 09:38	**Analyzed:** 03/19/2018 09:52	**Analyzed:** 03/19/2018 10:06
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	5.68	5	114	78.8	123.8	5.85	117	3	0.0	20.0

Continuing Calibration Verification

CCV: 591543	**CCV:** 591550
Analyzed: 03/19/2018 08:18	**Analyzed:** 03/19/2018 12:36
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	21.6	25.0	86.6	26.9	25.0	108

Interference Check Sample

ICSA: 591545
Analyzed: 03/19/2018 08:54
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0

Limit of Detection Verification

LODV: 591544	**LODV:** 591551
Analyzed: 03/19/2018 08:40	**Analyzed:** 03/19/2018 12:50
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0	1.12	1.00	112

Quality Control Sample Batch Report

Analysis Information

Workorder: 1807005

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2063 (HBN: 210594)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Comments

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
03/21/2018 14:03	03/22/2018 14:04

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
⬣ - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

00883814

18698/#2

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

1807005

Contract Chain of Custody

COC ID: 8726

1807005

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18030369
TSR:	Danielle Winnings

	LAB SAMPLE ID / ANALYSIS REQUESTED	CLIENT SAMPLE ID	MATRIX	COLLECT DATE / DUE DATE
1.	**HS18030369-01**	**LH18/24-SP650_030718**	**Water**	**07 Mar 2018 14:00**
	SUB_Perch-6850			22 Mar 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: J. Modashia Date/Time: 3/8/18 18:00

Received By: Date/Time: 03/09/2018 9:45

Cooler ID(s): Temperature(s):

00883815

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle) 1807005

Client Name: ALS Standcliff

Project/Task/Site: _____

Date/Time of Receipt: 03/07/2018 945

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:								
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA		
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA		
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA		
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA		

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 B20	3 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: _____ (Signature) Marianne Schmith (Printed Name) 03/07/2018 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

00883816



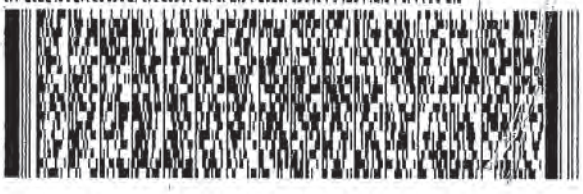
ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 08MAR18
ACTWGT: 11.25 LB
CAD: 300130/CAFE3111
DIMS: 14x11x10 IN

BILL SENDER

TO **PAUL POPE**
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18030369 RJ



FedEx Express



J171016102001ov

FRI - 09 MAR 3:00P
TRK# 0201 **7376 9753 1454**
STANDARD OVERNIGHT

AX BTFA

84123
UT-US **SLC**



ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18030369	Split:	Workorder ID: 1807005	Level: ENV_LVL4	Requested Analysis
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly	
Comments:			Preservatives	
			COOL	
			Containers	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	ID(s)	Count	EPA 6850, DoD QSM
1	03/07/2018 14:00	LH18/24-SP650_030718	1807005001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	03/09/2018 09:45	ALS Sample Receiving	Sample Login
Julie Warath 3/12/18 1100		14C	Storage
R.33.1	3.16.18/9:45	T. Bond	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00883817

Batch Worklist

Batch: ELMS/ 2063 **Created:** 3/19/2018 08:07 **Instrument:** **HBN:** 210594

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1806818 [ENV_LVL4]
Workorder: 1807005 [ENV_LVL4]
Workorder: 1807616 [ENV_LVL4]
Workorder: 1807619 [ENV_LVL4]
Workorder: 1807622 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	591543	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
2	591544	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	
3	591545	ICS for HBN 210594 [ELMS/2063]				ICS	3		E6850..D3Q	5311		3/22/2018	
4	591546	LMB for HBN 210594 [ELMS/2063]				LMB	3		E6850Q413Q	5311		3/22/2018	
5	591547	LCS for HBN 210594 [ELMS/2063]				LCS	3		E6850Q413Q	5311		3/22/2018	
6	1806818001	HBW7_030618				SAMPLE	3	1806818001-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
7	591548	HBW7_030618(1806818001MS)				MS	3		E6850Q413Q	5311		3/22/2018	
8	591549	HBW7_030618(1806818001MSD)				MSD	3		E6850Q413Q	5311		3/22/2018	
9	1806818002	HBW7_030618_a				SAMPLE	3	1806818002-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
10	1806818003	HBW10_030618				SAMPLE	3	1806818003-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
11	1806818004	HBW1_030618				SAMPLE	3	1806818004-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
12	1806818005	GPW1_030618				SAMPLE	3	1806818005-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
13	1806818006	GPW3_030618				SAMPLE	3	1806818006-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
14	1807005001	LH18/24-SP650_030718				SAMPLE	3	1807005001-A	E6850Q41.3	5480	4/4/2018	3/22/2018	
15	1807616001	LH18/24-SP650_031418				SAMPLE	3	1807616001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
16	1807619001	LH18/24-SP140_031418				SAMPLE	3	1807619001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
17	1807622001	LH18/24-SP650_031418				SAMPLE	3	1807622001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
18	591550	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
19	591551	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	

00883818



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1806818 (001-06); 1807005 (001); 1807916 (001); 1807619 (001); 1807622 (001) ELMS Batch/HBN ID: 2063 (210594)
Prep Date: 03/19/2018 Analysis Date: 03/19/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAR\19MAR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 591547; Target = 5.0µg/L. ASTM type II water was used for LMB 591546.

MS/MSD: MS/MSD was performed on sample 1806818001 (Client ID: HBW7_030618). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L. Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters. The ion ratio of m/z 83 to 85 may fail at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafile 19MARD02/03/13/19.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\210594-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 36735
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 WRK

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:	Lab Lot: LAB 109	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: T. Bosch
Create Date: 5/11/2017
Lab Lot: CLO4 QC STOCK

Amount: 100 mL
Expires: 3/31/2020
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK — **Description - Perchlorate ISTD Wrk 1,000ug/L**

Standard: 38780
MFG: ALS/SLC
MFG Lot: TNB: 10/09/17
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 10/09/2017 01:10PM
Verified By: Thomas Bosch
Verify Date:

Amount: 10 mL
Expires: 10/09/2018
Usable: Yes
Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ISO 17025 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ISO 17025 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORGANO-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 22, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18030488**

Laboratory Results for: **Longhorn GW Treatment Plant Bi-weekly samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Mar 08, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
Work Order: HS18030488

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18030488-01	LH18/24-SP650_030718	Water		07-Mar-2018 14:00	08-Mar-2018 09:30	☐
HS18030488-02	Trip Blank	Water	ALS 021518-88	07-Mar-2018 00:00	08-Mar-2018 09:30	☐

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
Work Order: HS18030488

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R312659

Sample ID: HS18030472-01MS

- MS and MSD are for an unrelated sample.

WetChemistry by Method SW9056

Batch ID: R312956

Sample ID: HS18030986-01MS

- MS and MSD are for an unrelated sample (Sulfate)

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Bi-weekly samples WorkOrder:HS18030488
Sample ID: LH18/24-SP650_030718 Lab ID:HS18030488-01
Collection Date: 07-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,2-Dichloroethane	**0.72**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	16-Mar-2018 14:44
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	16-Mar-2018 14:44
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	16-Mar-2018 14:44
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	16-Mar-2018 14:44
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	16-Mar-2018 14:44
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	16-Mar-2018 14:44
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Bi-weekly samples WorkOrder:HS18030488
Sample ID: LH18/24-SP650_030718 Lab ID:HS18030488-01
Collection Date: 07-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
cis-1,2-Dichloroethene	**3.2**		**0.20**	**0.50**	**1.0**	**ug/L**	1	16-Mar-2018 14:44
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	16-Mar-2018 14:44
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	16-Mar-2018 14:44
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:44
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Trichloroethene	**3.2**		**0.20**	**0.50**	**1.0**	**ug/L**	1	16-Mar-2018 14:44
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:44
Surr: 1,2-Dichloroethane-d4	*83.7*			**0**	*81-118*	*%REC*	*1*	*16-Mar-2018 14:44*
Surr: 4-Bromofluorobenzene	*97.8*			**0**	*85-114*	*%REC*	*1*	*16-Mar-2018 14:44*
Surr: Dibromofluoromethane	*86.7*			**0**	*80-119*	*%REC*	*1*	*16-Mar-2018 14:44*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*16-Mar-2018 14:44*
ANIONS BY SW9056A		**Method:SW9056**						Analyst: KMU
Chloride	**345**		**2.00**	**2.50**	**5.00**	**mg/L**	10	21-Mar-2018 17:27
Sulfate	**113**		**2.00**	**2.50**	**5.00**	**mg/L**	10	21-Mar-2018 17:27

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder:HS18030488
Sample ID: Trip Blank
Lab ID:HS18030488-02
Collection Date: 07-Mar-2018 00:00
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	16-Mar-2018 13:31
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	16-Mar-2018 13:31
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	16-Mar-2018 13:31
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	16-Mar-2018 13:31
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	16-Mar-2018 13:31
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder:HS18030488
Sample ID: Trip Blank
Lab ID:HS18030488-02
Collection Date: 07-Mar-2018 00:00
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	16-Mar-2018 13:31
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	16-Mar-2018 13:31
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 13:31
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 13:31
Surr: 1,2-Dichloroethane-d4	*83.7*			**0**	*81-118*	*%REC*	*1*	*16-Mar-2018 13:31*
Surr: 4-Bromofluorobenzene	*98.1*			**0**	*85-114*	*%REC*	*1*	*16-Mar-2018 13:31*
Surr: Dibromofluoromethane	*85.9*			**0**	*80-119*	*%REC*	*1*	*16-Mar-2018 13:31*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*16-Mar-2018 13:31*

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R312659	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18030488-01	LH18/24-SP650_030718	07 Mar 2018 14:00			16 Mar 2018 14:44	1
HS18030488-02	Trip Blank	07 Mar 2018 00:00			16 Mar 2018 13:31	1
Batch ID R312956	**Test Name :** ANIONS BY SW9056A			**Matrix:** Water		
HS18030488-01	LH18/24-SP650_030718	07 Mar 2018 14:00			21 Mar 2018 17:27	10

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 13:06**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477674** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 13:06**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477674** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*42.05*	*1.0*	*50*	*0*	*84.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*48.34*	*1.0*	*50*	*0*	*96.7*	*85 - 114*				
Surr: Dibromofluoromethane	*42.08*	*1.0*	*50*	*0*	*84.2*	*80 - 119*				
Surr: Toluene-d8	*52.32*	*1.0*	*50*	*0*	*105*	*89 - 112*				

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 12:17**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477672** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	47.23	1.0	50	0	94.5	78 - 124				
1,1,1-Trichloroethane	48.66	1.0	50	0	97.3	74 - 131				
1,1,2,2-Tetrachloroethane	40.32	1.0	50	0	80.6	71 - 121				
1,1,2-Trichloroethane	44.46	1.0	50	0	88.9	80 - 119				
1,1-Dichloroethane	44.71	1.0	50	0	89.4	77 - 125				
1,1-Dichloroethene	46.74	1.0	50	0	93.5	71 - 131				
1,1-Dichloropropene	49.83	1.0	50	0	99.7	79 - 125				
1,2,3-Trichlorobenzene	46.11	1.0	50	0	92.2	69 - 129				
1,2,3-Trichloropropane	42.02	1.0	50	0	84.0	73 - 122				
1,2,4-Trichlorobenzene	47.21	1.0	50	0	94.4	69 - 130				
1,2,4-Trimethylbenzene	47.92	1.0	50	0	95.8	76 - 124				
1,2-Dibromo-3-chloropropane	43.02	1.0	50	0	86.0	62 - 128				
1,2-Dibromoethane	46.94	1.0	50	0	93.9	77 - 121				
1,2-Dichlorobenzene	42.24	1.0	50	0	84.5	80 - 119				
1,2-Dichloroethane	47.83	1.0	50	0	95.7	73 - 128				
1,2-Dichloropropane	45.76	1.0	50	0	91.5	78 - 122				
1,3,5-Trimethylbenzene	48.43	1.0	50	0	96.9	75 - 124				
1,3-Dichlorobenzene	43.72	1.0	50	0	87.4	80 - 119				
1,3-Dichloropropane	43.57	1.0	50	0	87.1	80 - 119				
1,4-Dichlorobenzene	42.53	1.0	50	0	85.1	79 - 118				
2,2-Dichloropropane	46.59	1.0	50	0	93.2	60 - 139				
2-Butanone	92.97	2.0	100	0	93.0	56 - 143				
2-Chlorotoluene	47.14	1.0	50	0	94.3	79 - 122				
2-Hexanone	93.66	2.0	100	0	93.7	57 - 139				
4-Chlorotoluene	47.54	1.0	50	0	95.1	78 - 122				
4-Isopropyltoluene	43.19	1.0	50	0	86.4	77 - 127				
4-Methyl-2-pentanone	86.34	2.0	100	0	86.3	67 - 130				
Acetone	96.25	2.0	100	0	96.2	39 - 160				
Benzene	46.24	1.0	50	0	92.5	79 - 120				
Bromobenzene	41.88	1.0	50	0	83.8	80 - 120				
Bromochloromethane	50.78	1.0	50	0	102	78 - 123				
Bromodichloromethane	49.07	1.0	50	0	98.1	79 - 125				
Bromoform	50.32	1.0	50	0	101	66 - 130				
Bromomethane	50.85	1.0	50	0	102	53 - 141				

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 12:17**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477672** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	90.86	2.0	100	0	90.9	64 - 133				
Carbon tetrachloride	47.92	1.0	50	0	95.8	72 - 136				
Chlorobenzene	45.41	1.0	50	0	90.8	80 - 120				
Chloroethane	42.7	1.0	50	0	85.4	82 - 118				
Chloroform	44.24	1.0	50	0	88.5	79 - 124				
Chloromethane	46.84	1.0	50	0	93.7	50 - 139				
cis-1,2-Dichloroethene	48.47	1.0	50	0	96.9	78 - 123				
cis-1,3-Dichloropropene	50.21	1.0	50	0	100	75 - 124				
Dibromochloromethane	48.12	1.0	50	0	96.2	74 - 126				
Dibromomethane	51.61	1.0	50	0	103	79 - 123				
Dichlorodifluoromethane	40.68	1.0	50	0	81.4	32 - 152				
Ethylbenzene	51.29	1.0	50	0	103	79 - 121				
Hexachlorobutadiene	46.29	1.0	50	0	92.6	66 - 134				
Isopropylbenzene	46.53	1.0	50	0	93.1	72 - 131				
m,p-Xylene	89.9	2.0	100	0	89.9	80 - 121				
Methylene chloride	43.13	2.0	50	0	86.3	74 - 124				
Naphthalene	49.17	1.0	50	0	98.3	61 - 128				
n-Butylbenzene	44.74	1.0	50	0	89.5	75 - 128				
n-Propylbenzene	42.11	1.0	50	0	84.2	76 - 126				
o-Xylene	45.86	1.0	50	0	91.7	78 - 122				
sec-Butylbenzene	44.43	1.0	50	0	88.9	77 - 126				
Styrene	45.68	1.0	50	0	91.4	78 - 128				
tert-Butylbenzene	42.92	1.0	50	0	85.8	78 - 124				
Tetrachloroethene	46.83	1.0	50	0	93.7	74 - 129				
Toluene	43.52	1.0	50	0	87.0	80 - 121				
trans-1,2-Dichloroethene	49.3	1.0	50	0	98.6	75 - 124				
trans-1,3-Dichloropropene	52.97	1.0	50	0	106	73 - 127				
Trichloroethene	49.58	1.0	50	0	99.2	79 - 123				
Trichlorofluoromethane	47.28	1.0	50	0	94.6	65 - 141				
Vinyl chloride	45.51	1.0	50	0	91.0	58 - 137				
Surr: 1,2-Dichloroethane-d4	*43.66*	*1.0*	*50*	*0*	*87.3*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.08*	*1.0*	*50*	*0*	*100*	*85 - 114*				
Surr: Dibromofluoromethane	*41.09*	*1.0*	*50*	*0*	*82.2*	*80 - 119*				
Surr: Toluene-d8	*50.44*	*1.0*	*50*	*0*	*101*	*89 - 112*				

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030472-01MS** Units: **ug/L** Analysis Date: **16-Mar-2018 15:58**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.46	1.0	50	0	86.9	78 - 124				
1,1,1-Trichloroethane	46.73	1.0	50	0	93.5	74 - 131				
1,1,2,2-Tetrachloroethane	37.92	1.0	50	0	75.8	71 - 121				
1,1,2-Trichloroethane	40.81	1.0	50	0	81.6	80 - 119				
1,1-Dichloroethane	43.79	1.0	50	0	87.6	77 - 125				
1,1-Dichloroethene	54.72	1.0	50	9.032	91.4	71 - 131				
1,1-Dichloropropene	46.9	1.0	50	0	93.8	79 - 125				
1,2,3-Trichlorobenzene	40.65	1.0	50	0	81.3	69 - 129				
1,2,3-Trichloropropane	38.96	1.0	50	0	77.9	73 - 122				
1,2,4-Trichlorobenzene	41.37	1.0	50	0	82.7	69 - 130				
1,2,4-Trimethylbenzene	43.59	1.0	50	0	87.2	76 - 124				
1,2-Dibromo-3-chloropropane	41.62	1.0	50	0	83.2	62 - 128				
1,2-Dibromoethane	43.82	1.0	50	0	87.6	77 - 121				
1,2-Dichlorobenzene	38.26	1.0	50	0	76.5	80 - 119				S
1,2-Dichloroethane	43.58	1.0	50	1.942	83.3	73 - 128				
1,2-Dichloropropane	41.62	1.0	50	0	83.2	78 - 122				
1,3,5-Trimethylbenzene	44.04	1.0	50	0	88.1	75 - 124				
1,3-Dichlorobenzene	38.47	1.0	50	0	76.9	80 - 119				S
1,3-Dichloropropane	40.21	1.0	50	0	80.4	80 - 119				
1,4-Dichlorobenzene	37.29	1.0	50	0	74.6	79 - 118				S
2,2-Dichloropropane	44.91	1.0	50	0	89.8	60 - 139				
2-Butanone	92.32	2.0	100	0	92.3	56 - 143				
2-Chlorotoluene	42.52	1.0	50	0	85.0	79 - 122				
2-Hexanone	92.7	2.0	100	0	92.7	57 - 139				
4-Chlorotoluene	42.99	1.0	50	0	86.0	78 - 122				
4-Isopropyltoluene	38.85	1.0	50	0	77.7	77 - 127				
4-Methyl-2-pentanone	85.96	2.0	100	0	86.0	67 - 130				
Acetone	85.8	2.0	100	0	85.8	39 - 160				
Benzene	42.79	1.0	50	0	85.6	79 - 120				
Bromobenzene	37.85	1.0	50	0	75.7	80 - 120				S
Bromochloromethane	46.43	1.0	50	0	92.9	78 - 123				
Bromodichloromethane	44.5	1.0	50	0	89.0	79 - 125				
Bromoform	47.64	1.0	50	0	95.3	66 - 130				
Bromomethane	36.6	1.0	50	0	73.2	53 - 141				

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030472-01MS** Units: **ug/L** Analysis Date: **16-Mar-2018 15:58**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	89.2	2.0	100	0	89.2	64 - 133				
Carbon tetrachloride	49.42	1.0	50	0	98.8	72 - 136				
Chlorobenzene	41.46	1.0	50	0	82.9	80 - 120				
Chloroethane	43.86	1.0	50	0	87.7	82 - 118				
Chloroform	41.06	1.0	50	0	82.1	79 - 124				
Chloromethane	40.5	1.0	50	0	81.0	50 - 139				
cis-1,2-Dichloroethene	44.07	1.0	50	0	88.1	78 - 123				
cis-1,3-Dichloropropene	44.61	1.0	50	0	89.2	75 - 124				
Dibromochloromethane	44.38	1.0	50	0	88.8	74 - 126				
Dibromomethane	45.52	1.0	50	0	91.0	79 - 123				
Dichlorodifluoromethane	38.78	1.0	50	0	77.6	32 - 152				
Ethylbenzene	47.94	1.0	50	0	95.9	79 - 121				
Hexachlorobutadiene	37.33	1.0	50	0	74.7	66 - 134				
Isopropylbenzene	43.96	1.0	50	0	87.9	72 - 131				
m,p-Xylene	84.19	2.0	100	0	84.2	80 - 121				
Methylene chloride	38.21	2.0	50	0	76.4	74 - 124				
Naphthalene	44.6	1.0	50	0	89.2	61 - 128				
n-Butylbenzene	39.59	1.0	50	0	79.2	75 - 128				
n-Propylbenzene	38.87	1.0	50	0	77.7	76 - 126				
o-Xylene	42.25	1.0	50	0	84.5	78 - 122				
sec-Butylbenzene	40.11	1.0	50	0	80.2	77 - 126				
Styrene	41.69	1.0	50	0	83.4	78 - 128				
tert-Butylbenzene	39.61	1.0	50	0	79.2	78 - 124				
Tetrachloroethene	45.99	1.0	50	0	92.0	74 - 129				
Toluene	41.1	1.0	50	0	82.2	80 - 121				
trans-1,2-Dichloroethene	45.27	1.0	50	0	90.5	75 - 124				
trans-1,3-Dichloropropene	45.76	1.0	50	0	91.5	73 - 127				
Trichloroethene	47.78	1.0	50	0	95.6	79 - 123				
Trichlorofluoromethane	44.84	1.0	50	0	89.7	65 - 141				
Vinyl chloride	42.85	1.0	50	0	85.7	58 - 137				
Surr: 1,2-Dichloroethane-d4	*43.54*	*1.0*	*50*	*0*	*87.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.42*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*40.9*	*1.0*	*50*	*0*	*81.8*	*80 - 119*				
Surr: Toluene-d8	*51.22*	*1.0*	*50*	*0*	*102*	*89 - 112*				

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030472-01MSD** Units: **ug/L** Analysis Date: **16-Mar-2018 16:23**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477682** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	42.17	1.0	50	0	84.3	78 - 124	43.46	3.01	20	
1,1,1-Trichloroethane	45.35	1.0	50	0	90.7	74 - 131	46.73	3	20	
1,1,2,2-Tetrachloroethane	38.19	1.0	50	0	76.4	71 - 121	37.92	0.693	20	
1,1,2-Trichloroethane	40.18	1.0	50	0	80.4	80 - 119	40.81	1.54	20	
1,1-Dichloroethane	41.98	1.0	50	0	84.0	77 - 125	43.79	4.24	20	
1,1-Dichloroethene	53.29	1.0	50	9.032	88.5	71 - 131	54.72	2.66	20	
1,1-Dichloropropene	47.67	1.0	50	0	95.3	79 - 125	46.9	1.65	20	
1,2,3-Trichlorobenzene	42.96	1.0	50	0	85.9	69 - 129	40.65	5.53	20	
1,2,3-Trichloropropane	39.21	1.0	50	0	78.4	73 - 122	38.96	0.64	20	
1,2,4-Trichlorobenzene	42.1	1.0	50	0	84.2	69 - 130	41.37	1.75	20	
1,2,4-Trimethylbenzene	43.66	1.0	50	0	87.3	76 - 124	43.59	0.145	20	
1,2-Dibromo-3-chloropropane	41.84	1.0	50	0	83.7	62 - 128	41.62	0.532	20	
1,2-Dibromoethane	43.28	1.0	50	0	86.6	77 - 121	43.82	1.25	20	
1,2-Dichlorobenzene	38.46	1.0	50	0	76.9	80 - 119	38.26	0.517	20	S
1,2-Dichloroethane	43.96	1.0	50	1.942	84.0	73 - 128	43.58	0.862	20	
1,2-Dichloropropane	41.54	1.0	50	0	83.1	78 - 122	41.62	0.195	20	
1,3,5-Trimethylbenzene	44.52	1.0	50	0	89.0	75 - 124	44.04	1.08	20	
1,3-Dichlorobenzene	39.26	1.0	50	0	78.5	80 - 119	38.47	2.02	20	S
1,3-Dichloropropane	39.37	1.0	50	0	78.7	80 - 119	40.21	2.1	20	S
1,4-Dichlorobenzene	37.91	1.0	50	0	75.8	79 - 118	37.29	1.64	20	S
2,2-Dichloropropane	43.11	1.0	50	0	86.2	60 - 139	44.91	4.07	20	
2-Butanone	90.7	2.0	100	0	90.7	56 - 143	92.32	1.77	20	
2-Chlorotoluene	42.31	1.0	50	0	84.6	79 - 122	42.52	0.499	20	
2-Hexanone	93.02	2.0	100	0	93.0	57 - 139	92.7	0.341	20	
4-Chlorotoluene	42.73	1.0	50	0	85.5	78 - 122	42.99	0.61	20	
4-Isopropyltoluene	38.76	1.0	50	0	77.5	77 - 127	38.85	0.239	20	
4-Methyl-2-pentanone	86.29	2.0	100	0	86.3	67 - 130	85.96	0.383	20	
Acetone	86.03	2.0	100	0	86.0	39 - 160	85.8	0.266	20	
Benzene	41.78	1.0	50	0	83.6	79 - 120	42.79	2.38	20	
Bromobenzene	38.2	1.0	50	0	76.4	80 - 120	37.85	0.933	20	S
Bromochloromethane	43.77	1.0	50	0	87.5	78 - 123	46.43	5.9	20	
Bromodichloromethane	43.81	1.0	50	0	87.6	79 - 125	44.5	1.56	20	
Bromoform	46.58	1.0	50	0	93.2	66 - 130	47.64	2.25	20	
Bromomethane	41.19	1.0	50	0	82.4	53 - 141	36.6	11.8	20	

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030472-01MSD** Units: **ug/L** Analysis Date: **16-Mar-2018 16:23**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477682** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	86.07	2.0	100	0	86.1	64 - 133	89.2	3.57	20	
Carbon tetrachloride	45.56	1.0	50	0	91.1	72 - 136	49.42	8.15	20	
Chlorobenzene	41.06	1.0	50	0	82.1	80 - 120	41.46	0.982	20	
Chloroethane	48	1.0	50	0	96.0	82 - 118	43.86	9	20	
Chloroform	39.68	1.0	50	0	79.4	79 - 124	41.06	3.41	20	
Chloromethane	37.43	1.0	50	0	74.9	50 - 139	40.5	7.89	20	
cis-1,2-Dichloroethene	42.71	1.0	50	0	85.4	78 - 123	44.07	3.13	20	
cis-1,3-Dichloropropene	44.11	1.0	50	0	88.2	75 - 124	44.61	1.13	20	
Dibromochloromethane	43.16	1.0	50	0	86.3	74 - 126	44.38	2.77	20	
Dibromomethane	45.18	1.0	50	0	90.4	79 - 123	45.52	0.759	20	
Dichlorodifluoromethane	36.78	1.0	50	0	73.6	32 - 152	38.78	5.31	20	
Ethylbenzene	47	1.0	50	0	94.0	79 - 121	47.94	1.97	20	
Hexachlorobutadiene	37.98	1.0	50	0	76.0	66 - 134	37.33	1.7	20	
Isopropylbenzene	42.71	1.0	50	0	85.4	72 - 131	43.96	2.9	20	
m,p-Xylene	82.12	2.0	100	0	82.1	80 - 121	84.19	2.49	20	
Methylene chloride	36.93	2.0	50	0	73.9	74 - 124	38.21	3.43	20	S
Naphthalene	47.08	1.0	50	0	94.2	61 - 128	44.6	5.41	20	
n-Butylbenzene	39.64	1.0	50	0	79.3	75 - 128	39.59	0.13	20	
n-Propylbenzene	38.91	1.0	50	0	77.8	76 - 126	38.87	0.0939	20	
o-Xylene	41.56	1.0	50	0	83.1	78 - 122	42.25	1.66	20	
sec-Butylbenzene	40.38	1.0	50	0	80.8	77 - 126	40.11	0.659	20	
Styrene	41.18	1.0	50	0	82.4	78 - 128	41.69	1.22	20	
tert-Butylbenzene	39.92	1.0	50	0	79.8	78 - 124	39.61	0.788	20	
Tetrachloroethene	44.23	1.0	50	0	88.5	74 - 129	45.99	3.9	20	
Toluene	39.9	1.0	50	0	79.8	80 - 121	41.1	2.96	20	S
trans-1,2-Dichloroethene	43.82	1.0	50	0	87.6	75 - 124	45.27	3.24	20	
trans-1,3-Dichloropropene	45.71	1.0	50	0	91.4	73 - 127	45.76	0.0971	20	
Trichloroethene	46.64	1.0	50	0	93.3	79 - 123	47.78	2.42	20	
Trichlorofluoromethane	44.64	1.0	50	0	89.3	65 - 141	44.84	0.443	20	
Vinyl chloride	40.98	1.0	50	0	82.0	58 - 137	42.85	4.45	20	
Surr: 1,2-Dichloroethane-d4	*43.11*	*1.0*	*50*	*0*	*86.2*	*81 - 118*	*43.54*	*0.989*	*20*	
Surr: 4-Bromofluorobenzene	*49.75*	*1.0*	*50*	*0*	*99.5*	*85 - 114*	*50.42*	*1.34*	*20*	
Surr: Dibromofluoromethane	*41.21*	*1.0*	*50*	*0*	*82.4*	*80 - 119*	*40.9*	*0.765*	*20*	
Surr: Toluene-d8	*50.8*	*1.0*	*50*	*0*	*102*	*89 - 112*	*51.22*	*0.815*	*20*	

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

ALS Group Houston, Corp Date: 22-Mar-18

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder:	HS18030488

QC BATCH REPORT

Batch ID: R312659	**Instrument:** VOA2	**Method:** SW8260

The following samples were analyzed in this batch: HS18030488-01 HS18030488-02

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: HS18030488

QC BATCH REPORT

Batch ID: R312956 **Instrument: ICS2100** **Method: SW9056**

MBLK Sample ID: **WBLKW1-032118** Units: **mg/L** Analysis Date: **21-Mar-2018 16:43**
Client ID: Run ID: **ICS2100_312956** SeqNo: **4484476** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.250	0.500								U
Sulfate	0.250	0.500								U

LCS Sample ID: **WLCSW1-032118** Units: **mg/L** Analysis Date: **21-Mar-2018 16:58**
Client ID: Run ID: **ICS2100_312956** SeqNo: **4484477** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.55	0.500	20	0	103	80 - 120				
Sulfate	21.27	0.500	20	0	106	80 - 120				

LCSD Sample ID: **WLCSDW1-032118** Units: **mg/L** Analysis Date: **21-Mar-2018 17:12**
Client ID: Run ID: **ICS2100_312956** SeqNo: **4484478** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.49	0.500	20	0	102	80 - 120	20.55	0.312	20	
Sulfate	20.93	0.500	20	0	105	80 - 120	21.27	1.6	20	

MS Sample ID: **HS18030986-01MS** Units: **mg/L** Analysis Date: **21-Mar-2018 17:56**
Client ID: Run ID: **ICS2100_312956** SeqNo: **4484481** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	85.62	0.500	10	74.36	113	80 - 120				O
Sulfate	152.4	0.500	10	140.3	121	80 - 120				SEO

MSD Sample ID: **HS18030986-01MSD** Units: **mg/L** Analysis Date: **21-Mar-2018 18:10**
Client ID: Run ID: **ICS2100_312956** SeqNo: **4484482** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	85.3	0.500	10	74.36	109	80 - 120	85.62	0.372	20	O
Sulfate	151.9	0.500	10	140.3	116	80 - 120	152.4	0.361	20	EO

The following samples were analyzed in this batch: HS18030488-01

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

ALS Group Houston, Corp Date: 22-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Bi-weekly samples
WorkOrder: **HS18030488**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

ALS Group Houston, Corp Date: 22-Mar-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	17-027-0	27-Mar-2018
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

Date: 22-Mar-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18030488
Date/Time Received: **08-Mar-2018 09:30**
Received by: **RPG**

Checklist completed by: *Jared R. Makan* eSignature — 9-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 12-Mar-2018 Date

Matrices: **Water**
Carrier name: **FedEx Priority Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.2c/1.6c UC/C	IR30	
Cooler(s)/Kit(s):	25524		
Date/Time sample(s) sent to storage:	03/08/2018 18:00		
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:

Corrective Action:

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210, Houston, Tx. 77099 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job: GROUNDWATER TREATMENT PLANT BI-WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O Number

HS18030488

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant Bi-weekly samples

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: VOC	Analyses: CHLORIDE, SULFATE	Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_030718	Water	03/07/18 / 14:00		3	3		HCL	
LH18/24-SP650_030718	Water	03/07/18 / 14:00		1		1	NONE	
Trip Blank	Water	03/07/18		2	2		HCL	

Additional Remarks: **STANDARD TAT ON ALL PARAMETERS.** Cooler # 25524
Temp - 1.2 1.3 3.0 CF +0.4

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/07/18	14:30	R Cisneros	3/8/18	9:30						

9For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks

(Word) S:\Forms\Chain of Custody - BiWeekly

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

25524

CUSTODY SEAL
Date: 3/7/18 Time: 1430
Name: Scott Dessington
Company: BHATS

Seal Broken By: SM
Date: 03/08/18

25524 MAR 09 2018

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

25524

REF: ADDITIONAL COOLERS/TRIP/TEMP-RJ
RMA:

FedEx Express

E

TRK# 0221 7376 9752 7500

RETURNS MON-SAT
PRIORITY OVERNIGHT

THU - 08 MAR 10:30A 99
PRIORITY OVERNIGHT

FedEx
TRK# 0221 7376 9752 7500

77099
TX-US
IAH

AB SGRA

FTO 162785 07MAR18 GGGA 546C1/87F5/8C8A

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 28, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18030719**

Laboratory Results for: **Longhorn GW Treatment Plant Monthly Effluent Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Mar 15, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: DAYNA.FISHER
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
Work Order: HS18030719

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18030719-01	LH18/24-SP650-031418	Water		14-Mar-2018 14:00	15-Mar-2018 09:00	☐
HS18030719-02	Trip Blank	Water	ALS 021518-89	14-Mar-2018 14:00	15-Mar-2018 09:00	☐

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
Work Order:

Work Order Comments

• The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 126288

Sample ID: LH18/24-SP650-031418 (HS18030719-01)

• The surrogate recoveries could not be determined due to dilution below the calibration range.

Sample ID: LCSD-126288

• The RPD between the LCS and LCSD for some surrogates was outside of the control limit.

GCMS Volatiles by Method SW8260

Batch ID: R312659

Sample ID: HS18030472-01MS

• MS and MSD are for an unrelated sample

Batch ID: R313157

Sample ID: HS18030787-16MS

• MS and MSD are for an unrelated sample

Metals by Method SW6020

Batch ID: 126546

Sample ID: HS18030722-01MSD

• MSD is for an unrelated sample

WetChemistry by Method SW7196

Batch ID: R312698

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS18030719
Sample ID: LH18/24-SP650-031418 Lab ID:HS18030719-01
Collection Date: 14-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,2-Dichloroethane	**0.64**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	26-Mar-2018 18:53
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	26-Mar-2018 18:53
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	26-Mar-2018 18:53
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	26-Mar-2018 18:53
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	26-Mar-2018 18:53
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	26-Mar-2018 18:53
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**
Project: Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS18030719
Sample ID: LH18/24-SP650-031418 Lab ID:HS18030719-01
Collection Date: 14-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
cis-1,2-Dichloroethene	**3.4**		**0.20**	**0.50**	**1.0**	**ug/L**	1	26-Mar-2018 18:53
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	26-Mar-2018 18:53
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	26-Mar-2018 18:53
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	26-Mar-2018 18:53
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Trichloroethene	**2.7**		**0.20**	**0.50**	**1.0**	**ug/L**	1	26-Mar-2018 18:53
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	26-Mar-2018 18:53
Surr: 1,2-Dichloroethane-d4	*87.9*			**0**	*81-118*	*%REC*	*1*	*26-Mar-2018 18:53*
Surr: 4-Bromofluorobenzene	*98.4*			**0**	*85-114*	*%REC*	*1*	*26-Mar-2018 18:53*
Surr: Dibromofluoromethane	*88.0*			**0**	*80-119*	*%REC*	*1*	*26-Mar-2018 18:53*
Surr: Toluene-d8	*104*			**0**	*89-112*	*%REC*	*1*	*26-Mar-2018 18:53*
SEMIVOLATILES SIM	**Method:SW8270SIM**					Prep:SW3510 / 16-Mar-2018		Analyst: ACN
1,4-Dioxane	**7.6**		**1.0**	**1.0**	**1.0**	**ug/L**	100	23-Mar-2018 15:27
Surr: 2-Fluorobiphenyl	*0*	*S*		0	*40-140*	*%REC*	*100*	*23-Mar-2018 15:27*
Surr: 4-Terphenyl-d14	*0*	*S*		0	*40-140*	*%REC*	*100*	*23-Mar-2018 15:27*
Surr: Nitrobenzene-d5	*0*	*S*		0	*40-140*	*%REC*	*100*	*23-Mar-2018 15:27*

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.

ANALYTICAL REPORT

Project: Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS18030719

Sample ID: LH18/24-SP650-031418 Lab ID:HS18030719-01

Collection Date: 14-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**				Prep:SW3010A / 23-Mar-2018		Analyst: JCJ
Barium	**0.171**		**0.00190**	**0.00250**	**0.00400**	**mg/L**	1	27-Mar-2018 14:04
Lead	0.00100	U	0.000600	0.00100	0.00200	mg/L	1	27-Mar-2018 14:04
Selenium	0.00200	U	0.00110	0.00200	0.00200	mg/L	1	27-Mar-2018 14:04
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	27-Mar-2018 14:04
HEXAVALENT CHROMIUM BY SW7196A		**Method:SW7196**				Prep:SW7196		Analyst: JHD
Chromium, Hexavalent	0.00600	U	0.00600	0.00600	0.0100	mg/L	1	15-Mar-2018 13:45
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	22-Mar-2018 18:50

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS18030719
Sample ID: Trip Blank Lab ID:HS18030719-02
Collection Date: 14-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	16-Mar-2018 14:20
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	16-Mar-2018 14:20
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	16-Mar-2018 14:20
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	16-Mar-2018 14:20
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	16-Mar-2018 14:20
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS18030719
Sample ID: Trip Blank Lab ID:HS18030719-02
Collection Date: 14-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	16-Mar-2018 14:20
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	16-Mar-2018 14:20
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Mar-2018 14:20
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	16-Mar-2018 14:20
Surr: 1,2-Dichloroethane-d4	*85.4*			**0**	*81-118*	*%REC*	*1*	*16-Mar-2018 14:20*
Surr: 4-Bromofluorobenzene	*96.3*			**0**	*85-114*	*%REC*	*1*	*16-Mar-2018 14:20*
Surr: Dibromofluoromethane	*85.2*			**0**	*80-119*	*%REC*	*1*	*16-Mar-2018 14:20*
Surr: Toluene-d8	*105*			**0**	*89-112*	*%REC*	*1*	*16-Mar-2018 14:20*

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

ALS Group Houston, Corp

Date: 28-Mar-18

WEIGHT LOG

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

Batch ID: 126288 **Method:** SEMIVOLATILES SIM **Prep:** 3510_B_SIM

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18030719-01	1	990	1 (mL)	0.00101

Batch ID: 126546 **Method:** ICP-MS METALS BY SW6020A **Prep:** 3010A

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18030719-01	1	10	10 (mL)	1

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 126288	**Test Name :** SEMIVOLATILES SIM			**Matrix:** Water		
HS18030719-01	LH18/24-SP650-031418	14 Mar 2018 14:00		16 Mar 2018 08:57	23 Mar 2018 15:27	100
Batch ID 126546	**Test Name :** ICP-MS METALS BY SW6020A			**Matrix:** Water		
HS18030719-01	LH18/24-SP650-031418	14 Mar 2018 14:00		23 Mar 2018 11:00	27 Mar 2018 14:04	1
Batch ID R312659	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18030719-02	Trip Blank	14 Mar 2018 14:00			16 Mar 2018 14:20	1
Batch ID R312698	**Test Name :** HEXAVALENT CHROMIUM BY SW7196A			**Matrix:** Water		
HS18030719-01	LH18/24-SP650-031418	14 Mar 2018 14:00			15 Mar 2018 13:45	1
Batch ID R312987	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18030719-01	LH18/24-SP650-031418	14 Mar 2018 14:00			22 Mar 2018 18:50	1
Batch ID R313157	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18030719-01	LH18/24-SP650-031418	14 Mar 2018 14:00			26 Mar 2018 18:53	1

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: 126546 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-126546** Units: **mg/L** Analysis Date: **27-Mar-2018 14:00**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490476** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.00250	0.00400								U
Lead	0.00100	0.00200								U
Selenium	0.00200	0.00200								U
Silver	0.00100	0.00200								U

LCS Sample ID: **LCS-126546** Units: **mg/L** Analysis Date: **27-Mar-2018 14:02**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490477** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.04595	0.00400	0.05	0	91.9	80 - 120				
Lead	0.04504	0.00200	0.05	0	90.1	80 - 120				
Selenium	0.04524	0.00200	0.05	0	90.5	80 - 120				
Silver	0.04568	0.00200	0.05	0	91.4	80 - 120				

MS Sample ID: **HS18030722-01MS** Units: **mg/L** Analysis Date: **27-Mar-2018 14:11**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490481** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.2456	0.00400	0.05	0.2017	87.8	80 - 120				O
Lead	0.04416	0.00200	0.05	0.000238	87.8	80 - 120				
Selenium	0.05099	0.00200	0.05	0.000448	101	80 - 120				
Silver	0.04324	0.00200	0.05	0.000025	86.4	80 - 120				

MSD Sample ID: **HS18030722-01MSD** Units: **mg/L** Analysis Date: **27-Mar-2018 14:13**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490482** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.2386	0.00400	0.05	0.2017	73.8	80 - 120	0.2456	2.89	20	SO
Lead	0.04309	0.00200	0.05	0.000238	85.7	80 - 120	0.04416	2.45	20	
Selenium	0.04542	0.00200	0.05	0.000448	89.9	80 - 120	0.05099	11.6	20	
Silver	0.042	0.00200	0.05	0.000025	83.9	80 - 120	0.04324	2.91	20	

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: 126546 **Instrument: ICPMS04** **Method: SW6020**

PDS Sample ID: **HS18030722-01PDS** Units: **mg/L** Analysis Date: **27-Mar-2018 14:15**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490483** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.2895	0.00400	0.1	0.2017	87.8	75 - 125				
Lead	0.08629	0.00200	0.1	0.000238	86.0	75 - 125				
Selenium	0.09789	0.00200	0.1	0.000448	97.4	75 - 125				
Silver	0.08465	0.00200	0.1	0.000025	84.6	75 - 125				

SD Sample ID: **HS18030722-01SD** Units: **mg/L** Analysis Date: **27-Mar-2018 14:08**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490480** PrepDate: **23-Mar-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Barium	0.2009	0.0200					0.2017	0.366	10	
Lead	0.00500	0.0100					0.000238	0	10	U
Selenium	0.0100	0.0100					0.000448	0	10	U
Silver	0.00500	0.0100					0.000025	0	10	U

The following samples were analyzed in this batch: HS18030719-01

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: 126288 **Instrument: SV-5** **Method: SW8270SIM**

MBLK Sample ID: **MBLK-126288** Units: **ug/L** Analysis Date: **23-Mar-2018 13:43**
Client ID: Run ID: **SV-5_313040** SeqNo: **4486235** PrepDate: **16-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.010	0.010								U
Surr: 2-Fluorobiphenyl	*0.06676*	*0*	*0.08*	*0*	*83.4*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.05725*	*0*	*0.08*	*0*	*71.6*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.08141*	*0*	*0.08*	*0*	*102*	*40 - 140*				

LCS Sample ID: **LCS-126288** Units: **ug/L** Analysis Date: **23-Mar-2018 14:03**
Client ID: Run ID: **SV-5_313040** SeqNo: **4486236** PrepDate: **16-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.089	0.010	0.08	0	111	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06016*	*0*	*0.08*	*0*	*75.2*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.0602*	*0*	*0.08*	*0*	*75.3*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05265*	*0*	*0.08*	*0*	*65.8*	*40 - 140*				

LCSD Sample ID: **LCSD-126288** Units: **ug/L** Analysis Date: **23-Mar-2018 14:24**
Client ID: Run ID: **SV-5_313040** SeqNo: **4486237** PrepDate: **16-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.07621	0.010	0.08	0	95.3	40 - 140	0.089	15.5	20	
Surr: 2-Fluorobiphenyl	*0.08153*	*0*	*0.08*	*0*	*102*	*40 - 140*	*0.06016*	*30.2*	*20*	R
Surr: 4-Terphenyl-d14	*0.06082*	*0*	*0.08*	*0*	*76.0*	*40 - 140*	*0.0602*	*1.03*	*20*	
Surr: Nitrobenzene-d5	*0.06541*	*0*	*0.08*	*0*	*81.8*	*40 - 140*	*0.05265*	*21.6*	*20*	R

The following samples were analyzed in this batch: HS18030719-01

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 13:06**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477674** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 13:06**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477674** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*42.05*	*1.0*	*50*	*0*	*84.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*48.34*	*1.0*	*50*	*0*	*96.7*	*85 - 114*				
Surr: Dibromofluoromethane	*42.08*	*1.0*	*50*	*0*	*84.2*	*80 - 119*				
Surr: Toluene-d8	*52.32*	*1.0*	*50*	*0*	*105*	*89 - 112*				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 12:17**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477672** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	47.23	1.0	50	0	94.5	78 - 124				
1,1,1-Trichloroethane	48.66	1.0	50	0	97.3	74 - 131				
1,1,2,2-Tetrachloroethane	40.32	1.0	50	0	80.6	71 - 121				
1,1,2-Trichloroethane	44.46	1.0	50	0	88.9	80 - 119				
1,1-Dichloroethane	44.71	1.0	50	0	89.4	77 - 125				
1,1-Dichloroethene	46.74	1.0	50	0	93.5	71 - 131				
1,1-Dichloropropene	49.83	1.0	50	0	99.7	79 - 125				
1,2,3-Trichlorobenzene	46.11	1.0	50	0	92.2	69 - 129				
1,2,3-Trichloropropane	42.02	1.0	50	0	84.0	73 - 122				
1,2,4-Trichlorobenzene	47.21	1.0	50	0	94.4	69 - 130				
1,2,4-Trimethylbenzene	47.92	1.0	50	0	95.8	76 - 124				
1,2-Dibromo-3-chloropropane	43.02	1.0	50	0	86.0	62 - 128				
1,2-Dibromoethane	46.94	1.0	50	0	93.9	77 - 121				
1,2-Dichlorobenzene	42.24	1.0	50	0	84.5	80 - 119				
1,2-Dichloroethane	47.83	1.0	50	0	95.7	73 - 128				
1,2-Dichloropropane	45.76	1.0	50	0	91.5	78 - 122				
1,3,5-Trimethylbenzene	48.43	1.0	50	0	96.9	75 - 124				
1,3-Dichlorobenzene	43.72	1.0	50	0	87.4	80 - 119				
1,3-Dichloropropane	43.57	1.0	50	0	87.1	80 - 119				
1,4-Dichlorobenzene	42.53	1.0	50	0	85.1	79 - 118				
2,2-Dichloropropane	46.59	1.0	50	0	93.2	60 - 139				
2-Butanone	92.97	2.0	100	0	93.0	56 - 143				
2-Chlorotoluene	47.14	1.0	50	0	94.3	79 - 122				
2-Hexanone	93.66	2.0	100	0	93.7	57 - 139				
4-Chlorotoluene	47.54	1.0	50	0	95.1	78 - 122				
4-Isopropyltoluene	43.19	1.0	50	0	86.4	77 - 127				
4-Methyl-2-pentanone	86.34	2.0	100	0	86.3	67 - 130				
Acetone	96.25	2.0	100	0	96.2	39 - 160				
Benzene	46.24	1.0	50	0	92.5	79 - 120				
Bromobenzene	41.88	1.0	50	0	83.8	80 - 120				
Bromochloromethane	50.78	1.0	50	0	102	78 - 123				
Bromodichloromethane	49.07	1.0	50	0	98.1	79 - 125				
Bromoform	50.32	1.0	50	0	101	66 - 130				
Bromomethane	50.85	1.0	50	0	102	53 - 141				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180316** Units: **ug/L** Analysis Date: **16-Mar-2018 12:17**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477672** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	90.86	2.0	100	0	90.9	64 - 133				
Carbon tetrachloride	47.92	1.0	50	0	95.8	72 - 136				
Chlorobenzene	45.41	1.0	50	0	90.8	80 - 120				
Chloroethane	42.7	1.0	50	0	85.4	82 - 118				
Chloroform	44.24	1.0	50	0	88.5	79 - 124				
Chloromethane	46.84	1.0	50	0	93.7	50 - 139				
cis-1,2-Dichloroethene	48.47	1.0	50	0	96.9	78 - 123				
cis-1,3-Dichloropropene	50.21	1.0	50	0	100	75 - 124				
Dibromochloromethane	48.12	1.0	50	0	96.2	74 - 126				
Dibromomethane	51.61	1.0	50	0	103	79 - 123				
Dichlorodifluoromethane	40.68	1.0	50	0	81.4	32 - 152				
Ethylbenzene	51.29	1.0	50	0	103	79 - 121				
Hexachlorobutadiene	46.29	1.0	50	0	92.6	66 - 134				
Isopropylbenzene	46.53	1.0	50	0	93.1	72 - 131				
m,p-Xylene	89.9	2.0	100	0	89.9	80 - 121				
Methylene chloride	43.13	2.0	50	0	86.3	74 - 124				
Naphthalene	49.17	1.0	50	0	98.3	61 - 128				
n-Butylbenzene	44.74	1.0	50	0	89.5	75 - 128				
n-Propylbenzene	42.11	1.0	50	0	84.2	76 - 126				
o-Xylene	45.86	1.0	50	0	91.7	78 - 122				
sec-Butylbenzene	44.43	1.0	50	0	88.9	77 - 126				
Styrene	45.68	1.0	50	0	91.4	78 - 128				
tert-Butylbenzene	42.92	1.0	50	0	85.8	78 - 124				
Tetrachloroethene	46.83	1.0	50	0	93.7	74 - 129				
Toluene	43.52	1.0	50	0	87.0	80 - 121				
trans-1,2-Dichloroethene	49.3	1.0	50	0	98.6	75 - 124				
trans-1,3-Dichloropropene	52.97	1.0	50	0	106	73 - 127				
Trichloroethene	49.58	1.0	50	0	99.2	79 - 123				
Trichlorofluoromethane	47.28	1.0	50	0	94.6	65 - 141				
Vinyl chloride	45.51	1.0	50	0	91.0	58 - 137				
Surr: 1,2-Dichloroethane-d4	*43.66*	*1.0*	*50*	*0*	*87.3*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.08*	*1.0*	*50*	*0*	*100*	*85 - 114*				
Surr: Dibromofluoromethane	*41.09*	*1.0*	*50*	*0*	*82.2*	*80 - 119*				
Surr: Toluene-d8	*50.44*	*1.0*	*50*	*0*	*101*	*89 - 112*				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030472-01MS** Units: **ug/L** Analysis Date: **16-Mar-2018 15:58**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.46	1.0	50	0	86.9	78 - 124				
1,1,1-Trichloroethane	46.73	1.0	50	0	93.5	74 - 131				
1,1,2,2-Tetrachloroethane	37.92	1.0	50	0	75.8	71 - 121				
1,1,2-Trichloroethane	40.81	1.0	50	0	81.6	80 - 119				
1,1-Dichloroethane	43.79	1.0	50	0	87.6	77 - 125				
1,1-Dichloroethene	54.72	1.0	50	9.032	91.4	71 - 131				
1,1-Dichloropropene	46.9	1.0	50	0	93.8	79 - 125				
1,2,3-Trichlorobenzene	40.65	1.0	50	0	81.3	69 - 129				
1,2,3-Trichloropropane	38.96	1.0	50	0	77.9	73 - 122				
1,2,4-Trichlorobenzene	41.37	1.0	50	0	82.7	69 - 130				
1,2,4-Trimethylbenzene	43.59	1.0	50	0	87.2	76 - 124				
1,2-Dibromo-3-chloropropane	41.62	1.0	50	0	83.2	62 - 128				
1,2-Dibromoethane	43.82	1.0	50	0	87.6	77 - 121				
1,2-Dichlorobenzene	38.26	1.0	50	0	76.5	80 - 119				S
1,2-Dichloroethane	43.58	1.0	50	1.942	83.3	73 - 128				
1,2-Dichloropropane	41.62	1.0	50	0	83.2	78 - 122				
1,3,5-Trimethylbenzene	44.04	1.0	50	0	88.1	75 - 124				
1,3-Dichlorobenzene	38.47	1.0	50	0	76.9	80 - 119				S
1,3-Dichloropropane	40.21	1.0	50	0	80.4	80 - 119				
1,4-Dichlorobenzene	37.29	1.0	50	0	74.6	79 - 118				S
2,2-Dichloropropane	44.91	1.0	50	0	89.8	60 - 139				
2-Butanone	92.32	2.0	100	0	92.3	56 - 143				
2-Chlorotoluene	42.52	1.0	50	0	85.0	79 - 122				
2-Hexanone	92.7	2.0	100	0	92.7	57 - 139				
4-Chlorotoluene	42.99	1.0	50	0	86.0	78 - 122				
4-Isopropyltoluene	38.85	1.0	50	0	77.7	77 - 127				
4-Methyl-2-pentanone	85.96	2.0	100	0	86.0	67 - 130				
Acetone	85.8	2.0	100	0	85.8	39 - 160				
Benzene	42.79	1.0	50	0	85.6	79 - 120				
Bromobenzene	37.85	1.0	50	0	75.7	80 - 120				S
Bromochloromethane	46.43	1.0	50	0	92.9	78 - 123				
Bromodichloromethane	44.5	1.0	50	0	89.0	79 - 125				
Bromoform	47.64	1.0	50	0	95.3	66 - 130				
Bromomethane	36.6	1.0	50	0	73.2	53 - 141				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030472-01MS** Units: **ug/L** Analysis Date: **16-Mar-2018 15:58**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	89.2	2.0	100	0	89.2	64 - 133				
Carbon tetrachloride	49.42	1.0	50	0	98.8	72 - 136				
Chlorobenzene	41.46	1.0	50	0	82.9	80 - 120				
Chloroethane	43.86	1.0	50	0	87.7	82 - 118				
Chloroform	41.06	1.0	50	0	82.1	79 - 124				
Chloromethane	40.5	1.0	50	0	81.0	50 - 139				
cis-1,2-Dichloroethene	44.07	1.0	50	0	88.1	78 - 123				
cis-1,3-Dichloropropene	44.61	1.0	50	0	89.2	75 - 124				
Dibromochloromethane	44.38	1.0	50	0	88.8	74 - 126				
Dibromomethane	45.52	1.0	50	0	91.0	79 - 123				
Dichlorodifluoromethane	38.78	1.0	50	0	77.6	32 - 152				
Ethylbenzene	47.94	1.0	50	0	95.9	79 - 121				
Hexachlorobutadiene	37.33	1.0	50	0	74.7	66 - 134				
Isopropylbenzene	43.96	1.0	50	0	87.9	72 - 131				
m,p-Xylene	84.19	2.0	100	0	84.2	80 - 121				
Methylene chloride	38.21	2.0	50	0	76.4	74 - 124				
Naphthalene	44.6	1.0	50	0	89.2	61 - 128				
n-Butylbenzene	39.59	1.0	50	0	79.2	75 - 128				
n-Propylbenzene	38.87	1.0	50	0	77.7	76 - 126				
o-Xylene	42.25	1.0	50	0	84.5	78 - 122				
sec-Butylbenzene	40.11	1.0	50	0	80.2	77 - 126				
Styrene	41.69	1.0	50	0	83.4	78 - 128				
tert-Butylbenzene	39.61	1.0	50	0	79.2	78 - 124				
Tetrachloroethene	45.99	1.0	50	0	92.0	74 - 129				
Toluene	41.1	1.0	50	0	82.2	80 - 121				
trans-1,2-Dichloroethene	45.27	1.0	50	0	90.5	75 - 124				
trans-1,3-Dichloropropene	45.76	1.0	50	0	91.5	73 - 127				
Trichloroethene	47.78	1.0	50	0	95.6	79 - 123				
Trichlorofluoromethane	44.84	1.0	50	0	89.7	65 - 141				
Vinyl chloride	42.85	1.0	50	0	85.7	58 - 137				
Surr: 1,2-Dichloroethane-d4	*43.54*	*1.0*	*50*	*0*	*87.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.42*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*40.9*	*1.0*	*50*	*0*	*81.8*	*80 - 119*				
Surr: Toluene-d8	*51.22*	*1.0*	*50*	*0*	*102*	*89 - 112*				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030472-01MSD** Units: **ug/L** Analysis Date: **16-Mar-2018 16:23**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477682** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	42.17	1.0	50	0	84.3	78 - 124	43.46	3.01	20	
1,1,1-Trichloroethane	45.35	1.0	50	0	90.7	74 - 131	46.73	3	20	
1,1,2,2-Tetrachloroethane	38.19	1.0	50	0	76.4	71 - 121	37.92	0.693	20	
1,1,2-Trichloroethane	40.18	1.0	50	0	80.4	80 - 119	40.81	1.54	20	
1,1-Dichloroethane	41.98	1.0	50	0	84.0	77 - 125	43.79	4.24	20	
1,1-Dichloroethene	53.29	1.0	50	9.032	88.5	71 - 131	54.72	2.66	20	
1,1-Dichloropropene	47.67	1.0	50	0	95.3	79 - 125	46.9	1.65	20	
1,2,3-Trichlorobenzene	42.96	1.0	50	0	85.9	69 - 129	40.65	5.53	20	
1,2,3-Trichloropropane	39.21	1.0	50	0	78.4	73 - 122	38.96	0.64	20	
1,2,4-Trichlorobenzene	42.1	1.0	50	0	84.2	69 - 130	41.37	1.75	20	
1,2,4-Trimethylbenzene	43.66	1.0	50	0	87.3	76 - 124	43.59	0.145	20	
1,2-Dibromo-3-chloropropane	41.84	1.0	50	0	83.7	62 - 128	41.62	0.532	20	
1,2-Dibromoethane	43.28	1.0	50	0	86.6	77 - 121	43.82	1.25	20	
1,2-Dichlorobenzene	38.46	1.0	50	0	76.9	80 - 119	38.26	0.517	20	S
1,2-Dichloroethane	43.96	1.0	50	1.942	84.0	73 - 128	43.58	0.862	20	
1,2-Dichloropropane	41.54	1.0	50	0	83.1	78 - 122	41.62	0.195	20	
1,3,5-Trimethylbenzene	44.52	1.0	50	0	89.0	75 - 124	44.04	1.08	20	
1,3-Dichlorobenzene	39.26	1.0	50	0	78.5	80 - 119	38.47	2.02	20	S
1,3-Dichloropropane	39.37	1.0	50	0	78.7	80 - 119	40.21	2.1	20	S
1,4-Dichlorobenzene	37.91	1.0	50	0	75.8	79 - 118	37.29	1.64	20	S
2,2-Dichloropropane	43.11	1.0	50	0	86.2	60 - 139	44.91	4.07	20	
2-Butanone	90.7	2.0	100	0	90.7	56 - 143	92.32	1.77	20	
2-Chlorotoluene	42.31	1.0	50	0	84.6	79 - 122	42.52	0.499	20	
2-Hexanone	93.02	2.0	100	0	93.0	57 - 139	92.7	0.341	20	
4-Chlorotoluene	42.73	1.0	50	0	85.5	78 - 122	42.99	0.61	20	
4-Isopropyltoluene	38.76	1.0	50	0	77.5	77 - 127	38.85	0.239	20	
4-Methyl-2-pentanone	86.29	2.0	100	0	86.3	67 - 130	85.96	0.383	20	
Acetone	86.03	2.0	100	0	86.0	39 - 160	85.8	0.266	20	
Benzene	41.78	1.0	50	0	83.6	79 - 120	42.79	2.38	20	
Bromobenzene	38.2	1.0	50	0	76.4	80 - 120	37.85	0.933	20	S
Bromochloromethane	43.77	1.0	50	0	87.5	78 - 123	46.43	5.9	20	
Bromodichloromethane	43.81	1.0	50	0	87.6	79 - 125	44.5	1.56	20	
Bromoform	46.58	1.0	50	0	93.2	66 - 130	47.64	2.25	20	
Bromomethane	41.19	1.0	50	0	82.4	53 - 141	36.6	11.8	20	

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312659 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030472-01MSD** Units: **ug/L** Analysis Date: **16-Mar-2018 16:23**
Client ID: Run ID: **VOA2_312659** SeqNo: **4477682** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	86.07	2.0	100	0	86.1	64 - 133	89.2	3.57	20	
Carbon tetrachloride	45.56	1.0	50	0	91.1	72 - 136	49.42	8.15	20	
Chlorobenzene	41.06	1.0	50	0	82.1	80 - 120	41.46	0.982	20	
Chloroethane	48	1.0	50	0	96.0	82 - 118	43.86	9	20	
Chloroform	39.68	1.0	50	0	79.4	79 - 124	41.06	3.41	20	
Chloromethane	37.43	1.0	50	0	74.9	50 - 139	40.5	7.89	20	
cis-1,2-Dichloroethene	42.71	1.0	50	0	85.4	78 - 123	44.07	3.13	20	
cis-1,3-Dichloropropene	44.11	1.0	50	0	88.2	75 - 124	44.61	1.13	20	
Dibromochloromethane	43.16	1.0	50	0	86.3	74 - 126	44.38	2.77	20	
Dibromomethane	45.18	1.0	50	0	90.4	79 - 123	45.52	0.759	20	
Dichlorodifluoromethane	36.78	1.0	50	0	73.6	32 - 152	38.78	5.31	20	
Ethylbenzene	47	1.0	50	0	94.0	79 - 121	47.94	1.97	20	
Hexachlorobutadiene	37.98	1.0	50	0	76.0	66 - 134	37.33	1.7	20	
Isopropylbenzene	42.71	1.0	50	0	85.4	72 - 131	43.96	2.9	20	
m,p-Xylene	82.12	2.0	100	0	82.1	80 - 121	84.19	2.49	20	
Methylene chloride	36.93	2.0	50	0	73.9	74 - 124	38.21	3.43	20	S
Naphthalene	47.08	1.0	50	0	94.2	61 - 128	44.6	5.41	20	
n-Butylbenzene	39.64	1.0	50	0	79.3	75 - 128	39.59	0.13	20	
n-Propylbenzene	38.91	1.0	50	0	77.8	76 - 126	38.87	0.0939	20	
o-Xylene	41.56	1.0	50	0	83.1	78 - 122	42.25	1.66	20	
sec-Butylbenzene	40.38	1.0	50	0	80.8	77 - 126	40.11	0.659	20	
Styrene	41.18	1.0	50	0	82.4	78 - 128	41.69	1.22	20	
tert-Butylbenzene	39.92	1.0	50	0	79.8	78 - 124	39.61	0.788	20	
Tetrachloroethene	44.23	1.0	50	0	88.5	74 - 129	45.99	3.9	20	
Toluene	39.9	1.0	50	0	79.8	80 - 121	41.1	2.96	20	S
trans-1,2-Dichloroethene	43.82	1.0	50	0	87.6	75 - 124	45.27	3.24	20	
trans-1,3-Dichloropropene	45.71	1.0	50	0	91.4	73 - 127	45.76	0.0971	20	
Trichloroethene	46.64	1.0	50	0	93.3	79 - 123	47.78	2.42	20	
Trichlorofluoromethane	44.64	1.0	50	0	89.3	65 - 141	44.84	0.443	20	
Vinyl chloride	40.98	1.0	50	0	82.0	58 - 137	42.85	4.45	20	
Surr: 1,2-Dichloroethane-d4	*43.11*	*1.0*	*50*	*0*	*86.2*	*81 - 118*	*43.54*	*0.989*	*20*	
Surr: 4-Bromofluorobenzene	*49.75*	*1.0*	*50*	*0*	*99.5*	*85 - 114*	*50.42*	*1.34*	*20*	
Surr: Dibromofluoromethane	*41.21*	*1.0*	*50*	*0*	*82.4*	*80 - 119*	*40.9*	*0.765*	*20*	
Surr: Toluene-d8	*50.8*	*1.0*	*50*	*0*	*102*	*89 - 112*	*51.22*	*0.815*	*20*	

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

ALS Group Houston, Corp Date: 28-Mar-18

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder:	HS18030719

QC BATCH REPORT

Batch ID:	**R312659**	**Instrument:**	**VOA2**	**Method:**	**SW8260**

The following samples were analyzed in this batch: HS18030719-02

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180325** Units: **ug/L** Analysis Date: **26-Mar-2018 11:23**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489530** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180325** Units: **ug/L** Analysis Date: **26-Mar-2018 11:23**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489530** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*43.05*	*1.0*	*50*	*0*	*86.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.29*	*1.0*	*50*	*0*	*98.6*	*85 - 114*				
Surr: Dibromofluoromethane	*42.43*	*1.0*	*50*	*0*	*84.9*	*80 - 119*				
Surr: Toluene-d8	*53.13*	*1.0*	*50*	*0*	*106*	*89 - 112*				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180325** Units: **ug/L** Analysis Date: **26-Mar-2018 10:34**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	47.69	1.0	50	0	95.4	78 - 124				
1,1,1-Trichloroethane	48.75	1.0	50	0	97.5	74 - 131				
1,1,2,2-Tetrachloroethane	41.77	1.0	50	0	83.5	71 - 121				
1,1,2-Trichloroethane	44.24	1.0	50	0	88.5	80 - 119				
1,1-Dichloroethane	45.63	1.0	50	0	91.3	77 - 125				
1,1-Dichloroethene	47.45	1.0	50	0	94.9	71 - 131				
1,1-Dichloropropene	50.71	1.0	50	0	101	79 - 125				
1,2,3-Trichlorobenzene	47.1	1.0	50	0	94.2	69 - 129				
1,2,3-Trichloropropane	44.13	1.0	50	0	88.3	73 - 122				
1,2,4-Trichlorobenzene	48.08	1.0	50	0	96.2	69 - 130				
1,2,4-Trimethylbenzene	47	1.0	50	0	94.0	76 - 124				
1,2-Dibromo-3-chloropropane	46.2	1.0	50	0	92.4	62 - 128				
1,2-Dibromoethane	48.51	1.0	50	0	97.0	77 - 121				
1,2-Dichlorobenzene	42.19	1.0	50	0	84.4	80 - 119				
1,2-Dichloroethane	48.4	1.0	50	0	96.8	73 - 128				
1,2-Dichloropropane	46.35	1.0	50	0	92.7	78 - 122				
1,3,5-Trimethylbenzene	47.1	1.0	50	0	94.2	75 - 124				
1,3-Dichlorobenzene	42.48	1.0	50	0	85.0	80 - 119				
1,3-Dichloropropane	44.32	1.0	50	0	88.6	80 - 119				
1,4-Dichlorobenzene	42.16	1.0	50	0	84.3	79 - 118				
2,2-Dichloropropane	48.32	1.0	50	0	96.6	60 - 139				
2-Butanone	105.3	2.0	100	0	105	56 - 143				
2-Chlorotoluene	46.64	1.0	50	0	93.3	79 - 122				
2-Hexanone	100.9	2.0	100	0	101	57 - 139				
4-Chlorotoluene	47.17	1.0	50	0	94.3	78 - 122				
4-Isopropyltoluene	41.12	1.0	50	0	82.2	77 - 127				
4-Methyl-2-pentanone	94.12	2.0	100	0	94.1	67 - 130				
Acetone	103.1	2.0	100	0	103	39 - 160				
Benzene	46.42	1.0	50	0	92.8	79 - 120				
Bromobenzene	41.35	1.0	50	0	82.7	80 - 120				
Bromochloromethane	51.3	1.0	50	0	103	78 - 123				
Bromodichloromethane	50.18	1.0	50	0	100	79 - 125				
Bromoform	52.04	1.0	50	0	104	66 - 130				
Bromomethane	47.61	1.0	50	0	95.2	53 - 141				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180325** Units: **ug/L** Analysis Date: **26-Mar-2018 10:34**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	90.72	2.0	100	0	90.7	64 - 133				
Carbon tetrachloride	46.55	1.0	50	0	93.1	72 - 136				
Chlorobenzene	44.64	1.0	50	0	89.3	80 - 120				
Chloroethane	48.5	1.0	50	0	97.0	82 - 118				
Chloroform	44.43	1.0	50	0	88.9	79 - 124				
Chloromethane	48.02	1.0	50	0	96.0	50 - 139				
cis-1,2-Dichloroethene	48.53	1.0	50	0	97.1	78 - 123				
cis-1,3-Dichloropropene	50.89	1.0	50	0	102	75 - 124				
Dibromochloromethane	49.31	1.0	50	0	98.6	74 - 126				
Dibromomethane	52.01	1.0	50	0	104	79 - 123				
Dichlorodifluoromethane	44.54	1.0	50	0	89.1	32 - 152				
Ethylbenzene	49.2	1.0	50	0	98.4	79 - 121				
Hexachlorobutadiene	42.96	1.0	50	0	85.9	66 - 134				
Isopropylbenzene	44.7	1.0	50	0	89.4	72 - 131				
m,p-Xylene	87.17	2.0	100	0	87.2	80 - 121				
Methylene chloride	42.86	2.0	50	0	85.7	74 - 124				
Naphthalene	51.21	1.0	50	0	102	61 - 128				
n-Butylbenzene	42.17	1.0	50	0	84.3	75 - 128				
n-Propylbenzene	40.69	1.0	50	0	81.4	76 - 126				
o-Xylene	44.02	1.0	50	0	88.0	78 - 122				
sec-Butylbenzene	42.09	1.0	50	0	84.2	77 - 126				
Styrene	45.17	1.0	50	0	90.3	78 - 128				
tert-Butylbenzene	40.64	1.0	50	0	81.3	78 - 124				
Tetrachloroethene	44.96	1.0	50	0	89.9	74 - 129				
Toluene	42.96	1.0	50	0	85.9	80 - 121				
trans-1,2-Dichloroethene	48.96	1.0	50	0	97.9	75 - 124				
trans-1,3-Dichloropropene	54.04	1.0	50	0	108	73 - 127				
Trichloroethene	49.98	1.0	50	0	100.0	79 - 123				
Trichlorofluoromethane	46.11	1.0	50	0	92.2	65 - 141				
Vinyl chloride	46.38	1.0	50	0	92.8	58 - 137				
Surr: 1,2-Dichloroethane-d4	*44.81*	*1.0*	*50*	*0*	*89.6*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.6*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*40.82*	*1.0*	*50*	*0*	*81.6*	*80 - 119*				
Surr: Toluene-d8	*50.39*	*1.0*	*50*	*0*	*101*	*89 - 112*				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030787-16MS** Units: **ug/L** Analysis Date: **26-Mar-2018 16:25**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489541** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	45.47	1.0	50	0	90.9	78 - 124				
1,1,1-Trichloroethane	50.97	1.0	50	0	102	74 - 131				
1,1,2,2-Tetrachloroethane	40.19	1.0	50	0	80.4	71 - 121				
1,1,2-Trichloroethane	43.32	1.0	50	0	86.6	80 - 119				
1,1-Dichloroethane	44.87	1.0	50	0	89.7	77 - 125				
1,1-Dichloroethene	47.53	1.0	50	0	95.1	71 - 131				
1,1-Dichloropropene	51.47	1.0	50	0	103	79 - 125				
1,2,3-Trichlorobenzene	45.16	1.0	50	0	90.3	69 - 129				
1,2,3-Trichloropropane	41.17	1.0	50	0	82.3	73 - 122				
1,2,4-Trichlorobenzene	45.4	1.0	50	0	90.8	69 - 130				
1,2,4-Trimethylbenzene	46.64	1.0	50	0	93.3	76 - 124				
1,2-Dibromo-3-chloropropane	42.94	1.0	50	0	85.9	62 - 128				
1,2-Dibromoethane	45.7	1.0	50	0	91.4	77 - 121				
1,2-Dichlorobenzene	40.69	1.0	50	0	81.4	80 - 119				
1,2-Dichloroethane	45.07	1.0	50	0	90.1	73 - 128				
1,2-Dichloropropane	44.47	1.0	50	0	88.9	78 - 122				
1,3,5-Trimethylbenzene	47.97	1.0	50	0	95.9	75 - 124				
1,3-Dichlorobenzene	41.68	1.0	50	0	83.4	80 - 119				
1,3-Dichloropropane	42.26	1.0	50	0	84.5	80 - 119				
1,4-Dichlorobenzene	40.84	1.0	50	0	81.7	79 - 118				
2,2-Dichloropropane	49.5	1.0	50	0	99.0	60 - 139				
2-Butanone	96.4	2.0	100	0	96.4	56 - 143				
2-Chlorotoluene	45.86	1.0	50	0	91.7	79 - 122				
2-Hexanone	96.06	2.0	100	0	96.1	57 - 139				
4-Chlorotoluene	46.76	1.0	50	0	93.5	78 - 122				
4-Isopropyltoluene	42.7	1.0	50	0	85.4	77 - 127				
4-Methyl-2-pentanone	91	2.0	100	0	91.0	67 - 130				
Acetone	94.67	2.0	100	0	94.7	39 - 160				
Benzene	45.2	1.0	50	0	90.4	79 - 120				
Bromobenzene	39.64	1.0	50	0	79.3	80 - 120				S
Bromochloromethane	48.94	1.0	50	0	97.9	78 - 123				
Bromodichloromethane	47.01	1.0	50	0	94.0	79 - 125				
Bromoform	49.32	1.0	50	0	98.6	66 - 130				
Bromomethane	48.41	1.0	50	0	96.8	53 - 141				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18030787-16MS** Units: **ug/L** Analysis Date: **26-Mar-2018 16:25**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489541** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	95.07	2.0	100	0	95.1	64 - 133				
Carbon tetrachloride	52.18	1.0	50	0	104	72 - 136				
Chlorobenzene	44.03	1.0	50	0	88.1	80 - 120				
Chloroethane	41.7	1.0	50	0	83.4	82 - 118				
Chloroform	43.87	1.0	50	0	87.7	79 - 124				
Chloromethane	48.08	1.0	50	0	96.2	50 - 139				
cis-1,2-Dichloroethene	46.6	1.0	50	0	93.2	78 - 123				
cis-1,3-Dichloropropene	48.51	1.0	50	0	97.0	75 - 124				
Dibromochloromethane	46.99	1.0	50	0	94.0	74 - 126				
Dibromomethane	48.94	1.0	50	0	97.9	79 - 123				
Dichlorodifluoromethane	51.51	1.0	50	0	103	32 - 152				
Ethylbenzene	50.59	1.0	50	0	101	79 - 121				
Hexachlorobutadiene	45.98	1.0	50	0	92.0	66 - 134				
Isopropylbenzene	47.36	1.0	50	0	94.7	72 - 131				
m,p-Xylene	89.46	2.0	100	0	89.5	80 - 121				
Methylene chloride	41.91	2.0	50	0	83.8	74 - 124				
Naphthalene	48.81	1.0	50	0	97.6	61 - 128				
n-Butylbenzene	45.12	1.0	50	0	90.2	75 - 128				
n-Propylbenzene	42.21	1.0	50	0	84.4	76 - 126				
o-Xylene	44.54	1.0	50	0	89.1	78 - 122				
sec-Butylbenzene	44.46	1.0	50	0	88.9	77 - 126				
Styrene	44.33	1.0	50	0	88.7	78 - 128				
tert-Butylbenzene	46.04	1.0	50	3.639	84.8	78 - 124				
Tetrachloroethene	50.5	1.0	50	3.274	94.5	74 - 129				
Toluene	43.32	1.0	50	0	86.6	80 - 121				
trans-1,2-Dichloroethene	49.93	1.0	50	0	99.9	75 - 124				
trans-1,3-Dichloropropene	49.9	1.0	50	0	99.8	73 - 127				
Trichloroethene	49.76	1.0	50	0	99.5	79 - 123				
Trichlorofluoromethane	51.36	1.0	50	0	103	65 - 141				
Vinyl chloride	49.62	1.0	50	0	99.2	58 - 137				
Surr: 1,2-Dichloroethane-d4	*44.84*	*1.0*	*50*	*0*	*89.7*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.8*	*1.0*	*50*	*0*	*102*	*85 - 114*				
Surr: Dibromofluoromethane	*41.04*	*1.0*	*50*	*0*	*82.1*	*80 - 119*				
Surr: Toluene-d8	*50.81*	*1.0*	*50*	*0*	*102*	*89 - 112*				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030787-16MSD** Units: **ug/L** Analysis Date: **26-Mar-2018 16:50**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489542** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.1	1.0	50	0	88.2	78 - 124	45.47	3.05	20	
1,1,1-Trichloroethane	49.38	1.0	50	0	98.8	74 - 131	50.97	3.16	20	
1,1,2,2-Tetrachloroethane	39.78	1.0	50	0	79.6	71 - 121	40.19	1.02	20	
1,1,2-Trichloroethane	41.84	1.0	50	0	83.7	80 - 119	43.32	3.49	20	
1,1-Dichloroethane	43.6	1.0	50	0	87.2	77 - 125	44.87	2.87	20	
1,1-Dichloroethene	48.57	1.0	50	0	97.1	71 - 131	47.53	2.18	20	
1,1-Dichloropropene	50.71	1.0	50	0	101	79 - 125	51.47	1.48	20	
1,2,3-Trichlorobenzene	46.31	1.0	50	0	92.6	69 - 129	45.16	2.52	20	
1,2,3-Trichloropropane	41.41	1.0	50	0	82.8	73 - 122	41.17	0.575	20	
1,2,4-Trichlorobenzene	45.17	1.0	50	0	90.3	69 - 130	45.4	0.512	20	
1,2,4-Trimethylbenzene	46.01	1.0	50	0	92.0	76 - 124	46.64	1.37	20	
1,2-Dibromo-3-chloropropane	43.38	1.0	50	0	86.8	62 - 128	42.94	1.04	20	
1,2-Dibromoethane	45.21	1.0	50	0	90.4	77 - 121	45.7	1.07	20	
1,2-Dichlorobenzene	40.26	1.0	50	0	80.5	80 - 119	40.69	1.07	20	
1,2-Dichloroethane	43.26	1.0	50	0	86.5	73 - 128	45.07	4.1	20	
1,2-Dichloropropane	42.79	1.0	50	0	85.6	78 - 122	44.47	3.85	20	
1,3,5-Trimethylbenzene	47.19	1.0	50	0	94.4	75 - 124	47.97	1.65	20	
1,3-Dichlorobenzene	41.06	1.0	50	0	82.1	80 - 119	41.68	1.5	20	
1,3-Dichloropropane	40.87	1.0	50	0	81.7	80 - 119	42.26	3.36	20	
1,4-Dichlorobenzene	40.45	1.0	50	0	80.9	79 - 118	40.84	0.955	20	
2,2-Dichloropropane	48.21	1.0	50	0	96.4	60 - 139	49.5	2.64	20	
2-Butanone	96.94	2.0	100	0	96.9	56 - 143	96.4	0.558	20	
2-Chlorotoluene	45.18	1.0	50	0	90.4	79 - 122	45.86	1.49	20	
2-Hexanone	99.76	2.0	100	0	99.8	57 - 139	96.06	3.78	20	
4-Chlorotoluene	45.95	1.0	50	0	91.9	78 - 122	46.76	1.75	20	
4-Isopropyltoluene	42.47	1.0	50	0	84.9	77 - 127	42.7	0.537	20	
4-Methyl-2-pentanone	90.18	2.0	100	0	90.2	67 - 130	91	0.907	20	
Acetone	92.94	2.0	100	0	92.9	39 - 160	94.67	1.84	20	
Benzene	44.57	1.0	50	0	89.1	79 - 120	45.2	1.41	20	
Bromobenzene	39.97	1.0	50	0	79.9	80 - 120	39.64	0.826	20	S
Bromochloromethane	46.99	1.0	50	0	94.0	78 - 123	48.94	4.06	20	
Bromodichloromethane	45.85	1.0	50	0	91.7	79 - 125	47.01	2.48	20	
Bromoform	47.76	1.0	50	0	95.5	66 - 130	49.32	3.21	20	
Bromomethane	44.82	1.0	50	0	89.6	53 - 141	48.41	7.7	20	

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R313157 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18030787-16MSD** Units: **ug/L** Analysis Date: **26-Mar-2018 16:50**
Client ID: Run ID: **VOA2_313157** SeqNo: **4489542** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	92.64	2.0	100	0	92.6	64 - 133	95.07	2.58	20	
Carbon tetrachloride	48.81	1.0	50	0	97.6	72 - 136	52.18	6.67	20	
Chlorobenzene	43.13	1.0	50	0	86.3	80 - 120	44.03	2.09	20	
Chloroethane	44.12	1.0	50	0	88.2	82 - 118	41.7	5.63	20	
Chloroform	42.62	1.0	50	0	85.2	79 - 124	43.87	2.91	20	
Chloromethane	44.58	1.0	50	0	89.2	50 - 139	48.08	7.55	20	
cis-1,2-Dichloroethene	44.95	1.0	50	0	89.9	78 - 123	46.6	3.61	20	
cis-1,3-Dichloropropene	47.55	1.0	50	0	95.1	75 - 124	48.51	2.01	20	
Dibromochloromethane	45.37	1.0	50	0	90.7	74 - 126	46.99	3.5	20	
Dibromomethane	48.47	1.0	50	0	96.9	79 - 123	48.94	0.947	20	
Dichlorodifluoromethane	50.04	1.0	50	0	100	32 - 152	51.51	2.89	20	
Ethylbenzene	49.46	1.0	50	0	98.9	79 - 121	50.59	2.26	20	
Hexachlorobutadiene	46.34	1.0	50	0	92.7	66 - 134	45.98	0.777	20	
Isopropylbenzene	46.09	1.0	50	0	92.2	72 - 131	47.36	2.71	20	
m,p-Xylene	86.19	2.0	100	0	86.2	80 - 121	89.46	3.73	20	
Methylene chloride	40.75	2.0	50	0	81.5	74 - 124	41.91	2.81	20	
Naphthalene	49.64	1.0	50	0	99.3	61 - 128	48.81	1.69	20	
n-Butylbenzene	44.61	1.0	50	0	89.2	75 - 128	45.12	1.12	20	
n-Propylbenzene	41.84	1.0	50	0	83.7	76 - 126	42.21	0.883	20	
o-Xylene	43	1.0	50	0	86.0	78 - 122	44.54	3.5	20	
sec-Butylbenzene	44.2	1.0	50	0	88.4	77 - 126	44.46	0.581	20	
Styrene	42.88	1.0	50	0	85.8	78 - 128	44.33	3.33	20	
tert-Butylbenzene	45.33	1.0	50	3.639	83.4	78 - 124	46.04	1.55	20	
Tetrachloroethene	47.72	1.0	50	3.274	88.9	74 - 129	50.5	5.67	20	
Toluene	42.06	1.0	50	0	84.1	80 - 121	43.32	2.97	20	
trans-1,2-Dichloroethene	47.66	1.0	50	0	95.3	75 - 124	49.93	4.67	20	
trans-1,3-Dichloropropene	48.71	1.0	50	0	97.4	73 - 127	49.9	2.42	20	
Trichloroethene	49.37	1.0	50	0	98.7	79 - 123	49.76	0.79	20	
Trichlorofluoromethane	48.36	1.0	50	0	96.7	65 - 141	51.36	6.03	20	
Vinyl chloride	47.82	1.0	50	0	95.6	58 - 137	49.62	3.71	20	
Surr: 1,2-Dichloroethane-d4	*44.08*	*1.0*	*50*	*0*	*88.2*	*81 - 118*	*44.84*	*1.71*	*20*	
Surr: 4-Bromofluorobenzene	*50.49*	*1.0*	*50*	*0*	*101*	*85 - 114*	*50.8*	*0.622*	*20*	
Surr: Dibromofluoromethane	*41.57*	*1.0*	*50*	*0*	*83.1*	*80 - 119*	*41.04*	*1.28*	*20*	
Surr: Toluene-d8	*50.51*	*1.0*	*50*	*0*	*101*	*89 - 112*	*50.81*	*0.587*	*20*	

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

ALS Group Houston, Corp Date: 28-Mar-18

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder:	HS18030719

QC BATCH REPORT

Batch ID:	**R313157**	**Instrument:**	**VOA2**	**Method:**	**SW8260**

The following samples were analyzed in this batch: HS18030719-01

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS18030719

QC BATCH REPORT

Batch ID: R312698 **Instrument: UV-2450** **Method: SW7196**

MBLK Sample ID: **MBLK-312698** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: Run ID: **UV-2450_312698** SeqNo: **4478380** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.00600	0.0100								U

LCS Sample ID: **LCS-312698** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: Run ID: **UV-2450_312698** SeqNo: **4478381** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.223	0.0100	0.25	0	89.2	80 - 120				

MS Sample ID: **HS18030722-01MS** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: Run ID: **UV-2450_312698** SeqNo: **4478383** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.258	0.0100	0.25	0.005	101	75 - 125				

MSD Sample ID: **HS18030722-01MSD** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: Run ID: **UV-2450_312698** SeqNo: **4478384** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.257	0.0100	0.25	0.005	101	75 - 125	0.258	0.388	20	

The following samples were analyzed in this batch: HS18030719-01

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: **HS18030719**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group Houston, Corp Date: 28-Mar-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Effluent Samples
Work Order: HS18030719

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18030719-01	LH18/24-SP650-031418	Login	3/15/2018 11:07:14 AM	JRM	Sub
HS18030719-01	LH18/24-SP650-031418	Login	3/15/2018 11:07:14 AM	JRM	EXT091
HS18030719-01	LH18/24-SP650-031418	Login	3/15/2018 11:07:14 AM	JRM	WET346
HS18030719-01	LH18/24-SP650-031418	Login	3/15/2018 11:07:14 AM	JRM	MET065
HS18030719-01	LH18/24-SP650-031418	Login	3/15/2018 11:07:14 AM	JRM	VOA088
HS18030719-02	Trip Blank	Login	3/15/2018 11:07:14 AM	JRM	VOA088

00883893

Date: 28-Mar-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Date/Time Received: **15-Mar-2018 09:00**
Work Order: HS18030719
Received by: **JRM**

Checklist completed by: *Jared R. Makan* eSignature — 15-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 21-Mar-2018 Date

Matrices: **Water**
Carrier name: **FedEx Priority Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.9c/1.3c UC/C	IR25	
Cooler(s)/Kit(s):	43672		
Date/Time sample(s) sent to storage:	03/15/2018 11:115		
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:

Corrective Action:

00883894

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd., Suite 210 Houston, TX 77099 (281) 530 – 5656 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No.
NWO1312.0150.0
16.0001

Job:
GROUNDWATER TREATMENT PLANT MONTHLY EFFLUENT SAMPLES

Prepared By:
Scott Beesinger

P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: VOLATILES	SILVER, SELENIUM, LEAD, BARIUM	HEXAVALENT CHROMIUM	1, 4 - DIOXANE	PERCHLORATE						Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_031418	Water	03/14/18 / 14:00		3	X										HCL	
LH18/24-SP650_031418	Water	03/14/18 / 14:00		3			X	X	X						NONE	
LH18/24-SP650_031418	Water	03/14/18 / 14:00		1		X									HNO3	
Trip Blank	Water	03/14/18		2	X										HCL	

Additional Remarks: **STANDARD TURN AROUND TIME**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/14/18	14:30									

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
JM	3/15/18	09:00							

Remarks: Cooler 40672
Temp 1.9
MS CF-0.6

HS18030719

Bhate Environmental Associates, Inc.
nghorn GW Treatment Plant Monthly Effluent Sample



(Word) S:\Forms\Chain of Custody - BiWeekly

00883895

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

43672

CUSTODY SEAL

Date: 3/14/18 Time: 1430
Name: Scott Beissinger
Company: BHAM

Seal Broken By: YM
Date: 03/15/18

43672 MAR 15 2018

10 CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

43672

REF: ADDITIONAL COOLERS/TRIP/TEMP - RJ
RMA:

FedEx Express

FedEx
TRK# 0221 7376 9752 7532

THU - 15 MAR 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH

FTD 162786 14MAR18 GGGA 546C1/0715/0C0A

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1806818; 1807005; 1807616; 1807619; 1807622

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2063 (210594)

General Set Information: There were ten field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 591546) was less than 1/2 the CRDL. The recovery for the LCS (591547) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1806818001 (Client ID: HBW7_030618). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544). These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 19MARD02/03/13/19.

Thomas Bosch March 22, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: March 22, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1807622**
Project ID: HS18030719 031418
Purchase Order: HS18030719
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_031418	1807622001	03/14/18	03/16/18	

ANALYTICAL REPORT

Workorder: 34-1807622
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_031418** | Sampling Site: NA | Collected: 03/14/2018
Lab ID: 1807622001 | Media: 125 mL Nalgene | Received: 03/16/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2063 (HBN: 210594) | **Percent Solid:** NA
Analyzed: 03/19/2018 12:15 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**130**	10	20	40	10	

Comments

Quality Control: **EPA 6850, DoD QSM - (HBN: 210594)**

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 03/21/2018 14:03	/S/ Stephen Brose 03/22/2018 14:04

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1807622
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1807622

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2063 (HBN: 210594)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 591546
Analyzed: 03/19/2018 09:08
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 591547
Analyzed: 03/19/2018 09:23
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.26	5.00	105	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1806818001	**MS:** 591548	**MSD:** 591549
Analyzed: 03/19/2018 09:38	**Analyzed:** 03/19/2018 09:52	**Analyzed:** 03/19/2018 10:06
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	5.68	5	114	78.8	123.8	5.85	117	3	0.0	20.0

Continuing Calibration Verification

CCV: 591543	**CCV:** 591550
Analyzed: 03/19/2018 08:18	**Analyzed:** 03/19/2018 12:36
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	21.6	25.0	86.6	26.9	25.0	108

Interference Check Sample

ICSA: 591545
Analyzed: 03/19/2018 08:54
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0

Limit of Detection Verification

LODV: 591544	**LODV:** 591551
Analyzed: 03/19/2018 08:40	**Analyzed:** 03/19/2018 12:50
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0	1.12	1.00	112

Quality Control Sample Batch Report

Analysis Information

Workorder: 1807622

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2063 (HBN: 210594)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Comments

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
03/21/2018 14:03	03/22/2018 14:04

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
⬣ - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

00883903

18698/#2

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

1807622

contract Chain of Custody

COC ID: 8776

1807622

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18030719
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18030719-01**	**LH18/24-SP650-031418**	**Water**	**14 Mar 2018 14:00**
	SUB_Perch-6850			29 Mar 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: J. MAKWANI Date/Time: 3/15/18 18:00

Received By: [signature] Date/Time: 03/16/18 9:46

Cooler ID(s): Temperature(s):

00883904

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston — Project/Task/Site: 1807622

Date/Time of Receipt: 03-16-18 9:46 — Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8357	4 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Tamara Tassell (Signature) Tamara Tassell (Printed Name) 03-16-18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

00883905



ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 15MAR18
ACTWGT: 17.20 LB
CAD: 300130/CAFE3111
DIMS: 19x16x13 IN

BILL SENDER

TO PAUL POPE
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CTY UT 84123
(801) 266-7700
REF: HS18030719/2022 RJ

FedEx Express

TRK# 0201 7376 975 3262

FRI - 16 MAR 3:00P
STANDARD OVERNIGHT

AX BTFA

84123
UT-US SLC

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18030719	Split:	Workorder ID: 1807622	Level: ENV_LVL4
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly
Comments:			Preservatives: COOL

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	03/14/2018 14:00	LH18/24-SP650_031418	1807622001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	03/16/2018 09:46	ALS Sample Receiving	Sample Login
Julie Warath	3/16/18 1125	SB	Storage
R.33.1	3.18.18/10:30	T. Bezek	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00883906

Batch Worklist

Batch: ELMS/ 2063 **Created:** 3/19/2018 08:07 **Instrument:** **HBN:** 210594

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1806818 [ENV_LVL4]
Workorder: 1807005 [ENV_LVL4]
Workorder: 1807616 [ENV_LVL4]
Workorder: 1807619 [ENV_LVL4]
Workorder: 1807622 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	591543	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
2	591544	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	
3	591545	ICS for HBN 210594 [ELMS/2063]				ICS	3		E6850..D3Q	5311		3/22/2018	
4	591546	LMB for HBN 210594 [ELMS/2063]				LMB	3		E6850Q413Q	5311		3/22/2018	
5	591547	LCS for HBN 210594 [ELMS/2063]				LCS	3		E6850Q413Q	5311		3/22/2018	
6	1806818001	HBW7_030618				SAMPLE	3	1806818001-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
7	591548	HBW7_030618(1806818001MS)				MS	3		E6850Q413Q	5311		3/22/2018	
8	591549	HBW7_030618(1806818001MSD)				MSD	3		E6850Q413Q	5311		3/22/2018	
9	1806818002	HBW7_030618_a				SAMPLE	3	1806818002-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
10	1806818003	HBW10_030618				SAMPLE	3	1806818003-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
11	1806818004	HBW1_030618				SAMPLE	3	1806818004-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
12	1806818005	GPW1_030618				SAMPLE	3	1806818005-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
13	1806818006	GPW3_030618				SAMPLE	3	1806818006-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
14	1807005001	LH18/24-SP650_030718				SAMPLE	3	1807005001-A	E6850Q41.3	5480	4/4/2018	3/22/2018	
15	1807616001	LH18/24-SP650_031418				SAMPLE	3	1807616001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
16	1807619001	LH18/24-SP140_031418				SAMPLE	3	1807619001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
17	1807622001	LH18/24-SP650_031418				SAMPLE	3	1807622001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
18	591550	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
19	591551	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	

00883907



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1806818 (001-06); 1807005 (001); 1807916 (001); 1807619 (001); 1807622 (001) ELMS Batch/HBN ID: 2063 (210594)
Prep Date: 03/19/2018 Analysis Date: 03/19/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAR\19MAR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 591547; Target = 5.0µg/L. ASTM type II water was used for LMB 591546.

MS/MSD: MS/MSD was performed on sample 1806818001 (Client ID: HBW7_030618). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L. Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters. The ion ratio of m/z 83 to 85 may fail at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafile 19MARD02/03/13/19.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\210594-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 36735
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 WRK

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:	Lab Lot: LAB 109	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK	Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748	Created By: T. Bosch	Amount: 100 mL
MFG: Ultra Scientific	Create Date: 5/11/2017	Expires: 3/31/2020
MFG Lot: CP-0860	Lab Lot: CLO4 QC STOCK	Usable: Yes
Part ID: ICC-013		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK — **Description - Perchlorate ISTD Wrk 1,000ug/L**

Standard: 38780
MFG: ALS/SLC
MFG Lot: TNB: 10/09/17
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 10/09/2017 01:10PM
Verified By: Thomas Bosch
Verify Date:

Amount: 10 mL
Expires: 10/09/2018
Usable: Yes
Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

00883922

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORGANO-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 23, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18030720**

Laboratory Results for: **Longhorn GW Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Mar 15, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: DAYNA.FISHER
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order: HS18030720

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18030720-01	LH18/24-SP650_031418	Water		14-Mar-2018 14:00	15-Mar-2018 09:00	☐

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order:

CASE NARRATIVE

Work Order Comments

- The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

WetChemistry by Method E415.1

Batch ID: R312878

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E350.3

Batch ID: R312824

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: R312752

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp

Date: 23-Mar-18

ANALYTICAL REPORT

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Sample ID: LH18/24-SP650_031418
Collection Date: 14-Mar-2018 14:00

WorkOrder:HS18030720
Lab ID:HS18030720-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: SAP
Nitrogen, Ammonia (As N)	**16**		**0.20**	**0.10**	**0.20**	**mg/L**	1	21-Mar-2018 08:45
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**2.37**		**0.100**	**0.250**	**0.250**	**mg/L**	10	16-Mar-2018 12:35
TOTAL ORGANIC CARBON BY E415.1		**Method:E415.1**						Analyst: KMU
Organic Carbon, Total	**24.3**		**1.00**	**1.00**	**2.00**	**mg/L**	2	20-Mar-2018 23:32
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	22-Mar-2018 18:50

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030720

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R312752	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS18030720-01	LH18/24-SP650_031418	14 Mar 2018 14:00			16 Mar 2018 12:35	10
Batch ID R312824	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS18030720-01	LH18/24-SP650_031418	14 Mar 2018 14:00			21 Mar 2018 08:45	1
Batch ID R312878	**Test Name :** TOTAL ORGANIC CARBON BY E415.1			**Matrix:** Water		
HS18030720-01	LH18/24-SP650_031418	14 Mar 2018 14:00			20 Mar 2018 23:32	2
Batch ID R312987	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18030720-01	LH18/24-SP650_031418	14 Mar 2018 14:00			22 Mar 2018 18:50	1

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030720

QC BATCH REPORT

Batch ID: R312752 **Instrument: UV-2450** **Method: E365.3**

MBLK Sample ID: **MBLK-312752** Units: **mg/L** Analysis Date: **16-Mar-2018 12:35**
Client ID: Run ID: **UV-2450_312752** SeqNo: **4479614** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250								U

LCS Sample ID: **LCS-312752** Units: **mg/L** Analysis Date: **16-Mar-2018 12:35**
Client ID: Run ID: **UV-2450_312752** SeqNo: **4479615** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.23	0.0250	0.25	0	92.0	85 - 115				

MS Sample ID: **HS18030720-01MS** Units: **mg/L** Analysis Date: **16-Mar-2018 12:35**
Client ID: **LH18/24-SP650_031418** Run ID: **UV-2450_312752** SeqNo: **4479617** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	4.55	0.250	2.5	2.37	87.2	80 - 120				

MSD Sample ID: **HS18030720-01MSD** Units: **mg/L** Analysis Date: **16-Mar-2018 12:35**
Client ID: **LH18/24-SP650_031418** Run ID: **UV-2450_312752** SeqNo: **4479618** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	4.61	0.250	2.5	2.37	89.6	80 - 120	4.55	1.31	20	

The following samples were analyzed in this batch: HS18030720-01

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030720

QC BATCH REPORT

Batch ID: R312824 **Instrument: WetChem_HS** **Method: E350.3**

MBLK Sample ID: **MBLK-R312824** Units: **mg/L** Analysis Date: **21-Mar-2018 08:45**
Client ID: Run ID: **WetChem_HS_312824** SeqNo: **4481445** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.10	0.20								U

LCS Sample ID: **LCS-R312824** Units: **mg/L** Analysis Date: **21-Mar-2018 08:45**
Client ID: Run ID: **WetChem_HS_312824** SeqNo: **4481444** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.17	0.20	10	0	102	80 - 120				

MS Sample ID: **HS18030953-01MS** Units: **mg/L** Analysis Date: **21-Mar-2018 08:45**
Client ID: Run ID: **WetChem_HS_312824** SeqNo: **4481482** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	13.81	0.20	10	2.939	109	80 - 120				

MSD Sample ID: **HS18030953-01MSD** Units: **mg/L** Analysis Date: **21-Mar-2018 08:45**
Client ID: Run ID: **WetChem_HS_312824** SeqNo: **4481483** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	13.61	0.20	10	2.939	107	80 - 120	13.81	1.46	20	

The following samples were analyzed in this batch: HS18030720-01

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18030720

QC BATCH REPORT

Batch ID: R312878 **Instrument: TOC_02** **Method: E415.1**

MBLK Sample ID: **WBLKW1-032018** Units: **mg/L** Analysis Date: **20-Mar-2018 19:47**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482712** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	0.500	1.00								U

LCS Sample ID: **WLCSW1-032018** Units: **mg/L** Analysis Date: **20-Mar-2018 20:03**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482713** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.15	1.00	10	0	102	80 - 120				

LCSD Sample ID: **WLCSDW1-032018** Units: **mg/L** Analysis Date: **20-Mar-2018 20:18**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482714** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.34	1.00	10	0	103	80 - 120	10.15	1.85	20	

MS Sample ID: **HS18030472-05MS** Units: **mg/L** Analysis Date: **20-Mar-2018 23:17**
Client ID: Run ID: **TOC_02_312878** SeqNo: **4482726** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.7	1.00	10	1.447	92.5	80 - 120				

The following samples were analyzed in this batch: HS18030720-01

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

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: **HS18030720**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group Houston, Corp Date: 23-Mar-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	17-027-0	27-Mar-2018
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

ALS Group Houston, Corp Date: 23-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order: HS18030720

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18030720-01	LH18/24-SP650_031418	Login	3/15/2018 11:17:39 AM	JRM	Sub
HS18030720-01	LH18/24-SP650_031418	Login	3/15/2018 11:17:39 AM	JRM	WET261
HS18030720-01	LH18/24-SP650_031418	Login	3/15/2018 11:17:39 AM	JRM	WET261
HS18030720-01	LH18/24-SP650_031418	Login	3/15/2018 11:17:39 AM	JRM	WET261

00883935

Date: 23-Mar-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Date/Time Received: **15-Mar-2018 09:00**
Work Order: HS18030720
Received by: **JRM**

Checklist completed by: *Jared R. Makan* eSignature — 15-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 21-Mar-2018 Date

Matrices: **Water**
Carrier name: **FedEx Priority Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.9c/1.3c UC/C	IR25	
Cooler(s)/Kit(s):	43672		
Date/Time sample(s) sent to storage:	03/15/2018 11:25		
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:

Corrective Action:

00883936

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONJA WEST

Project: BHATE LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS	Project No. NWO1312.0150.0 16.0001
Job: **GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES**	
Prepared By: Scott Beesinger	P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: AMMONIA-N	TOTAL ORGANIC CARBON	ORTHO-PHOSPHATE	PERCHLORATE							Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_031418	Water	03/14/18 / 14:00		2	X	X									H2SO4	
LH18/24-SP650_031418	Water	03/14/18 / 14:00		2			X	X							NONE	

Additional Remarks: **Standard TAT on all parameters**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/14/18	14:30									

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
JM	3/15/18	09:00							

Remarks: Cooler 43672
Temp 1.9
IR25 CF-0.5

HS18030720

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant Weekly Samples



00883937

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

43672

CUSTODY SEAL

Date: 5/14/18 Time: 1430
Name: Scott Bessonger
Company: BHATZ

Seal Broken By: SM
Date: 03/15/18

43672 MAR 15 2018

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

43672

REF: ADDITIONAL COOLERS/TRIP/TEMP - RJ

RMA:

FedEx Express

FedEx
TRK# 0221 7376 9752 7532

THU - 15 MAR 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH

FID 162785 14MAR18 GGGA 546C1/0/F5/0C0A

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1806818; 1807005; 1807616; 1807619; 1807622

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2063 (210594)

General Set Information: There were ten field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 591546) was less than 1/2 the CRDL. The recovery for the LCS (591547) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1806818001 (Client ID: HBW7_030618). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544). These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 19MARD02/03/13/19.

Thomas Bosch March 22, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: March 22, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1807616**
Project ID: HS18030720 031418
Purchase Order: HS18030720
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_031418	1807616001	03/14/18	03/16/18	

ANALYTICAL REPORT

Workorder: 34-1807616
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_031418**	Sampling Site: NA	Collected: 03/14/2018
Lab ID: 1807616001	Media: 125 mL Nalgene	Received: 03/16/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2063 (HBN: 210594)	**Percent Solid:** NA
	Analyzed: 03/19/2018 11:46	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**130**	10	20	40	10	

Comments

Quality Control: **EPA 6850, DoD QSM - (HBN: 210594)**

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 03/21/2018 14:03	/S/ Stephen Brose 03/22/2018 14:04

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1807616
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1807616

Limits:	Client SOW/Contract Specified	**Preparation:**	NA
Basis:	DoD QSM	**Batch:**	NA
		Prepared By:	NA
Analysis:	EPA 6850		
Batch:	ELMS/2063 (HBN: 210594)		
Analyzed By:	Thomas Bosch		

Blank

LMB: 591546
Analyzed: 03/19/2018 09:08
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 591547
Analyzed: 03/19/2018 09:23
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.26	5.00	105	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1806818001	**MS:** 591548	**MSD:** 591549
Analyzed: 03/19/2018 09:38	**Analyzed:** 03/19/2018 09:52	**Analyzed:** 03/19/2018 10:06
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	5.68	5	114	78.8	123.8	5.85	117	3	0.0	20.0

Continuing Calibration Verification

CCV: 591543	**CCV:** 591550
Analyzed: 03/19/2018 08:18	**Analyzed:** 03/19/2018 12:36
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	21.6	25.0	86.6	26.9	25.0	108

Interference Check Sample

ICSA: 591545
Analyzed: 03/19/2018 08:54
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0

Limit of Detection Verification

LODV: 591544	**LODV:** 591551
Analyzed: 03/19/2018 08:40	**Analyzed:** 03/19/2018 12:50
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0	1.12	1.00	112

Quality Control Sample Batch Report

Analysis Information

Workorder: 1807616

Limits:	Client SOW/Contract Specified	**Preparation:**	NA
Basis:	DoD QSM	**Batch:**	NA
		Prepared By:	NA
Analysis:	EPA 6850		
Batch:	ELMS/2063 (HBN: 210594)		
Analyzed By:	Thomas Bosch		

Comments

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
03/21/2018 14:03	03/22/2018 14:04

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- ◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
- ⬣ - Result is above the calibration range
- # - The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

00883945

18698 #2

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

1807616

Subcontract Chain of Custody

COC ID: 8777

1807616

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18030720
TSR:	Danielle Winnings

	LAB SAMPLE ID / ANALYSIS REQUESTED	CLIENT SAMPLE ID	MATRIX	COLLECT DATE / DUE DATE
1.	**HS18030720-01**	**LH18/24-SP650_031418**	**Water**	**14 Mar 2018 14:00**
	SUB_Perch-6850			29 Mar 2018

Comments: Please analyze for the analysis listed above. Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: J. Millward Date/Time: 3/15/18 18:20

Received By: [signature] Date/Time: 03-16-18 9:46

Cooler ID(s): Temperature(s):

00883946

ALS-Salt Lake City-Related Information Report (CRIR)

Cooler or Container Information Checklist (Fill In or Circle)

Client Name: ALS Houston — Project/Task/Site: 1807614

Date/Time of Receipt: 8-16-18 9:46 — Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA		
	Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA		
	Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA	VOA Headspace Present?	Yes/No/NA
	Frozen/Melted/NA		

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8357	4 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Tom Tassell (Signature) Tom Tassell (Printed Name) 8-16-18 (Date)

Client-Related Information

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

Briefly Describe the Problem and the Action Taken:

Client Notified? YES ☐ NO ☐

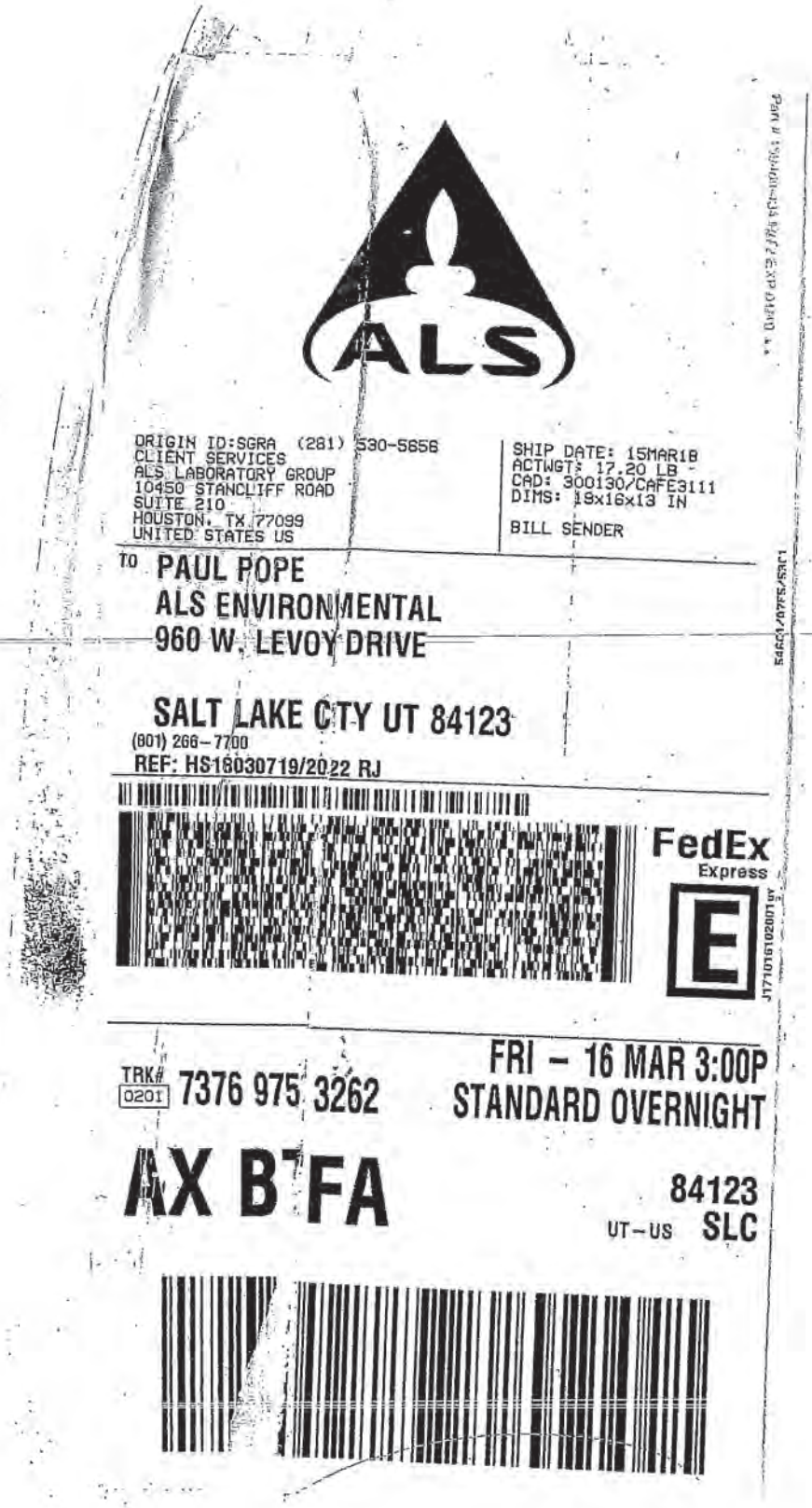
Response Required Within 24 Hours

Project Management

Project Manager Comments:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

00883947



ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 15MAR18
ACTWGT: 17.20 LB
CAD: 300130/CAFE3111
DIMS: 18x16x13 IN

BILL SENDER

TO PAUL POPE
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CTY UT 84123
(801) 266-7700
REF: HS18030719/2022 RJ

FedEx Express

TRK# 0201 7376 975 3262

FRI - 16 MAR 3:00P
STANDARD OVERNIGHT

AX B FA

84123
UT-US SLC

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18030720	Split:	Workorder ID: 1807616	Level: ENV_LVL4
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly
Comments:			Preservatives

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	03/14/2018 14:00	LH18/24-SP650_031418	1807616001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	03/16/2018 09:46	ALS Sample Receiving	Sample Login
Julie Warath	3/16/18 1120	SB	storage
R.33.1	3.18.18/10.30	T. Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

Fri, 03/16/18 11:15 AM

ALSCOCV3.1

00883948

Batch Worklist

Batch: ELMS/ 2063 **Created:** 3/19/2018 08:07 **Instrument:** **HBN:** 210594

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1806818 [ENV_LVL4]
Workorder: 1807005 [ENV_LVL4]
Workorder: 1807616 [ENV_LVL4]
Workorder: 1807619 [ENV_LVL4]
Workorder: 1807622 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	591543	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
2	591544	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	
3	591545	ICS for HBN 210594 [ELMS/2063]				ICS	3		E6850..D3Q	5311		3/22/2018	
4	591546	LMB for HBN 210594 [ELMS/2063]				LMB	3		E6850Q413Q	5311		3/22/2018	
5	591547	LCS for HBN 210594 [ELMS/2063]				LCS	3		E6850Q413Q	5311		3/22/2018	
6	1806818001	HBW7_030618				SAMPLE	3	1806818001-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
7	591548	HBW7_030618(1806818001MS)				MS	3		E6850Q413Q	5311		3/22/2018	
8	591549	HBW7_030618(1806818001MSD)				MSD	3		E6850Q413Q	5311		3/22/2018	
9	1806818002	HBW7_030618_a				SAMPLE	3	1806818002-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
10	1806818003	HBW10_030618				SAMPLE	3	1806818003-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
11	1806818004	HBW1_030618				SAMPLE	3	1806818004-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
12	1806818005	GPW1_030618				SAMPLE	3	1806818005-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
13	1806818006	GPW3_030618				SAMPLE	3	1806818006-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
14	1807005001	LH18/24-SP650_030718				SAMPLE	3	1807005001-A	E6850Q41.3	5480	4/4/2018	3/22/2018	
15	1807616001	LH18/24-SP650_031418				SAMPLE	3	1807616001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
16	1807619001	LH18/24-SP140_031418				SAMPLE	3	1807619001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
17	1807622001	LH18/24-SP650_031418				SAMPLE	3	1807622001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
18	591550	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
19	591551	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	

00883949



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1806818 (001-06); 1807005 (001); 1807916 (001); 1807619 (001); 1807622 (001) ELMS Batch/HBN ID: 2063 (210594)
Prep Date: 03/19/2018 Analysis Date: 03/19/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAR\19MAR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 591547; Target = 5.0µg/L. ASTM type II water was used for LMB 591546.

MS/MSD: MS/MSD was performed on sample 1806818001 (Client ID: HBW7_030618). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L. Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters. The ion ratio of m/z 83 to 85 may fail at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafile 19MARD02/03/13/19.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\210594-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 36735
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 WRK

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:	Lab Lot: LAB 109	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK	Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: T. Bosch
Create Date: 5/11/2017
Lab Lot: CLO4 QC STOCK

Amount: 100 mL
Expires: 3/31/2020
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK — **Description - Perchlorate ISTD Wrk 1,000ug/L**

Standard: 38780
MFG: ALS/SLC
MFG Lot: TNB: 10/09/17
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 10/09/2017 01:10PM
Verified By: Thomas Bosch
Verify Date:

Amount: 10 mL
Expires: 10/09/2018
Usable: Yes
Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

TRIPLE ISO CERTIFICATION · ISO 9001 · ISO GUIDE 34 · ISO 17025 · ULTRA

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORGANO-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 28, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18030722**

Laboratory Results for: **Longhorn GW Treatment Plant Monthly Influent Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Mar 15, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: DAYNA.FISHER
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
Work Order: HS18030722

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18030722-01	LH18/24-SP140_031418	Water		14-Mar-2018 14:00	15-Mar-2018 09:00	☐

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: Longhorn GW Treatment Plant Monthly Influent Samples
Work Order:

Work Order Comments

• The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

Metals by Method SW6020

Batch ID: 126546

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW7196

Batch ID: R312698

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.

ANALYTICAL REPORT

Project: Longhorn GW Treatment Plant Monthly Influent Samples WorkOrder:HS18030722

Sample ID: LH18/24-SP140_031418 Lab ID:HS18030722-01

Collection Date: 14-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**				Prep:SW3010A / 23-Mar-2018		Analyst: JCJ
Selenium	0.00200	U	0.00110	0.00200	0.00200	mg/L	1	27-Mar-2018 14:06
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	27-Mar-2018 14:06
HEXAVALENT CHROMIUM BY SW7196A		**Method:SW7196**				Prep:SW7196		Analyst: JHD
Chromium, Hexavalent	0.00600	U	0.00600	0.00600	0.0100	mg/L	1	15-Mar-2018 13:45
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	22-Mar-2018 18:50

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

ALS Group Houston, Corp

Date: 28-Mar-18

WEIGHT LOG

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
WorkOrder: HS18030722

Batch ID: 126546 **Method:** ICP-MS METALS BY SW6020A **Prep:** 3010A

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18030722-01	1	10	10 (mL)	1

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
WorkOrder: HS18030722

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 126546	**Test Name :** ICP-MS METALS BY SW6020A			**Matrix:** Water		
HS18030722-01	LH18/24-SP140_031418	14 Mar 2018 14:00		23 Mar 2018 11:00	27 Mar 2018 14:06	1
Batch ID R312698	**Test Name :** HEXAVALENT CHROMIUM BY SW7196A			**Matrix:** Water		
HS18030722-01	LH18/24-SP140_031418	14 Mar 2018 14:00			15 Mar 2018 13:45	1
Batch ID R312987	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18030722-01	LH18/24-SP140_031418	14 Mar 2018 14:00			22 Mar 2018 18:50	1

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
WorkOrder: HS18030722

QC BATCH REPORT

Batch ID: 126546 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-126546** Units: **mg/L** Analysis Date: **27-Mar-2018 14:00**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490476** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.00200	0.00200								U
Silver	0.00100	0.00200								U

LCS Sample ID: **LCS-126546** Units: **mg/L** Analysis Date: **27-Mar-2018 14:02**
Client ID: Run ID: **ICPMS04_313164** SeqNo: **4490477** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.04524	0.00200	0.05	0	90.5	80 - 120				
Silver	0.04568	0.00200	0.05	0	91.4	80 - 120				

MS Sample ID: **HS18030722-01MS** Units: **mg/L** Analysis Date: **27-Mar-2018 14:11**
Client ID: **LH18/24-SP140_031418** Run ID: **ICPMS04_313164** SeqNo: **4490481** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.05099	0.00200	0.05	0.000448	101	80 - 120				
Silver	0.04324	0.00200	0.05	0.000025	86.4	80 - 120				

MSD Sample ID: **HS18030722-01MSD** Units: **mg/L** Analysis Date: **27-Mar-2018 14:13**
Client ID: **LH18/24-SP140_031418** Run ID: **ICPMS04_313164** SeqNo: **4490482** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.04542	0.00200	0.05	0.000448	89.9	80 - 120	0.05099	11.6	20	
Silver	0.042	0.00200	0.05	0.000025	83.9	80 - 120	0.04324	2.91	20	

PDS Sample ID: **HS18030722-01PDS** Units: **mg/L** Analysis Date: **27-Mar-2018 14:15**
Client ID: **LH18/24-SP140_031418** Run ID: **ICPMS04_313164** SeqNo: **4490483** PrepDate: **23-Mar-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.09789	0.00200	0.1	0.000448	97.4	75 - 125				
Silver	0.08465	0.00200	0.1	0.000025	84.6	75 - 125				

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
WorkOrder: HS18030722

QC BATCH REPORT

Batch ID: 126546 **Instrument: ICPMS04** **Method: SW6020**

SD Sample ID: **HS18030722-01SD** Units: **mg/L** Analysis Date: **27-Mar-2018 14:08**
Client ID: **LH18/24-SP140_031418** Run ID: **ICPMS04_313164** SeqNo: **4490480** PrepDate: **23-Mar-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Selenium	0.0100	0.0100					0.000448	0	10	U
Silver	0.00500	0.0100					0.000025	0	10	U

The following samples were analyzed in this batch: HS18030722-01

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
WorkOrder: HS18030722

QC BATCH REPORT

Batch ID: R312698 **Instrument: UV-2450** **Method: SW7196**

MBLK Sample ID: **MBLK-312698** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: Run ID: **UV-2450_312698** SeqNo: **4478380** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.00600	0.0100								U

LCS Sample ID: **LCS-312698** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: Run ID: **UV-2450_312698** SeqNo: **4478381** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.223	0.0100	0.25	0	89.2	80 - 120				

MS Sample ID: **HS18030722-01MS** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: **LH18/24-SP140_031418** Run ID: **UV-2450_312698** SeqNo: **4478383** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.258	0.0100	0.25	0.005	101	75 - 125				

MSD Sample ID: **HS18030722-01MSD** Units: **mg/L** Analysis Date: **15-Mar-2018 13:45**
Client ID: **LH18/24-SP140_031418** Run ID: **UV-2450_312698** SeqNo: **4478384** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.257	0.0100	0.25	0.005	101	75 - 125	0.258	0.388	20	

The following samples were analyzed in this batch: HS18030722-01

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

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
WorkOrder: **HS18030722**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group Houston, Corp Date: 28-Mar-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

ALS Group Houston, Corp Date: 28-Mar-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Monthly Influent Samples
Work Order: HS18030722

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18030722-01	LH18/24-SP140_031418	Login	3/15/2018 11:35:16 AM	JRM	Sub
HS18030722-01	LH18/24-SP140_031418	Login	3/15/2018 11:35:16 AM	JRM	WET346
HS18030722-01	LH18/24-SP140_031418	Login	3/15/2018 11:35:16 AM	JRM	MET065

00883978

Date: 28-Mar-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Date/Time Received: **15-Mar-2018 09:00**
Work Order: HS18030722
Received by: **JRM**

Checklist completed by: *Jared R. Makan* eSignature — 15-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 21-Mar-2018 Date

Matrices: **Water**
Carrier name: **FedEx Priority Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.9c/1.3c UC/C	IR25	
Cooler(s)/Kit(s):	43672		
Date/Time sample(s) sent to storage:	03/15/2018 11:40		
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:

Corrective Action:

00883979

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd., Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONIA WEST

Project: BHATE LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS	Project No. NWO1312.0150.0 16.0001
Job: **GROUNDWATER TREATMENT PLANT MONTHLY INFLUENT SAMPLES**	
Prepared By: Scott Beesinger	P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: SILVER & SELENIUM	HEXAVALENT CHROMIUM	PERCHLORATE							Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP140_031418	Water	03/14/18 / 14:00		1	X									HNO3	
LH18/24-SP140_031418	Water	03/14/18 / 14:00		2		X	X							NONE	

Additional Remarks: **STANDARD TURN AROUND TIME**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/14/18	14:30									

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
Jm	3/15/18	09:00							

Remarks: Cooler 45172
Temp 1.9
pH 2.5 CP-0.6

HS18030722

Bhate Environmental Associates. Inc.

nghorn GW Treatment Plant Monthly Influent Sample



(Word) S:\I-ces\Forms\Chain of Custody - BiWeekly

00883980

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

43672

CUSTODY SEAL

Date: 5/14/18 Time: 1430
Name: Scott Bessonger
Company: BHATZ

Seal Broken By: SM
Date: 03/15/18

43672 MAR 15 2018

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

43672

REF: ADDITIONAL COOLERS/TRIP/TEMP - RJ

RMA:

FedEx Express

FedEx
TRK# 0221 7376 9752 7532

THU - 15 MAR 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX US
IAH

FID 162705 14MAR18 GGGA 546C1/02C5/0CBA

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1806818; 1807005; 1807616; 1807619; 1807622

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2063 (210594)

General Set Information: There were ten field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 591546) was less than 1/2 the CRDL. The recovery for the LCS (591547) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1806818001 (Client ID: HBW7_030618). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544). These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 19MARD02/03/13/19.

Thomas Bosch March 22, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: March 22, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1807619**
Project ID: HS18030722 031418
Purchase Order: HS18030722
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP140_031418	1807619001	03/14/18	03/16/18	

ANALYTICAL REPORT

Workorder: 34-1807619
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP140_031418**	Sampling Site: NA	Collected: 03/14/2018
Lab ID: 1807619001	Media: 125 mL Nalgene	Received: 03/16/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2063 (HBN: 210594)	**Percent Solid:** NA
	Analyzed: 03/19/2018 12:01	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**7000**	1000	2000	4000	1000	

Comments

Quality Control: **EPA 6850, DoD QSM - (HBN: 210594)**

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 03/21/2018 14:03	/S/ Stephen Brose 03/22/2018 14:04

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1807619
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1807619

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2063 (HBN: 210594)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 591546
Analyzed: 03/19/2018 09:08
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 591547
Analyzed: 03/19/2018 09:23
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.26	5.00	105	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1806818001	**MS:** 591548	**MSD:** 591549
Analyzed: 03/19/2018 09:38	**Analyzed:** 03/19/2018 09:52	**Analyzed:** 03/19/2018 10:06
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	5.68	5	114	78.8	123.8	5.85	117	3	0.0	20.0

Continuing Calibration Verification

CCV: 591543	**CCV:** 591550
Analyzed: 03/19/2018 08:18	**Analyzed:** 03/19/2018 12:36
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	21.6	25.0	86.6	26.9	25.0	108

Interference Check Sample

ICSA: 591545
Analyzed: 03/19/2018 08:54
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0

Limit of Detection Verification

LODV: 591544	**LODV:** 591551
Analyzed: 03/19/2018 08:40	**Analyzed:** 03/19/2018 12:50
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.850	1.00	85.0	1.12	1.00	112

Quality Control Sample Batch Report

Analysis Information

Workorder: 1807619

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2063 (HBN: 210594)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Comments

Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
03/21/2018 14:03	03/22/2018 14:04

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
⬣ - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

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10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

18698/#2

1807619

Subcontract Chain of Custody

COC ID: 8778

1807619

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18030722
TSR:	Danielle Winnings

	LAB SAMPLE ID / ANALYSIS REQUESTED	CLIENT SAMPLE ID	MATRIX	COLLECT DATE / DUE DATE
1.	**HS18030722-01**	**LH18/24-SP140_031418**	**Water**	**14 Mar 2018 14:00**
	SUB_Perch-6850			29 Mar 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: J. Makenny — Date/Time: 3/15/18 18:30

Received By: [signature] — Date/Time: 03/16/18 9:46

Cooler ID(s): _____ — Temperature(s): _____

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ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston — Project/Task/Site: 1807619

Date/Time of Receipt: 03-16-18 9:46 — Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8357	4 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Tamara Tassell (Signature) Tamara Tassell (Printed Name) 03-16-18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

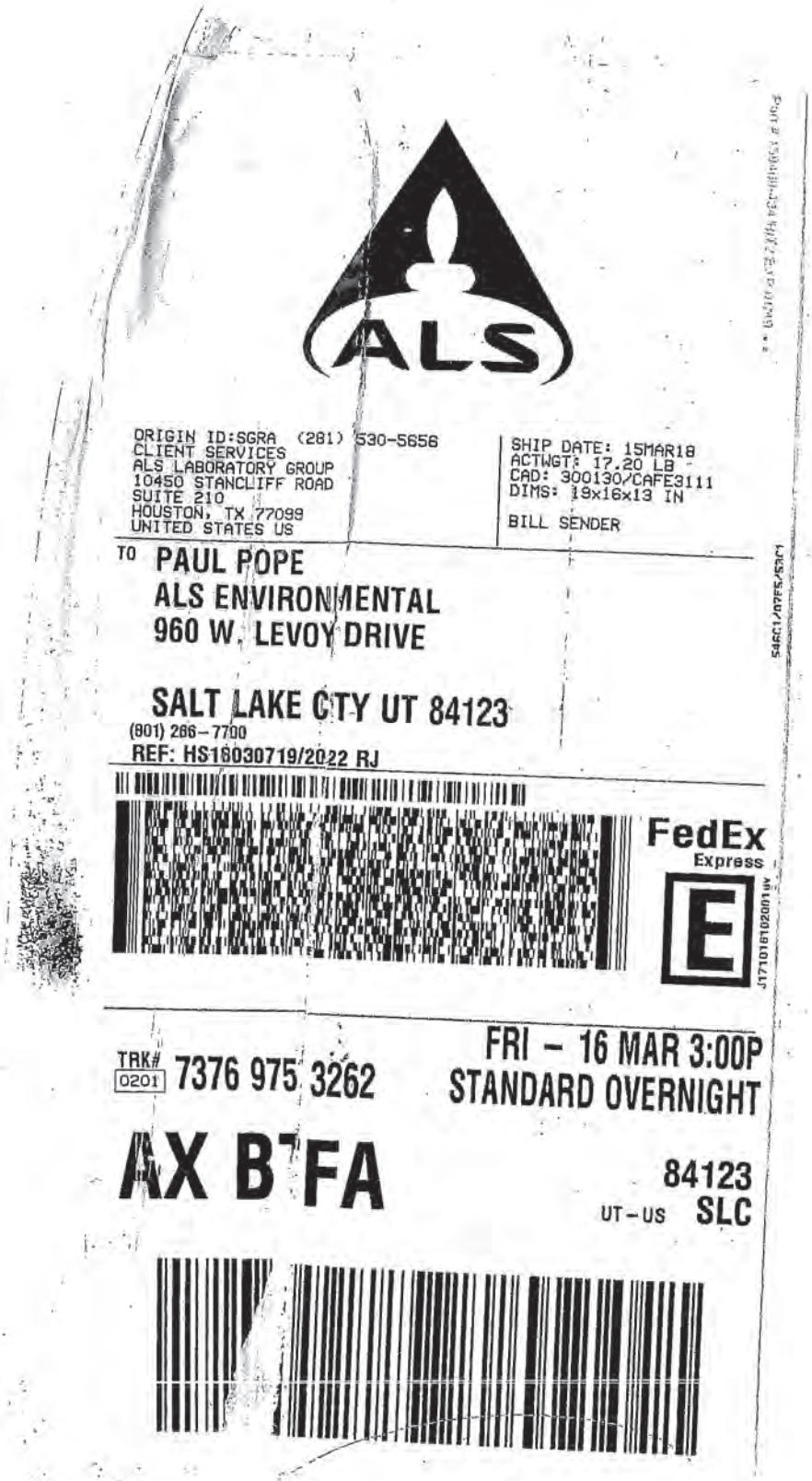
Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

00883990



ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 15MAR18
ACTWGT: 17.20 LB
CAD: 300130/CAFE3111
DIMS: 19x16x13 IN

BILL SENDER

TO PAUL POPE
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18030719/2022 RJ

FedEx Express

TRK# 0201 7376 975 3262

FRI - 16 MAR 3:00P
STANDARD OVERNIGHT

AX BTFA

84123
UT-US SLC

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18030722	Split:	Workorder ID: 1807619	Level: ENV_LVL4	Requested Analysis
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly	
Comments:			Preservatives: COOL	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	EPA 6850, DoD QSM	
1	03/14/2018 14:00	LH18/24-SP140_031418	1807619001		Water	A	1	A	
2									
3									
4									
5									
6									
7									
8									
9									
10									

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	03/16/2018 09:46	ALS Sample Receiving	Sample Login
Julie Warath	3/16/18 1120	SB	Storage
R.33.1	3.18.18/10:30	T. Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00883991

Batch Worklist

Batch: ELMS/ 2063 **Created:** 3/19/2018 08:07 **Instrument:** **HBN:** 210594

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1806818 [ENV_LVL4]
Workorder: 1807005 [ENV_LVL4]
Workorder: 1807616 [ENV_LVL4]
Workorder: 1807619 [ENV_LVL4]
Workorder: 1807622 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	591543	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
2	591544	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	
3	591545	ICS for HBN 210594 [ELMS/2063]				ICS	3		E6850..D3Q	5311		3/22/2018	
4	591546	LMB for HBN 210594 [ELMS/2063]				LMB	3		E6850Q413Q	5311		3/22/2018	
5	591547	LCS for HBN 210594 [ELMS/2063]				LCS	3		E6850Q413Q	5311		3/22/2018	
6	1806818001	HBW7_030618				SAMPLE	3	1806818001-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
7	591548	HBW7_030618(1806818001MS)				MS	3		E6850Q413Q	5311		3/22/2018	
8	591549	HBW7_030618(1806818001MSD)				MSD	3		E6850Q413Q	5311		3/22/2018	
9	1806818002	HBW7_030618_a				SAMPLE	3	1806818002-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
10	1806818003	HBW10_030618				SAMPLE	3	1806818003-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
11	1806818004	HBW1_030618				SAMPLE	3	1806818004-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
12	1806818005	GPW1_030618				SAMPLE	3	1806818005-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
13	1806818006	GPW3_030618				SAMPLE	3	1806818006-A	E6850Q41.3	5480	4/3/2018	3/22/2018	
14	1807005001	LH18/24-SP650_030718				SAMPLE	3	1807005001-A	E6850Q41.3	5480	4/4/2018	3/22/2018	
15	1807616001	LH18/24-SP650_031418				SAMPLE	3	1807616001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
16	1807619001	LH18/24-SP140_031418				SAMPLE	3	1807619001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
17	1807622001	LH18/24-SP650_031418				SAMPLE	3	1807622001-A	E6850Q41.3	5480	4/11/2018	3/29/2018	
18	591550	CCV for HBN 210594 [ELMS/2063]				CCV	3		E685041C3Q	5311		3/22/2018	
19	591551	LODV for HBN 210594 [ELMS/2063				LODV	3		E6850..D3Q	5311		3/22/2018	

00883992



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1806818 (001-06); 1807005 (001); 1807916 (001); 1807619 (001); 1807622 (001) ELMS Batch/HBN ID: 2063 (210594)
Prep Date: 03/19/2018 Analysis Date: 03/19/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAR\19MAR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/22/2018, sequence 22FEB18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 591547; Target = 5.0µg/L. ASTM type II water was used for LMB 591546.

MS/MSD: MS/MSD was performed on sample 1806818001 (Client ID: HBW7_030618). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L. Samples 1807616001 and 1807622001 were analyzed and reported at 1:10 dilutions. Sample 1807619001 was analyzed and reported at a 1:1,000 dilution. The reporting limits have been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters. The ion ratio of m/z 83 to 85 may fail at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for the Limit of Detection Verification standard (LODV1 – 591544).
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafile 19MARD02/03/13/19.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\210594-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 36735
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 WRK

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025	
MFG Lot:	Lab Lot: LAB 109	Usable: Yes	
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: T. Bosch
Create Date: 5/11/2017
Lab Lot: CLO4 QC STOCK

Amount: 100 mL
Expires: 3/31/2020
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK — **Description - Perchlorate ISTD Wrk 1,000ug/L**

Standard: **38780**
MFG: ALS/SLC
MFG Lot: TNB: 10/09/17
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 10/09/2017 01:10PM
Verified By: Thomas Bosch
Verify Date:

Amount: 10 mL
Expires: 10/09/2018
Usable: Yes
Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORGANO-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

April 05, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18031052**

Laboratory Results for: **Longhorn GW Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Mar 22, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order: HS18031052

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18031052-01	LH18/24-SP650_032118	Water		21-Mar-2018 14:00	22-Mar-2018 08:45	☐

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order:

Work Order Comments

• The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

Subcontracted by Method NA

Batch ID: R313807

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E415.1

Batch ID: R313559

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E350.3

Batch ID: R313145

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: R312929

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder:HS18031052
Sample ID: LH18/24-SP650_032118
Lab ID:HS18031052-01
Collection Date: 21-Mar-2018 14:00
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: SAP
Nitrogen, Ammonia (As N)	**14**		**0.20**	**0.10**	**0.20**	**mg/L**	1	26-Mar-2018 17:00
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**3.50**		**0.100**	**0.250**	**0.250**	**mg/L**	10	22-Mar-2018 16:10
TOTAL ORGANIC CARBON BY E415.1		**Method:E415.1**						Analyst: KMU
Organic Carbon, Total	**25.5**		**0.500**	**0.500**	**1.00**	**mg/L**	1	31-Mar-2018 19:49
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	05-Apr-2018 13:57

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031052

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R312929	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS18031052-01	LH18/24-SP650_032118	21 Mar 2018 14:00			22 Mar 2018 16:10	10
Batch ID R313145	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS18031052-01	LH18/24-SP650_032118	21 Mar 2018 14:00			26 Mar 2018 17:00	1
Batch ID R313559	**Test Name :** TOTAL ORGANIC CARBON BY E415.1			**Matrix:** Water		
HS18031052-01	LH18/24-SP650_032118	21 Mar 2018 14:00			31 Mar 2018 19:49	1
Batch ID R313807	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18031052-01	LH18/24-SP650_032118	21 Mar 2018 14:00			05 Apr 2018 13:57	1

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031052

QC BATCH REPORT

Batch ID: R312929 **Instrument: UV-2450** **Method: E365.3**

MBLK Sample ID: **MBLK-312929** Units: **mg/L** Analysis Date: **22-Mar-2018 10:15**
Client ID: Run ID: **UV-2450_312929** SeqNo: **4485817** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250								U

LCS Sample ID: **LCS-312929** Units: **mg/L** Analysis Date: **22-Mar-2018 10:15**
Client ID: Run ID: **UV-2450_312929** SeqNo: **4485818** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.241	0.0250	0.25	0	96.4	85 - 115				

LCSD Sample ID: **LCSD-312929** Units: **mg/L** Analysis Date: **22-Mar-2018 10:15**
Client ID: Run ID: **UV-2450_312929** SeqNo: **4485819** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.242	0.0250	0.25	0	96.8	85 - 115	0.241	0.414	20	

MS Sample ID: **HS18030986-01MS** Units: **mg/L** Analysis Date: **22-Mar-2018 10:15**
Client ID: Run ID: **UV-2450_312929** SeqNo: **4485820** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.232	0.0250	0.25	0	92.8	80 - 120				

MSD Sample ID: **HS18030986-01MSD** Units: **mg/L** Analysis Date: **22-Mar-2018 10:15**
Client ID: Run ID: **UV-2450_312929** SeqNo: **4485821** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.229	0.0250	0.25	0	91.6	80 - 120	0.232	1.3	20	

The following samples were analyzed in this batch: HS18031052-01

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031052

QC BATCH REPORT

Batch ID: R313145 **Instrument: WetChem_HS** **Method: E350.3**

MBLK Sample ID: **MBLK-R313145** Units: **mg/L** Analysis Date: **26-Mar-2018 17:00**
Client ID: Run ID: **WetChem_HS_313145** SeqNo: **4488958** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.10	0.20								U

LCS Sample ID: **LCS-R313145** Units: **mg/L** Analysis Date: **26-Mar-2018 17:00**
Client ID: Run ID: **WetChem_HS_313145** SeqNo: **4488957** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.3	0.20	10	0	103	80 - 120				

MS Sample ID: **HS18031052-01MS** Units: **mg/L** Analysis Date: **26-Mar-2018 17:00**
Client ID: **LH18/24-SP650_032118** Run ID: **WetChem_HS_313145** SeqNo: **4488954** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	24.35	0.20	10	14.44	99.1	80 - 120				

MSD Sample ID: **HS18031052-01MSD** Units: **mg/L** Analysis Date: **26-Mar-2018 17:00**
Client ID: **LH18/24-SP650_032118** Run ID: **WetChem_HS_313145** SeqNo: **4488953** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	24.79	0.20	10	14.44	104	80 - 120	24.35	1.79	20	

The following samples were analyzed in this batch: HS18031052-01

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031052

QC BATCH REPORT

Batch ID: R313559 **Instrument: TOC_02** **Method: E415.1**

MBLK	Sample ID: **WBLKW1-033118**			Units: **mg/L**		Analysis Date: **31-Mar-2018 18:26**				
Client ID:		Run ID: **TOC_02_313559**		SeqNo: **4499622**		PrepDate:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	0.500	1.00								U
LCS	Sample ID: **WLCSW1-033118**			Units: **mg/L**		Analysis Date: **31-Mar-2018 18:41**				
Client ID:		Run ID: **TOC_02_313559**		SeqNo: **4499623**		PrepDate:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.94	1.00	10	0	109	80 - 120				
LCSD	Sample ID: **WLCSDW1-033118**			Units: **mg/L**		Analysis Date: **31-Mar-2018 18:54**				
Client ID:		Run ID: **TOC_02_313559**		SeqNo: **4499624**		PrepDate:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.82	1.00	10	0	108	80 - 120	10.94	1.1	20	
MS	Sample ID: **HS18030926-01MS**			Units: **mg/L**		Analysis Date: **31-Mar-2018 19:21**				
Client ID:		Run ID: **TOC_02_313559**		SeqNo: **4499626**		PrepDate:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	27.03	1.00	10	16.92	101	80 - 120				

The following samples were analyzed in this batch: HS18031052-01

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: **HS18031052**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group Houston, Corp Date: 05-Apr-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018

Date: 05-Apr-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18031052
Date/Time Received: **22-Mar-2018 08:45**
Received by: **PJM**

Checklist completed by: *Raegen Giga* eSignature — 22-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 22-Mar-2018 Date

Matrices: **water**
Carrier name: **FedEx First Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.2c/1.6c uc/c	IR 30	
Cooler(s)/Kit(s):	42746		
Date/Time sample(s) sent to storage:	03/22/2018 14:16		
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:

Corrective Action:

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONIA WEST

Page 1 of 1

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O. Number

HS18031052
Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	AMMONIA-N	TOTAL ORGANIC CARBON	ORTHO-PHOSPHATE	PERCHLORATE							Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_032118	Water	03/21/18 / 14:00		2	X	X									H2SO4	
LH18/24-SP650_032118	Water	03/21/18 / 14:00		2			X	X							NONE	

Additional Remarks: **Standard TAT on all parameters**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/21/18	14:30	PM [signature]	3/22/18	08:45						

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks:

42746 UK 1.2 #30 CIF 0.4

(Word) S:\1-ces\Forms\Chain of Custody - BiWeekly

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

42746

Date: 3/21/18 Time: 1430
Name: Scott Beesinger
Company: BHATE

CUSTODY SEAL

Seal Broken By:
Date: 3/22/18

Must Deliver Next Business Day
Time and Tempature Sensitive!

ALS

ORIGIN ID:SGRA (903) 930-6193
SCOTT BEESINER
BHATE ENVIRONMENTAL ASSOCIATES
1203-B EAST GRAND AVE. PMB202

MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 23FEB18
ACTWGT: 1.00 LB MAN
CAD: 300130/CAFE3100
DIMS: 26x14x14 IN

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

42746

REF: ADDITIONAL COOLERS/TRIP/TEMP - RJ
RMA:

FedEx Express
E

RETURNS MON-SAT
THU - 22 MAR 10:30A
PRIORITY OVERNIGHT

FedEx
TRK# 0221 7376 9752 7554

AB SGRA

77099
TX-US
IAH

FID 178949 21MAR18 GGGA 546C1/0/F5/BCBA

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1808267; 1809210

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2070 (211649)

General Set Information: There were two field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Sample 1808267001 was analyzed and reported at 1:10 dilution. The reporting limit has been adjusted accordingly.

Method QC data: The method blank (LMB 593523) was less than 1/2 the CRDL. The recovery for the LCS (593524) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1808267001 (Client ID: LH18/24-SP650_032118). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 02APRD01/02 and 04APRD03.

Thomas Bosch April 05, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: April 05, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1808267**
Project ID: HS18031052 032118
Purchase Order: HS18031052
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_032118	1808267001	03/21/18	03/23/18	

ANALYTICAL REPORT

Workorder: 34-1808267
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_032118**	Sampling Site: NA	Collected: 03/21/2018
Lab ID: 1808267001	Media: Liquid	Received: 03/23/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2070 (HBN: 211649)	**Percent Solid:** NA
	Analyzed: 04/04/2018 10:39	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**500**	10	20	40	10	

Comments

Workorder: 1808267

Sample 1808267001 was analyzed and reported at 1:10 dilution. The reporting limit has been adjusted accordingly.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 04/05/2018 09:48	/S/ Stephen Brose 04/05/2018 11:16

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1808267
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1808267

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2070 (HBN: 211649)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 593523
Analyzed: 04/04/2018 09:27
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 593524
Analyzed: 04/04/2018 09:41
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.50	5.00	90.1	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1808267001	**MS:** 593525	**MSD:** 593526
Analyzed: 04/04/2018 10:39	**Analyzed:** 04/04/2018 10:53	**Analyzed:** 04/04/2018 11:52
Dilution: 10	**Dilution:** 10	**Dilution:** 10
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	500	540	50	86.0	78.8	123.8	541	89.9	0.361	0.0	20.0

Continuing Calibration Verification

CCV: 593520	**CCV:** 593527
Analyzed: 04/04/2018 08:44	**Analyzed:** 04/04/2018 12:20
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.7	25.0	103	25.2	25.0	101

Interference Check Sample

ICSA: 593522
Analyzed: 04/04/2018 09:12
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.755	1.00	75.5

Limit of Detection Verification

LODV: 593521	**LODV:** 593528
Analyzed: 04/04/2018 08:58	**Analyzed:** 04/04/2018 12:34
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.00	1.00	100	1.02	1.00	102

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1808267

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2070 (HBN: 211649)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
04/05/2018 09:48	04/05/2018 11:16

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◆ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

1808267

18698/#2

1808267

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 8810

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18031052
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18031052-01**	**LH18/24-SP650_032118**	**Water**	**21 Mar 2018 14:00**
	SUB_Perch-6850			05 Apr 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 3/22/18 1800.

Received By: _____ Date/Time: 3/23/18 0955

Cooler ID(s): 513 Temperature(s): 2

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18031052	Split:	Workorder ID: 1808267	Level: ENV_LVL4
Client: ALS Environmental (Houston)		Account: 8101	Type: LIQUID
Comments:			Preservatives: COOL

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	03/21/2018 14:00	LH18/24-SP650_032118	1808267001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

22 of 40

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Edwards, Meredith D.	03/23/2018 09:55	ALS Sample Receiving	Sample Login
[signature]	3/23/2018 1650	14B	Storage
R-33.1	3/28.18/13:10	T. Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00884030

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

180247

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston

Project/Task/Site: HS180310S2

Date/Time of Receipt: 3/23/18 0955

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:								
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA		
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA		
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA		
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA		

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8373	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: [signature] (Signature) Jessica Helland (Printed Name) 3/23/18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

Batch Worklist

Batch: ELMS/ 2070 **Created:** 4/2/2018 07:44 **Instrument:** LCMS04 **HBN:** 211649

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1808267 [ENV_LVL4]

Workorder: 1809210 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	593520	CCV for HBN 211649 [ELMS/2070]				CCV	3		E685041C3Q	5311		4/5/2018	4/4/2018
2	593521	LODV for HBN 211649 [ELMS/2070				LODV	3		E6850..D3Q	5311		4/5/2018	4/4/2018
3	593522	ICS for HBN 211649 [ELMS/2070]				ICS	3		E6850..D3Q	5311		4/5/2018	4/4/2018
4	593523	LMB for HBN 211649 [ELMS/2070]				LMB	3		E6850Q413Q	5311		4/5/2018	4/4/2018
5	593524	LCS for HBN 211649 [ELMS/2070]				LCS	3		E6850Q413Q	5311		4/5/2018	4/4/2018
6	1808267001	LH18/24-SP650_032118				SAMPLE	3	1808267001-A	E6850Q41.3	5480	4/18/2018	4/5/2018	4/4/2018
7	593525	LH18/24-SP650...(1808267001MS)				MS	3		E6850Q413Q	5311		4/5/2018	4/4/2018
8	593526	LH18/24-SP65...(1808267001MSD)				MSD	3		E6850Q413Q	5311		4/5/2018	4/4/2018
9	1809210001	LH18/24-SP650_032818				SAMPLE	3	1809210001-A	E6850Q41.3	5480	4/25/2018	4/12/2018	4/4/2018
10	593527	CCV for HBN 211649 [ELMS/2070]				CCV	3		E685041C3Q	5311		4/5/2018	4/4/2018
11	593528	LODV for HBN 211649 [ELMS/2070				LODV	3		E6850..D3Q	5311		4/5/2018	4/4/2018

00884032



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1808267 (001); 1809210 (001)
ELMS Batch/HBN ID: 2070 (211649)
Prep Date: 04/04/2018 Analysis Date: 04/04/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\APR\04APR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 04/02/2018, sequence 02APR18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 593524; Target = 5.0µg/L. ASTM type II water was used for LMB 593523.

MS/MSD: MS/MSD was performed on sample 1808267001 (Client ID: LH18/24-SP650_032118). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L. The parent sample and the MS/MSD were analyzed at 1:10 dilutions. The effective spike target was 50.µg/L.

COMMENTS:
1) Results reported in µg/L. Sample 1808267001 was analyzed and reported at 1:10 dilution. The reporting limit has been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\APR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafiles 02APRD01/02 and 04APRD03.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\211649-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK		Description - 6850 WKG Std 100.ug/L
Standard: 36735	Created By: T. Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 05/10/2017	Expires: 05/10/2018
MFG Lot: TNB: 05/10/17	Lab Lot: CLO4 WRK	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749 | Created By: T. Bosch | Amount: 10 mL
MFG: ALS/SLC | Create Date: 05/11/2017 | Expires: 05/11/2018
MFG Lot: TNB: 05/11/2017 | Lab Lot: CLO4 QC INT 10.ug/mL | Usable: Yes
Part ID:

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025	
MFG Lot:	Lab Lot: LAB 109	Usable: Yes	
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK	Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748	Created By: T. Bosch	Amount: 100 mL
MFG: Ultra Scientific	Create Date: 5/11/2017	Expires: 3/31/2020
MFG Lot: CP-0860	Lab Lot: CLO4 QC STOCK	Usable: Yes
Part ID: ICC-013		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 38780	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 10/09/2017 01:10PM	Expires: 10/09/2018
MFG Lot: TNB: 10/09/17	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard®, Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

Page 1 of 1

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number . Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

MA 01810-5813 USA • 1 800 322 1174 (North America) • 1 978 749 8000 (International) • isotope.com

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

April 04, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18031054**

Laboratory Results for: **Longhorn GW Treatment Plant BI-Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Mar 22, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: DAYNA.FISHER
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
Work Order: HS18031054

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18031054-01	LH18/24-SP650_032118	Water		21-Mar-2018 14:00	22-Mar-2018 08:45	☐
HS18031054-02	Trip Blank ALS-021518-90	Water		21-Mar-2018 14:00	22-Mar-2018 08:45	☐

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
Work Order: HS18031054

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R313713

Sample ID: VLCSW-180403

- 1,2,4-Trichlorobenzene exceeded QC limits for LCS. Samples are ND for this compound.

Sample ID: HS18031152-07MS

- MS and MSD are for an unrelated sample

WetChemistry by Method SW9056

Batch ID: R313706

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**
Project: Longhorn GW Treatment Plant BI-Weekly Samples WorkOrder:HS18031054
Sample ID: LH18/24-SP650_032118 Lab ID:HS18031054-01
Collection Date: 21-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,1,1-Trichloroethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,1,2,2-Tetrachloroethane	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,1,2-Trichloroethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,1-Dichloroethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,1-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,1-Dichloropropene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2,3-Trichlorobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2,3-Trichloropropane	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2,4-Trichlorobenzene	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2,4-Trimethylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2-Dibromo-3-chloropropane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2-Dibromoethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2-Dichlorobenzene	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2-Dichloroethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,2-Dichloropropane	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,3,5-Trimethylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,3-Dichlorobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,3-Dichloropropane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
1,4-Dichlorobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
2,2-Dichloropropane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	03-Apr-2018 16:28
2-Chlorotoluene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	03-Apr-2018 16:28
4-Chlorotoluene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
4-Isopropyltoluene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	03-Apr-2018 16:28
Acetone	2.0	U	0.40	2.0	2.0	ug/L	1	03-Apr-2018 16:28
Benzene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Bromobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Bromochloromethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Bromodichloromethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Bromoform	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Bromomethane	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Carbon disulfide	2.0	U	0.60	2.0	2.0	ug/L	1	03-Apr-2018 16:28
Carbon tetrachloride	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Chlorobenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Chloroethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant BI-Weekly Samples WorkOrder:HS18031054
Sample ID: LH18/24-SP650_032118 Lab ID:HS18031054-01
Collection Date: 21-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: PC
Chloroform	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Chloromethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
cis-1,2-Dichloroethene	**2.3**		**0.20**	**1.0**	**1.0**	**ug/L**	1	03-Apr-2018 16:28
cis-1,3-Dichloropropene	1.0	U	0.10	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Dibromochloromethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Dibromomethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Dichlorodifluoromethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Ethylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Isopropylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
m,p-Xylene	2.0	U	0.50	2.0	2.0	ug/L	1	03-Apr-2018 16:28
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	03-Apr-2018 16:28
n-Butylbenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 16:28
n-Propylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Naphthalene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
o-Xylene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
sec-Butylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Styrene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
tert-Butylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Toluene	**0.81**	J	**0.20**	**1.0**	**1.0**	**ug/L**	1	03-Apr-2018 16:28
trans-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
trans-1,3-Dichloropropene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Trichloroethene	**2.0**		**0.20**	**1.0**	**1.0**	**ug/L**	1	03-Apr-2018 16:28
Trichlorofluoromethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 16:28
Surr: 1,2-Dichloroethane-d4	*100*			**0**	*81-118*	*%REC*	*1*	*03-Apr-2018 16:28*
Surr: 4-Bromofluorobenzene	*92.8*			**0**	*85-114*	*%REC*	*1*	*03-Apr-2018 16:28*
Surr: Dibromofluoromethane	*103*			**0**	*80-119*	*%REC*	*1*	*03-Apr-2018 16:28*
Surr: Toluene-d8	*103*			**0**	*89-112*	*%REC*	*1*	*03-Apr-2018 16:28*
ANIONS BY SW9056A		**Method:SW9056**						Analyst: KMU
Chloride	**312**		**2.00**	**2.50**	**5.00**	**mg/L**	10	04-Apr-2018 02:12
Sulfate	**119**		**2.00**	**2.50**	**5.00**	**mg/L**	10	04-Apr-2018 02:12

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**
Project: Longhorn GW Treatment Plant BI-Weekly Samples WorkOrder:HS18031054
Sample ID: Trip Blank ALS-021518-90 Lab ID:HS18031054-02
Collection Date: 21-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,1,1-Trichloroethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,1,2,2-Tetrachloroethane	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,1,2-Trichloroethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,1-Dichloroethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,1-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,1-Dichloropropene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2,3-Trichlorobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2,3-Trichloropropane	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2,4-Trichlorobenzene	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2,4-Trimethylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2-Dibromo-3-chloropropane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2-Dibromoethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2-Dichlorobenzene	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2-Dichloroethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,2-Dichloropropane	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,3,5-Trimethylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,3-Dichlorobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,3-Dichloropropane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
1,4-Dichlorobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
2,2-Dichloropropane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	03-Apr-2018 18:06
2-Chlorotoluene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	03-Apr-2018 18:06
4-Chlorotoluene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
4-Isopropyltoluene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	03-Apr-2018 18:06
Acetone	2.0	U	0.40	2.0	2.0	ug/L	1	03-Apr-2018 18:06
Benzene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Bromobenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Bromochloromethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Bromodichloromethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Bromoform	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Bromomethane	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Carbon disulfide	2.0	U	0.60	2.0	2.0	ug/L	1	03-Apr-2018 18:06
Carbon tetrachloride	1.0	U	0.50	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Chlorobenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Chloroethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: Longhorn GW Treatment Plant BI-Weekly Samples WorkOrder:HS18031054
Sample ID: Trip Blank ALS-021518-90 Lab ID:HS18031054-02
Collection Date: 21-Mar-2018 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
Chloroform	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Chloromethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
cis-1,3-Dichloropropene	1.0	U	0.10	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Dibromochloromethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Dibromomethane	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Dichlorodifluoromethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Ethylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Isopropylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
m,p-Xylene	2.0	U	0.50	2.0	2.0	ug/L	1	03-Apr-2018 18:06
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	03-Apr-2018 18:06
n-Butylbenzene	1.0	U	0.40	1.0	1.0	ug/L	1	03-Apr-2018 18:06
n-Propylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Naphthalene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
o-Xylene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
sec-Butylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Styrene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
tert-Butylbenzene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Toluene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
trans-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
trans-1,3-Dichloropropene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Trichlorofluoromethane	1.0	U	0.30	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	03-Apr-2018 18:06
Surr: 1,2-Dichloroethane-d4	*98.7*			**0**	*81-118*	*%REC*	*1*	*03-Apr-2018 18:06*
Surr: 4-Bromofluorobenzene	*90.7*			**0**	*85-114*	*%REC*	*1*	*03-Apr-2018 18:06*
Surr: Dibromofluoromethane	*101*			**0**	*80-119*	*%REC*	*1*	*03-Apr-2018 18:06*
Surr: Toluene-d8	*101*			**0**	*89-112*	*%REC*	*1*	*03-Apr-2018 18:06*

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R313706	**Test Name :** ANIONS BY SW9056A			**Matrix:** Water		
HS18031054-01	LH18/24-SP650_032118	21 Mar 2018 14:00			04 Apr 2018 02:12	10
Batch ID R313713	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18031054-01	LH18/24-SP650_032118	21 Mar 2018 14:00			03 Apr 2018 16:28	1
HS18031054-02	Trip Blank ALS-021518-90	21 Mar 2018 14:00			03 Apr 2018 18:06	1

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **MBLKW-180403** Units: **ug/L** Analysis Date: **03-Apr-2018 13:07**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503510** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	1.0	1.0								U
1,1,1-Trichloroethane	1.0	1.0								U
1,1,2,2-Tetrachloroethane	1.0	1.0								U
1,1,2-Trichloroethane	1.0	1.0								U
1,1-Dichloroethane	1.0	1.0								U
1,1-Dichloroethene	1.0	1.0								U
1,1-Dichloropropene	1.0	1.0								U
1,2,3-Trichlorobenzene	1.0	1.0								U
1,2,3-Trichloropropane	1.0	1.0								U
1,2,4-Trichlorobenzene	1.0	1.0								U
1,2,4-Trimethylbenzene	1.0	1.0								U
1,2-Dibromo-3-chloropropane	1.0	1.0								U
1,2-Dibromoethane	1.0	1.0								U
1,2-Dichlorobenzene	1.0	1.0								U
1,2-Dichloroethane	1.0	1.0								U
1,2-Dichloropropane	1.0	1.0								U
1,3,5-Trimethylbenzene	1.0	1.0								U
1,3-Dichlorobenzene	1.0	1.0								U
1,3-Dichloropropane	1.0	1.0								U
1,4-Dichlorobenzene	1.0	1.0								U
2,2-Dichloropropane	1.0	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	1.0	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	1.0	1.0								U
4-Isopropyltoluene	1.0	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	2.0	2.0								U
Benzene	1.0	1.0								U
Bromobenzene	1.0	1.0								U
Bromochloromethane	1.0	1.0								U
Bromodichloromethane	1.0	1.0								U
Bromoform	1.0	1.0								U
Bromomethane	1.0	1.0								U

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **MBLKW-180403** Units: **ug/L** Analysis Date: **03-Apr-2018 13:07**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503510** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	2.0	2.0								U
Carbon tetrachloride	1.0	1.0								U
Chlorobenzene	1.0	1.0								U
Chloroethane	1.0	1.0								U
Chloroform	1.0	1.0								U
Chloromethane	1.0	1.0								U
cis-1,2-Dichloroethene	1.0	1.0								U
cis-1,3-Dichloropropene	1.0	1.0								U
Dibromochloromethane	1.0	1.0								U
Dibromomethane	1.0	1.0								U
Dichlorodifluoromethane	1.0	1.0								U
Ethylbenzene	1.0	1.0								U
Hexachlorobutadiene	1.0	1.0								U
Isopropylbenzene	1.0	1.0								U
m,p-Xylene	2.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	1.0	1.0								U
n-Butylbenzene	1.0	1.0								U
n-Propylbenzene	1.0	1.0								U
o-Xylene	1.0	1.0								U
sec-Butylbenzene	1.0	1.0								U
Styrene	1.0	1.0								U
tert-Butylbenzene	1.0	1.0								U
Tetrachloroethene	1.0	1.0								U
Toluene	1.0	1.0								U
trans-1,2-Dichloroethene	1.0	1.0								U
trans-1,3-Dichloropropene	1.0	1.0								U
Trichloroethene	1.0	1.0								U
Trichlorofluoromethane	1.0	1.0								U
Vinyl chloride	1.0	1.0								U
Surr: 1,2-Dichloroethane-d4	*48.99*	*1.0*	*50*	*0*	*98.0*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*44.77*	*1.0*	*50*	*0*	*89.5*	*85 - 114*				
Surr: Dibromofluoromethane	*50.28*	*1.0*	*50*	*0*	*101*	*80 - 119*				
Surr: Toluene-d8	*50.51*	*1.0*	*50*	*0*	*101*	*89 - 112*				

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180403** Units: **ug/L** Analysis Date: **03-Apr-2018 12:18**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503509** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	46.02	1.0	50	0	92.0	78 - 124				
1,1,1-Trichloroethane	47.01	1.0	50	0	94.0	74 - 131				
1,1,2,2-Tetrachloroethane	50.2	1.0	50	0	100	71 - 121				
1,1,2-Trichloroethane	46.09	1.0	50	0	92.2	80 - 119				
1,1-Dichloroethane	47.81	1.0	50	0	95.6	77 - 125				
1,1-Dichloroethene	47.46	1.0	50	0	94.9	71 - 131				
1,1-Dichloropropene	47.38	1.0	50	0	94.8	79 - 125				
1,2,3-Trichlorobenzene	53.76	1.0	50	0	108	69 - 129				
1,2,3-Trichloropropane	49.6	1.0	50	0	99.2	73 - 122				
1,2,4-Trichlorobenzene	66.2	1.0	50	0	132	69 - 130				S
1,2,4-Trimethylbenzene	50.14	1.0	50	0	100	76 - 124				
1,2-Dibromo-3-chloropropane	48.75	1.0	50	0	97.5	62 - 128				
1,2-Dibromoethane	47.73	1.0	50	0	95.5	77 - 121				
1,2-Dichlorobenzene	50.52	1.0	50	0	101	80 - 119				
1,2-Dichloroethane	46.4	1.0	50	0	92.8	73 - 128				
1,2-Dichloropropane	49.34	1.0	50	0	98.7	78 - 122				
1,3,5-Trimethylbenzene	49.52	1.0	50	0	99.0	75 - 124				
1,3-Dichlorobenzene	48.71	1.0	50	0	97.4	80 - 119				
1,3-Dichloropropane	47.62	1.0	50	0	95.2	80 - 119				
1,4-Dichlorobenzene	46.49	1.0	50	0	93.0	79 - 118				
2,2-Dichloropropane	46.65	1.0	50	0	93.3	60 - 139				
2-Butanone	96.76	2.0	100	0	96.8	56 - 143				
2-Chlorotoluene	47.8	1.0	50	0	95.6	79 - 122				
2-Hexanone	98.35	2.0	100	0	98.3	57 - 139				
4-Chlorotoluene	48.21	1.0	50	0	96.4	78 - 122				
4-Isopropyltoluene	48.77	1.0	50	0	97.5	77 - 127				
4-Methyl-2-pentanone	93.77	2.0	100	0	93.8	67 - 130				
Acetone	95.88	2.0	100	0	95.9	39 - 160				
Benzene	46.24	1.0	50	0	92.5	79 - 120				
Bromobenzene	48.26	1.0	50	0	96.5	80 - 120				
Bromochloromethane	43.91	1.0	50	0	87.8	78 - 123				
Bromodichloromethane	47.17	1.0	50	0	94.3	79 - 125				
Bromoform	47.8	1.0	50	0	95.6	66 - 130				
Bromomethane	52.46	1.0	50	0	105	53 - 141				

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180403** Units: **ug/L** Analysis Date: **03-Apr-2018 12:18**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503509** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	94.17	2.0	100	0	94.2	64 - 133				
Carbon tetrachloride	48.63	1.0	50	0	97.3	72 - 136				
Chlorobenzene	47.77	1.0	50	0	95.5	80 - 120				
Chloroethane	46.05	1.0	50	0	92.1	82 - 118				
Chloroform	47.4	1.0	50	0	94.8	79 - 124				
Chloromethane	45.95	1.0	50	0	91.9	50 - 139				
cis-1,2-Dichloroethene	48.26	1.0	50	0	96.5	78 - 123				
cis-1,3-Dichloropropene	49.61	1.0	50	0	99.2	75 - 124				
Dibromochloromethane	46.55	1.0	50	0	93.1	74 - 126				
Dibromomethane	47.76	1.0	50	0	95.5	79 - 123				
Dichlorodifluoromethane	46.79	1.0	50	0	93.6	32 - 152				
Ethylbenzene	47.29	1.0	50	0	94.6	79 - 121				
Hexachlorobutadiene	53.43	1.0	50	0	107	66 - 134				
Isopropylbenzene	46.9	1.0	50	0	93.8	72 - 131				
m,p-Xylene	96.17	2.0	100	0	96.2	80 - 121				
Methylene chloride	48.39	2.0	50	0	96.8	74 - 124				
Naphthalene	51.79	1.0	50	0	104	61 - 128				
n-Butylbenzene	49.21	1.0	50	0	98.4	75 - 128				
n-Propylbenzene	49.4	1.0	50	0	98.8	76 - 126				
o-Xylene	47.48	1.0	50	0	95.0	78 - 122				
sec-Butylbenzene	48.49	1.0	50	0	97.0	77 - 126				
Styrene	50.71	1.0	50	0	101	78 - 128				
tert-Butylbenzene	48.77	1.0	50	0	97.5	78 - 124				
Tetrachloroethene	46.66	1.0	50	0	93.3	74 - 129				
Toluene	47.2	1.0	50	0	94.4	80 - 121				
trans-1,2-Dichloroethene	48.26	1.0	50	0	96.5	75 - 124				
trans-1,3-Dichloropropene	49.38	1.0	50	0	98.8	73 - 127				
Trichloroethene	47.67	1.0	50	0	95.3	79 - 123				
Trichlorofluoromethane	46.77	1.0	50	0	93.5	65 - 141				
Vinyl chloride	46.86	1.0	50	0	93.7	58 - 137				
Surr: 1,2-Dichloroethane-d4	*47.64*	*1.0*	*50*	*0*	*95.3*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*47.86*	*1.0*	*50*	*0*	*95.7*	*85 - 114*				
Surr: Dibromofluoromethane	*49.48*	*1.0*	*50*	*0*	*99.0*	*80 - 119*				
Surr: Toluene-d8	*49.94*	*1.0*	*50*	*0*	*99.9*	*89 - 112*				

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18031152-07MS** Units: **ug/L** Analysis Date: **03-Apr-2018 16:52**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503517** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.25	1.0	50	0	88.5	78 - 124				
1,1,1-Trichloroethane	40.25	1.0	50	0	80.5	74 - 131				
1,1,2,2-Tetrachloroethane	51.21	1.0	50	0	102	71 - 121				
1,1,2-Trichloroethane	45.75	1.0	50	0	91.5	80 - 119				
1,1-Dichloroethane	44.82	1.0	50	0	89.6	77 - 125				
1,1-Dichloroethene	39.98	1.0	50	0	80.0	71 - 131				
1,1-Dichloropropene	39.13	1.0	50	0	78.3	79 - 125				S
1,2,3-Trichlorobenzene	49.08	1.0	50	0	98.2	69 - 129				
1,2,3-Trichloropropane	49.47	1.0	50	0	98.9	73 - 122				
1,2,4-Trichlorobenzene	58.83	1.0	50	0	118	69 - 130				
1,2,4-Trimethylbenzene	42.89	1.0	50	0	85.8	76 - 124				
1,2-Dibromo-3-chloropropane	47.35	1.0	50	0	94.7	62 - 128				
1,2-Dibromoethane	48.5	1.0	50	0	97.0	77 - 121				
1,2-Dichlorobenzene	45.82	1.0	50	0	91.6	80 - 119				
1,2-Dichloroethane	45.91	1.0	50	0	91.8	73 - 128				
1,2-Dichloropropane	47.21	1.0	50	0	94.4	78 - 122				
1,3,5-Trimethylbenzene	41.2	1.0	50	0	82.4	75 - 124				
1,3-Dichlorobenzene	43.41	1.0	50	0	86.8	80 - 119				
1,3-Dichloropropane	47.48	1.0	50	0	95.0	80 - 119				
1,4-Dichlorobenzene	42.13	1.0	50	0	84.3	79 - 118				
2,2-Dichloropropane	39.87	1.0	50	0	79.7	60 - 139				
2-Butanone	100.7	2.0	100	0	101	56 - 143				
2-Chlorotoluene	42.66	1.0	50	0	85.3	79 - 122				
2-Hexanone	109.6	2.0	100	0	110	57 - 139				
4-Chlorotoluene	43.49	1.0	50	0	87.0	78 - 122				
4-Isopropyltoluene	38.42	1.0	50	0	76.8	77 - 127				S
4-Methyl-2-pentanone	104	2.0	100	0	104	67 - 130				
Acetone	99.89	2.0	100	0	99.9	39 - 160				
Benzene	43.12	1.0	50	0	86.2	79 - 120				
Bromobenzene	45.87	1.0	50	0	91.7	80 - 120				
Bromochloromethane	44.78	1.0	50	0	89.6	78 - 123				
Bromodichloromethane	45.64	1.0	50	0	91.3	79 - 125				
Bromoform	47.39	1.0	50	0	94.8	66 - 130				
Bromomethane	48.59	1.0	50	0	97.2	53 - 141				

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18031152-07MS** Units: **ug/L** Analysis Date: **03-Apr-2018 16:52**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503517** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	84.29	2.0	100	0	84.3	64 - 133				
Carbon tetrachloride	39.66	1.0	50	0	79.3	72 - 136				
Chlorobenzene	44.77	1.0	50	0	89.5	80 - 120				
Chloroethane	74.62	1.0	50	0	149	82 - 118				S
Chloroform	45.9	1.0	50	0	91.8	79 - 124				
Chloromethane	33.96	1.0	50	0	67.9	50 - 139				
cis-1,2-Dichloroethene	45.51	1.0	50	0	91.0	78 - 123				
cis-1,3-Dichloropropene	48.08	1.0	50	0	96.2	75 - 124				
Dibromochloromethane	45.75	1.0	50	0	91.5	74 - 126				
Dibromomethane	48.06	1.0	50	0	96.1	79 - 123				
Dichlorodifluoromethane	37.56	1.0	50	0	75.1	32 - 152				
Ethylbenzene	41.94	1.0	50	0	83.9	79 - 121				
Hexachlorobutadiene	33.67	1.0	50	0	67.3	66 - 134				
Isopropylbenzene	39.39	1.0	50	0	78.8	72 - 131				
m,p-Xylene	85.51	2.0	100	0	85.5	80 - 121				
Methylene chloride	47.56	2.0	50	0	95.1	74 - 124				
Naphthalene	50.75	1.0	50	0	101	61 - 128				
n-Butylbenzene	36.69	1.0	50	0	73.4	75 - 128				S
n-Propylbenzene	40.74	1.0	50	0	81.5	76 - 126				
o-Xylene	43.65	1.0	50	0	87.3	78 - 122				
sec-Butylbenzene	36.61	1.0	50	0	73.2	77 - 126				S
Styrene	47.87	1.0	50	0	95.7	78 - 128				
tert-Butylbenzene	38.42	1.0	50	0	76.8	78 - 124				S
Tetrachloroethene	38.8	1.0	50	0	77.6	74 - 129				
Toluene	43.2	1.0	50	0	86.4	80 - 121				
trans-1,2-Dichloroethene	43.79	1.0	50	0	87.6	75 - 124				
trans-1,3-Dichloropropene	48.12	1.0	50	0	96.2	73 - 127				
Trichloroethene	40.44	1.0	50	0	80.9	79 - 123				
Trichlorofluoromethane	37.94	1.0	50	0	75.9	65 - 141				
Vinyl chloride	40.01	1.0	50	0	80.0	58 - 137				
Surr: 1,2-Dichloroethane-d4	*50.17*	*1.0*	*50*	*0*	*100*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*48.98*	*1.0*	*50*	*0*	*98.0*	*85 - 114*				
Surr: Dibromofluoromethane	*52.1*	*1.0*	*50*	*0*	*104*	*80 - 119*				
Surr: Toluene-d8	*50.96*	*1.0*	*50*	*0*	*102*	*89 - 112*				

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18031152-07MSD** Units: **ug/L** Analysis Date: **03-Apr-2018 17:17**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503518** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.74	1.0	50	0	89.5	78 - 124	44.25	1.11	20	
1,1,1-Trichloroethane	41.01	1.0	50	0	82.0	74 - 131	40.25	1.86	20	
1,1,2,2-Tetrachloroethane	51.57	1.0	50	0	103	71 - 121	51.21	0.71	20	
1,1,2-Trichloroethane	46.58	1.0	50	0	93.2	80 - 119	45.75	1.79	20	
1,1-Dichloroethane	44.71	1.0	50	0	89.4	77 - 125	44.82	0.234	20	
1,1-Dichloroethene	41.61	1.0	50	0	83.2	71 - 131	39.98	3.99	20	
1,1-Dichloropropene	41.34	1.0	50	0	82.7	79 - 125	39.13	5.51	20	
1,2,3-Trichlorobenzene	65.18	1.0	50	0	130	69 - 129	49.08	28.2	20	SR
1,2,3-Trichloropropane	50.5	1.0	50	0	101	73 - 122	49.47	2.04	20	
1,2,4-Trichlorobenzene	73.06	1.0	50	0	146	69 - 130	58.83	21.6	20	SR
1,2,4-Trimethylbenzene	46.94	1.0	50	0	93.9	76 - 124	42.89	9.02	20	
1,2-Dibromo-3-chloropropane	52.12	1.0	50	0	104	62 - 128	47.35	9.58	20	
1,2-Dibromoethane	48.31	1.0	50	0	96.6	77 - 121	48.5	0.401	20	
1,2-Dichlorobenzene	49.3	1.0	50	0	98.6	80 - 119	45.82	7.32	20	
1,2-Dichloroethane	44.41	1.0	50	0	88.8	73 - 128	45.91	3.32	20	
1,2-Dichloropropane	47.25	1.0	50	0	94.5	78 - 122	47.21	0.0771	20	
1,3,5-Trimethylbenzene	46.25	1.0	50	0	92.5	75 - 124	41.2	11.5	20	
1,3-Dichlorobenzene	46.22	1.0	50	0	92.4	80 - 119	43.41	6.26	20	
1,3-Dichloropropane	47.13	1.0	50	0	94.3	80 - 119	47.48	0.746	20	
1,4-Dichlorobenzene	44.86	1.0	50	0	89.7	79 - 118	42.13	6.28	20	
2,2-Dichloropropane	40.57	1.0	50	0	81.1	60 - 139	39.87	1.76	20	
2-Butanone	102	2.0	100	0	102	56 - 143	100.7	1.3	20	
2-Chlorotoluene	45.4	1.0	50	0	90.8	79 - 122	42.66	6.24	20	
2-Hexanone	112.1	2.0	100	0	112	57 - 139	109.6	2.33	20	
4-Chlorotoluene	45.86	1.0	50	0	91.7	78 - 122	43.49	5.29	20	
4-Isopropyltoluene	44.48	1.0	50	0	89.0	77 - 127	38.42	14.6	20	
4-Methyl-2-pentanone	104.7	2.0	100	0	105	67 - 130	104	0.601	20	
Acetone	99.04	2.0	100	0	99.0	39 - 160	99.89	0.854	20	
Benzene	43.15	1.0	50	0	86.3	79 - 120	43.12	0.0647	20	
Bromobenzene	46.94	1.0	50	0	93.9	80 - 120	45.87	2.32	20	
Bromochloromethane	43.95	1.0	50	0	87.9	78 - 123	44.78	1.86	20	
Bromodichloromethane	45.41	1.0	50	0	90.8	79 - 125	45.64	0.522	20	
Bromoform	48.09	1.0	50	0	96.2	66 - 130	47.39	1.47	20	
Bromomethane	50.17	1.0	50	0	100	53 - 141	48.59	3.21	20	

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313713 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18031152-07MSD** Units: **ug/L** Analysis Date: **03-Apr-2018 17:17**
Client ID: Run ID: **VOA6_313713** SeqNo: **4503518** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	85.54	2.0	100	0	85.5	64 - 133	84.29	1.47	20	
Carbon tetrachloride	42.32	1.0	50	0	84.6	72 - 136	39.66	6.47	20	
Chlorobenzene	45.05	1.0	50	0	90.1	80 - 120	44.77	0.622	20	
Chloroethane	62.75	1.0	50	0	125	82 - 118	74.62	17.3	20	S
Chloroform	45.43	1.0	50	0	90.9	79 - 124	45.9	1.04	20	
Chloromethane	33.6	1.0	50	0	67.2	50 - 139	33.96	1.05	20	
cis-1,2-Dichloroethene	45.33	1.0	50	0	90.7	78 - 123	45.51	0.403	20	
cis-1,3-Dichloropropene	47.46	1.0	50	0	94.9	75 - 124	48.08	1.3	20	
Dibromochloromethane	45.75	1.0	50	0	91.5	74 - 126	45.75	0.00189	20	
Dibromomethane	48.07	1.0	50	0	96.1	79 - 123	48.06	0.0308	20	
Dichlorodifluoromethane	38.98	1.0	50	0	78.0	32 - 152	37.56	3.71	20	
Ethylbenzene	44.04	1.0	50	0	88.1	79 - 121	41.94	4.88	20	
Hexachlorobutadiene	40.17	1.0	50	0	80.3	66 - 134	33.67	17.6	20	
Isopropylbenzene	43.07	1.0	50	0	86.1	72 - 131	39.39	8.93	20	
m,p-Xylene	89.87	2.0	100	0	89.9	80 - 121	85.51	4.98	20	
Methylene chloride	46.5	2.0	50	0	93.0	74 - 124	47.56	2.25	20	
Naphthalene	69.62	1.0	50	0	139	61 - 128	50.75	31.4	20	SR
n-Butylbenzene	43.64	1.0	50	0	87.3	75 - 128	36.69	17.3	20	
n-Propylbenzene	45.36	1.0	50	0	90.7	76 - 126	40.74	10.7	20	
o-Xylene	45.19	1.0	50	0	90.4	78 - 122	43.65	3.47	20	
sec-Butylbenzene	43.34	1.0	50	0	86.7	77 - 126	36.61	16.8	20	
Styrene	48.93	1.0	50	0	97.9	78 - 128	47.87	2.19	20	
tert-Butylbenzene	44.48	1.0	50	0	89.0	78 - 124	38.42	14.6	20	
Tetrachloroethene	41.52	1.0	50	0	83.0	74 - 129	38.8	6.79	20	
Toluene	42.75	1.0	50	0	85.5	80 - 121	43.2	1.05	20	
trans-1,2-Dichloroethene	44.1	1.0	50	0	88.2	75 - 124	43.79	0.691	20	
trans-1,3-Dichloropropene	48.11	1.0	50	0	96.2	73 - 127	48.12	0.0233	20	
Trichloroethene	42.98	1.0	50	0	86.0	79 - 123	40.44	6.09	20	
Trichlorofluoromethane	39.03	1.0	50	0	78.1	65 - 141	37.94	2.81	20	
Vinyl chloride	41.02	1.0	50	0	82.0	58 - 137	40.01	2.49	20	
Surr: 1,2-Dichloroethane-d4	*49.78*	*1.0*	*50*	*0*	*99.6*	*81 - 118*	*50.17*	*0.77*	*20*	
Surr: 4-Bromofluorobenzene	*49.04*	*1.0*	*50*	*0*	*98.1*	*85 - 114*	*48.98*	*0.124*	*20*	
Surr: Dibromofluoromethane	*51.29*	*1.0*	*50*	*0*	*103*	*80 - 119*	*52.1*	*1.55*	*20*	
Surr: Toluene-d8	*50.59*	*1.0*	*50*	*0*	*101*	*89 - 112*	*50.96*	*0.734*	*20*	

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

ALS Group Houston, Corp Date: 04-Apr-18

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder:	HS18031054

QC BATCH REPORT

Batch ID:	**R313713**	**Instrument:**	**VOA6**	**Method:**	**SW8260**

The following samples were analyzed in this batch:	HS18031054-01	HS18031054-02

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: HS18031054

QC BATCH REPORT

Batch ID: R313706 **Instrument: ICS2100** **Method: SW9056**

MBLK Sample ID: **WBLKW1-040318** Units: **mg/L** Analysis Date: **03-Apr-2018 18:27**
Client ID: Run ID: **ICS2100_313706** SeqNo: **4503399** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.250	0.500								U
Sulfate	0.250	0.500								U

LCS Sample ID: **WLCSW1-040318** Units: **mg/L** Analysis Date: **03-Apr-2018 18:42**
Client ID: Run ID: **ICS2100_313706** SeqNo: **4503400** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.33	0.500	20	0	96.7	80 - 120				
Sulfate	19.71	0.500	20	0	98.5	80 - 120				

LCSD Sample ID: **WLCSDW1-040318** Units: **mg/L** Analysis Date: **03-Apr-2018 18:56**
Client ID: Run ID: **ICS2100_313706** SeqNo: **4503401** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.82	0.500	20	0	99.1	80 - 120	19.33	2.5	20	
Sulfate	20.18	0.500	20	0	101	80 - 120	19.71	2.37	20	

MS Sample ID: **HS18031069-07MS** Units: **mg/L** Analysis Date: **03-Apr-2018 22:04**
Client ID: Run ID: **ICS2100_313706** SeqNo: **4503412** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	331.3	5.00	100	233	98.3	80 - 120				
Sulfate	252.5	5.00	100	150.2	102	80 - 120				

MSD Sample ID: **HS18031069-07MSD** Units: **mg/L** Analysis Date: **03-Apr-2018 22:19**
Client ID: Run ID: **ICS2100_313706** SeqNo: **4503413** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	343.3	5.00	100	233	110	80 - 120	331.3	3.55	20	
Sulfate	261.8	5.00	100	150.2	112	80 - 120	252.5	3.63	20	

The following samples were analyzed in this batch: HS18031054-01

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

ALS Group Houston, Corp Date: 04-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant BI-Weekly Samples
WorkOrder: **HS18031054**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

ALS Group Houston, Corp Date: 04-Apr-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018

00884069

Date: 04-Apr-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Date/Time Received: **22-Mar-2018 08:45**
Work Order: HS18031054
Received by: **PJM**

Checklist completed by: *Raegen Giga* eSignature — 22-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 22-Mar-2018 Date

Matrices: **water**
Carrier name: **FedEx First Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.2c/1.6c uc/c	IR 30	
Cooler(s)/Kit(s):	42746		
Date/Time sample(s) sent to storage:	03/22/2018 14:16		
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:

Corrective Action:

00884070

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210, Houston, Tx. 77099 ATTN: SONIA WEST

Page 1 of 1

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job:
GROUNDWATER TREATMENT PLANT BI-WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O Number

HS18031054
Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant Bi-Weekly Samples

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	VOC	CHLORIDE, SULFATE									Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_032118	Water	03/21/18 / 14:00		3	3										HCL	
LH18/24-SP650_032118	Water	03/21/18 / 14:00		1		1									NONE	
Trip Blank	Water	03/21/18		2	2										HCL	

Additional Remarks: **STANDARD TAT ON ALL PARAMETERS.**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/21/18	14:30	Pm	3/22/18	08:45						

9For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks

42746 ulc 1.2° +3° clc 0.4°

(Word) S:\1-ces\Forms\Chain of Custody - BiWeekly

00884071

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

42746

Date: 3/21/18 Time: 1430
Name: Scott Beesinger
Company: BHATE

CUSTODY SEAL

Seal Broken By:
Date: 3/22/18

Must Deliver Next Business Day
Time and Tempature Sensitive!

ALS

ORIGIN ID:SGRA (903) 930-6193
SCOTT BEESINER
BHATE ENVIRONMENTAL ASSOCIATES
1203-B FAST GRAND AVE. PMB202
MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 23FEB18
ACTWGT: 1.00 LB MAN
CAD: 300130/CAFE3108
DIMS: 26x14x14 IN

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: ADDITIONAL COOLERS/TRIP/TEMP - RJ

42746

RMA:

FedEx Express

E

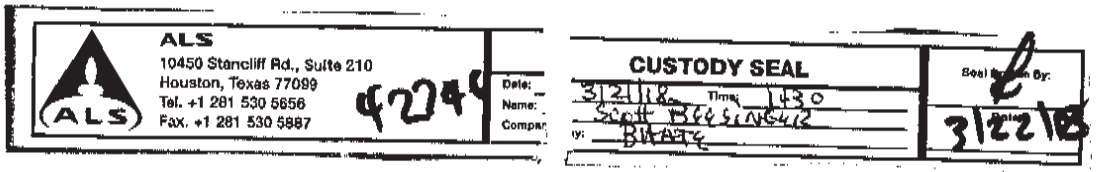
RETURNS MON - SAT
THU - 22 MAR 10:30A
PRIORITY OVERNIGHT

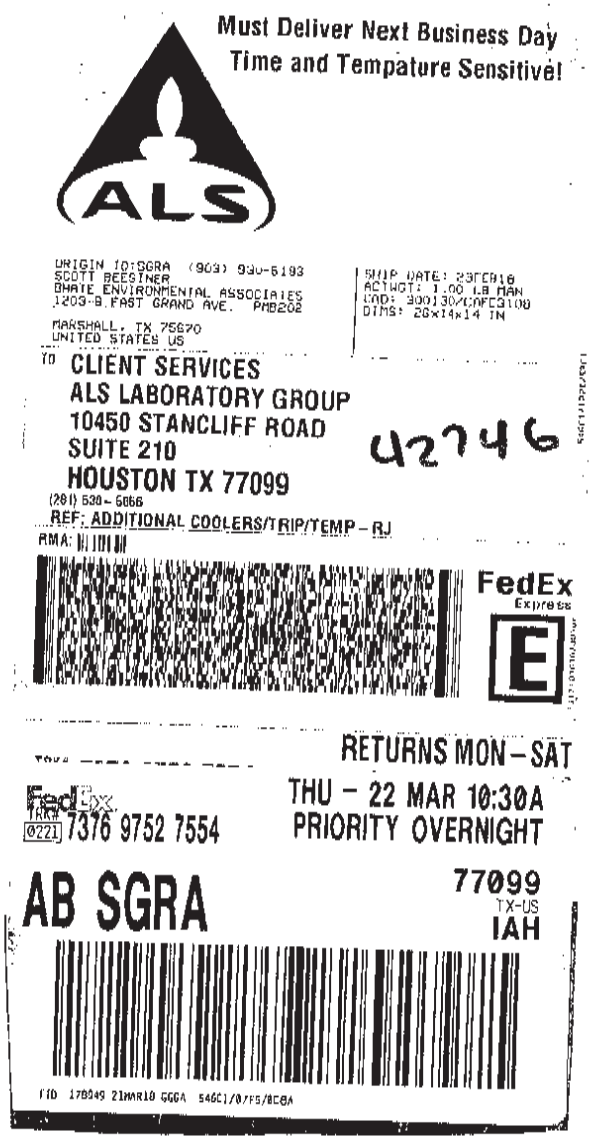
FedEx
TRK# 0221 7376 9752 7554

AB SGRA

77099
TX-US
IAH

FID 178049 21MAR18 GGGA 546C1/0/F5/8C8A





10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

April 05, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18031414**

Laboratory Results for: **Longhorn GW Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Mar 29, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order: HS18031414

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18031414-01	LH18/24-SP650_032818	Water		28-Mar-2018 14:00	29-Mar-2018 12:15	☐

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Work Order:

CASE NARRATIVE

Work Order Comments

- The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

WetChemistry by Method E350.3

Batch ID: R313674

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E415.1

Batch ID: R313559

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: R313487

Sample ID: LH18/24-SP650_032818(HS18031414-01)

- Sample was analyzed outside of the holding time due to laboratory error. Sample results should be considered estimated.

ALS Group Houston, Corp

Date: 05-Apr-18

ANALYTICAL REPORT

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
Sample ID: LH18/24-SP650_032818
Collection Date: 28-Mar-2018 14:00

WorkOrder:HS18031414
Lab ID:HS18031414-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: SAP
Nitrogen, Ammonia (As N)	**14**		**0.20**	**0.10**	**0.20**	**mg/L**	1	03-Apr-2018 14:41
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**1.79**	H	**0.100**	**0.250**	**0.250**	**mg/L**	10	30-Mar-2018 18:15
TOTAL ORGANIC CARBON BY E415.1		**Method:E415.1**						Analyst: KMU
Organic Carbon, Total	**21.4**		**0.500**	**0.500**	**1.00**	**mg/L**	1	31-Mar-2018 21:33
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	05-Apr-2018 13:57

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031414

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R313487	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS18031414-01	LH18/24-SP650_032818	28 Mar 2018 14:00			30 Mar 2018 18:15	10
Batch ID R313559	**Test Name :** TOTAL ORGANIC CARBON BY E415.1			**Matrix:** Water		
HS18031414-01	LH18/24-SP650_032818	28 Mar 2018 14:00			31 Mar 2018 21:33	1
Batch ID R313674	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS18031414-01	LH18/24-SP650_032818	28 Mar 2018 14:00			03 Apr 2018 14:41	1
Batch ID R313807	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18031414-01	LH18/24-SP650_032818	28 Mar 2018 14:00			05 Apr 2018 13:57	1

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031414

QC BATCH REPORT

Batch ID: R313487 **Instrument: UV-2450** **Method: E365.3**

MBLK Sample ID: **MBLK-R313487** Units: **mg/L** Analysis Date: **30-Mar-2018 18:15**
Client ID: Run ID: **UV-2450_313487** SeqNo: **4497734** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250								U

LCS Sample ID: **LCS-R313487** Units: **mg/L** Analysis Date: **30-Mar-2018 18:15**
Client ID: Run ID: **UV-2450_313487** SeqNo: **4497733** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.273	0.0250	0.25	0	109	85 - 115				

MS Sample ID: **HS18031414-01MS** Units: **mg/L** Analysis Date: **30-Mar-2018 18:15**
Client ID: **LH18/24-SP650_032818** Run ID: **UV-2450_313487** SeqNo: **4497736** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	4.49	0.250	2.5	1.79	108	80 - 120				

MSD Sample ID: **HS18031414-01MSD** Units: **mg/L** Analysis Date: **30-Mar-2018 18:15**
Client ID: **LH18/24-SP650_032818** Run ID: **UV-2450_313487** SeqNo: **4497735** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	4.63	0.250	2.5	1.79	114	80 - 120	4.49	3.07	20	

The following samples were analyzed in this batch: HS18031414-01

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031414

QC BATCH REPORT

Batch ID: R313559 **Instrument: TOC_02** **Method: E415.1**

MBLK Sample ID: **WBLKW1-033118** Units: **mg/L** Analysis Date: **31-Mar-2018 18:26**
Client ID: Run ID: **TOC_02_313559** SeqNo: **4499622** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	0.500	1.00								U

LCS Sample ID: **WLCSW1-033118** Units: **mg/L** Analysis Date: **31-Mar-2018 18:41**
Client ID: Run ID: **TOC_02_313559** SeqNo: **4499623** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.94	1.00	10	0	109	80 - 120				

LCSD Sample ID: **WLCSDW1-033118** Units: **mg/L** Analysis Date: **31-Mar-2018 18:54**
Client ID: Run ID: **TOC_02_313559** SeqNo: **4499624** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.82	1.00	10	0	108	80 - 120	10.94	1.1	20	

MS Sample ID: **HS18030926-01MS** Units: **mg/L** Analysis Date: **31-Mar-2018 19:21**
Client ID: Run ID: **TOC_02_313559** SeqNo: **4499626** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	27.03	1.00	10	16.92	101	80 - 120				

The following samples were analyzed in this batch: HS18031414-01

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS18031414

QC BATCH REPORT

Batch ID: R313674 **Instrument: WetChem_HS** **Method: E350.3**

MBLK Sample ID: **MBLK-313674** Units: **mg/L** Analysis Date: **03-Apr-2018 14:41**
Client ID: Run ID: **WetChem_HS_313674** SeqNo: **4502221** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.10	0.20								U

LCS Sample ID: **LCS-313674** Units: **mg/L** Analysis Date: **03-Apr-2018 14:41**
Client ID: Run ID: **WetChem_HS_313674** SeqNo: **4502222** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.42	0.20	10	0	104	80 - 120				

MS Sample ID: **HS18031464-01MS** Units: **mg/L** Analysis Date: **03-Apr-2018 14:41**
Client ID: Run ID: **WetChem_HS_313674** SeqNo: **4502234** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	19.02	0.20	10	8.055	110	80 - 120				

MSD Sample ID: **HS18031464-01MSD** Units: **mg/L** Analysis Date: **03-Apr-2018 14:41**
Client ID: Run ID: **WetChem_HS_313674** SeqNo: **4502235** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	18.95	0.20	10	8.055	109	80 - 120	19.02	0.369	20	

The following samples were analyzed in this batch: HS18031414-01

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

ALS Group Houston, Corp Date: 05-Apr-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant Weekly Samples
WorkOrder: **HS18031414**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group Houston, Corp Date: 05-Apr-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018

00884082

Date: 05-Apr-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Date/Time Received: **29-Mar-2018 12:15**
Work Order: HS18031414
Received by: **PJM**

Checklist completed by: *Raegen Giga* eSignature — 29-Mar-2018 Date
Reviewed by: *RJ Modashia* eSignature — 30-Mar-2018 Date

Matrices: **water**
Carrier name: **FedEx Priority Overnight**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.9c/3.3c uc/c	IR 25	
Cooler(s)/Kit(s):	42760		
Date/Time sample(s) sent to storage:	03/29/2018 19:45		
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:

Corrective Action:

00884083

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O. Number

HS18031414
Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant Weekly Samples

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: AMMONIA-N	TOTAL ORGANIC CARBON	ORTHO-PHOSPHATE	PERCHLORATE	Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_032818	Water	03/28/18 / 14:00		2	X	X			H2SO4	
LH18/24-SP650_032818	Water	03/28/18 / 14:00		2			X	X	NONE	

Additional Remarks: **Standard TAT on all parameters**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/28/18	14:30							PM	3-29-18	9:15

For Lab Use Only

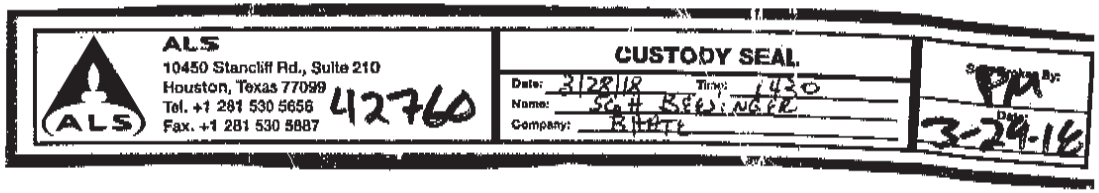
Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks:

42760 uc 3.9C IR 25 CF -0.6

(Word) S:\Forms\Chain of Custody - B:Weekly

00884084



ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

42760

CUSTODY SEAL

Date: 3/28/18 Time: 1430
Name: SCOTT BEESINGER
Company: BHATE

Sent/Broken By: PM
Date: 3-29-18



FedEx
TRK# 0221 7376 9752 7510

THU - 29 MAR 10:30A
PRIORITY OVERNIGHT

AB SGRA 42760

77099
TX-US
IAH

FID 162785 28MAR18 GGGA 546C1/0/F5/0C8A

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1808267; 1809210

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2070 (211649)

General Set Information: There were two field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Sample 1808267001 was analyzed and reported at 1:10 dilution. The reporting limit has been adjusted accordingly.

Method QC data: The method blank (LMB 593523) was less than 1/2 the CRDL. The recovery for the LCS (593524) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1808267001 (Client ID: LH18/24-SP650_032118). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 02APRD01/02 and 04APRD03.

Thomas Bosch April 05, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: April 05, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1809210**
Project ID: HS18031414 032818
Purchase Order: HS18031414
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_032818	1809210001	03/28/18	03/31/18	

ANALYTICAL REPORT

Workorder: 34-1809210
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_032818** | Sampling Site: NA | Collected: 03/28/2018
Lab ID: 1809210001 | Media: 125 mL Nalgene | Received: 03/31/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water
Batch: ELMS/2070 (HBN: 211649)
Analyzed: 04/04/2018 12:06
Instrument ID: LCMS04
Percent Solid: NA
Report Basis: Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 04/05/2018 09:48	/S/ Stephen Brose 04/05/2018 11:16

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1809210
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1809210

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2070 (HBN: 211649)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 593523
Analyzed: 04/04/2018 09:27
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 593524
Analyzed: 04/04/2018 09:41
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.50	5.00	90.1	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1808267001	**MS:** 593525	**MSD:** 593526
Analyzed: 04/04/2018 10:39	**Analyzed:** 04/04/2018 10:53	**Analyzed:** 04/04/2018 11:52
Dilution: 10	**Dilution:** 10	**Dilution:** 10
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	500	540	50	86.0	78.8	123.8	541	89.9	0.361	0.0	20.0

Continuing Calibration Verification

CCV: 593520	**CCV:** 593527
Analyzed: 04/04/2018 08:44	**Analyzed:** 04/04/2018 12:20
Units: ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.7	25.0	103	25.2	25.0	101

Interference Check Sample

ICSA: 593522
Analyzed: 04/04/2018 09:12
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.755	1.00	75.5

Limit of Detection Verification

LODV: 593521	**LODV:** 593528
Analyzed: 04/04/2018 08:58	**Analyzed:** 04/04/2018 12:34
Units: ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.00	1.00	100	1.02	1.00	102

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1809210

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2070 (HBN: 211649)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
04/05/2018 09:48	04/05/2018 11:16

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◆ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

00884092

18698/#2

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

1809210

contract Chain of Custody

COC ID: 8849

1809210

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18031414
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18031414-01**	**LH18/24-SP650_032818**	**Water**	**28 Mar 2018 14:00**
	SUB_Perch-6850			12 Apr 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 3/30/18 1800

Received By: _____ Date/Time: 3/31/18 0924

Cooler ID(s): _____ Temperature(s): _____

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18031414	Split:	Workorder ID: 1809210	Level: ENV_LVL4
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly
Comments:			Preservatives: COOL

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	03/28/2018 14:00	LH18/24-SP650_032818	1809210001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Wrath, Julie	03/31/2018 09:24	ALS Sample Receiving	Sample Login
Julie Wrath	4/4/18 1115	135	Storage
R.33.1	04.04.18 /08.00	T. Bosh	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00884093

00884094

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Hanston — Project/Task/Site: 1809210

Date/Time of Receipt: 3/31/18 0924 — Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 - 8404	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Julie Worath (Signature) — Julie Worath (Printed Name) — 3/31/18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

00884095



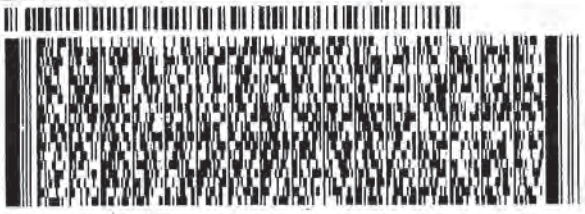
ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 30MAR18
ACTWGT: 8.55 LB
CAD: 300130/CAFE3111
DIMS: 14x11x10 IN

BILL SENDER

TO **SAMPLE RECEIVING**
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18031414-RJ



FedEx Express



SATURDAY 12:00P
PRIORITY OVERNIGHT

TRK# 0201 **7376 9753 8757**

XO BTFA

84123
UT-US **SLC**



Batch Worklist

Batch: ELMS/ 2070 **Created:** 4/2/2018 07:44 **Instrument:** LCMS04 **HBN:** 211649
Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1808267 [ENV_LVL4]
Workorder: 1809210 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	593520	CCV for HBN 211649 [ELMS/2070]				CCV	3		E685041C3Q	5311		4/5/2018	4/4/2018
2	593521	LODV for HBN 211649 [ELMS/2070				LODV	3		E6850..D3Q	5311		4/5/2018	4/4/2018
3	593522	ICS for HBN 211649 [ELMS/2070]				ICS	3		E6850..D3Q	5311		4/5/2018	4/4/2018
4	593523	LMB for HBN 211649 [ELMS/2070]				LMB	3		E6850Q413Q	5311		4/5/2018	4/4/2018
5	593524	LCS for HBN 211649 [ELMS/2070]				LCS	3		E6850Q413Q	5311		4/5/2018	4/4/2018
6	1808267001	LH18/24-SP650_032118				SAMPLE	3	1808267001-A	E6850Q41.3	5480	4/18/2018	4/5/2018	4/4/2018
7	593525	LH18/24-SP650...(1808267001MS)				MS	3		E6850Q413Q	5311		4/5/2018	4/4/2018
8	593526	LH18/24-SP65...(1808267001MSD)				MSD	3		E6850Q413Q	5311		4/5/2018	4/4/2018
9	1809210001	LH18/24-SP650_032818				SAMPLE	3	1809210001-A	E6850Q41.3	5480	4/25/2018	4/12/2018	4/4/2018
10	593527	CCV for HBN 211649 [ELMS/2070]				CCV	3		E685041C3Q	5311		4/5/2018	4/4/2018
11	593528	LODV for HBN 211649 [ELMS/2070				LODV	3		E6850..D3Q	5311		4/5/2018	4/4/2018

00884096



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1808267 (001); 1809210 (001)
ELMS Batch/HBN ID: 2070 (211649)
Prep Date: 04/04/2018 Analysis Date: 04/04/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\APR\04APR18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 04/02/2018, sequence 02APR18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 593524; Target = 5.0µg/L. ASTM type II water was used for LMB 593523.

MS/MSD: MS/MSD was performed on sample 1808267001 (Client ID: LH18/24-SP650_032118). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L. The parent sample and the MS/MSD were analyzed at 1:10 dilutions. The effective spike target was 50.µg/L.

COMMENTS:

1) Results reported in µg/L. Sample 1808267001 was analyzed and reported at 1:10 dilution. The reporting limit has been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\APR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafiles 02APRD01/02 and 04APRD03.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\211649-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 36735
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 WRK

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:		Lab Lot: LAB 109	Usable: Yes
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O			Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025	
MFG Lot:	Lab Lot: LAB 109	Usable: Yes	
Part ID:			

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK	Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748	Created By: T. Bosch	Amount: 100 mL
MFG: Ultra Scientific	Create Date: 5/11/2017	Expires: 3/31/2020
MFG Lot: CP-0860	Lab Lot: CLO4 QC STOCK	Usable: Yes
Part ID: ICC-013		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 38780	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 10/09/2017 01:10PM	Expires: 10/09/2018
MFG Lot: TNB: 10/09/17	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK — Description - Perchlorate ISTD Stock

Standard: 23118
MFG: Cambridge Isotope
MFG Lot: SDDG-013
Part ID: OLM-7310-S

Created By: Thomas Bosch
Create Date: 04/04/2014 03:04PM
Verified By: Thomas Bosch
Verify Date: 02/05/2009 12:02AM

Amount: 1 mL
Expires: 02/27/2024
Usable: Yes
Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard®, Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

APPENDIX D
LABORATORY ANALYTICAL RESULTS FOR LHAAP-16 (PROVIDED ON CD ONLY)

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 22, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18020534**

Laboratory Results for: **LHAAP - 16 Annuals**

Dear Marcia,

ALS Environmental received 10 sample(s) on Feb 08, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: Dayna.Fisher
RJ Modashia
Project Manager

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Work Order: HS18020534

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18020534-01	16EW01_020718	Groundwater		07-Feb-2018 12:25	08-Feb-2018 08:40	☐
HS18020534-02	16EW02_020718	Groundwater		07-Feb-2018 13:10	08-Feb-2018 08:40	☐
HS18020534-03	16EW03_020718	Groundwater		07-Feb-2018 13:20	08-Feb-2018 08:40	☐
HS18020534-04	16EW04_020718	Groundwater		07-Feb-2018 13:50	08-Feb-2018 08:40	☐
HS18020534-05	16EW05_020718	Groundwater		07-Feb-2018 12:38	08-Feb-2018 08:40	☐
HS18020534-06	16EW05_020718_a	Groundwater		07-Feb-2018 12:38	08-Feb-2018 08:40	☐
HS18020534-07	16EW06_020718	Groundwater		07-Feb-2018 13:00	08-Feb-2018 08:40	☐
HS18020534-08	16EW07_020718	Groundwater		07-Feb-2018 13:30	08-Feb-2018 08:40	☐
HS18020534-09	16EW08_020718	Groundwater		07-Feb-2018 13:40	08-Feb-2018 08:40	☐
HS18020534-10	Trip Blank	Water	ALS-012618-37	07-Feb-2018 00:01	08-Feb-2018 08:40	☐

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Work Order: HS18020534

CASE NARRATIVE

Work Order Comments

- The analyses for Perchlorate was subcontracted to ALS Environmental in Salt Lake City, Utah Final report attached.

GCMS Volatiles by Method SW8260

Batch ID: R311248

Sample ID: HS18020569-06MS

- MS and MSD are for an unrelated sample

Batch ID: R311205

Sample ID: HS18020448-02MS

- MS and MSD are for an unrelated sample

Batch ID: R311113

Sample ID: 16EW01_020718 (HS18020534-01MS/MSD)

- Some target analytes failed QC limits for MS/MSD due to high concentrations.

Batch ID: R311214

Sample ID: HS18020569-02MSD

- MSD is for an unrelated sample

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW01_020718
Collection Date: 07-Feb-2018 12:25

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,1-Dichloroethene	**11**		**0.20**	**0.50**	**1.0**	**ug/L**	1	19-Feb-2018 14:30
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,2-Dichloroethane	**15**		**0.20**	**0.50**	**1.0**	**ug/L**	1	19-Feb-2018 14:30
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	19-Feb-2018 14:30
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	19-Feb-2018 14:30
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	19-Feb-2018 14:30
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	19-Feb-2018 14:30
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	19-Feb-2018 14:30
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW01_020718
Collection Date: 07-Feb-2018 12:25

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	**0.79**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	19-Feb-2018 14:30
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
cis-1,2-Dichloroethene	**3,100**		**5.0**	**12**	**25**	**ug/L**	25	19-Feb-2018 16:30
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	19-Feb-2018 14:30
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	19-Feb-2018 14:30
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	19-Feb-2018 14:30
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
trans-1,2-Dichloroethene	**5.0**		**0.20**	**0.50**	**1.0**	**ug/L**	1	19-Feb-2018 14:30
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Trichloroethene	**3,600**		**5.0**	**12**	**25**	**ug/L**	25	19-Feb-2018 16:30
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	19-Feb-2018 14:30
Vinyl chloride	**31**		**0.20**	**0.50**	**1.0**	**ug/L**	1	19-Feb-2018 14:30
Surr: 1,2-Dichloroethane-d4	*91.4*			**0**	*81-118*	*%REC*	*25*	*19-Feb-2018 16:30*
Surr: 1,2-Dichloroethane-d4	*92.9*			**0**	*81-118*	*%REC*	*1*	*19-Feb-2018 14:30*
Surr: 4-Bromofluorobenzene	*92.4*			**0**	*85-114*	*%REC*	*25*	*19-Feb-2018 16:30*
Surr: 4-Bromofluorobenzene	*96.6*			**0**	*85-114*	*%REC*	*1*	*19-Feb-2018 14:30*
Surr: Dibromofluoromethane	*86.1*			**0**	*80-119*	*%REC*	*25*	*19-Feb-2018 16:30*
Surr: Dibromofluoromethane	*86.5*			**0**	*80-119*	*%REC*	*1*	*19-Feb-2018 14:30*
Surr: Toluene-d8	*105*			**0**	*89-112*	*%REC*	*1*	*19-Feb-2018 14:30*
Surr: Toluene-d8	*108*			**0**	*89-112*	*%REC*	*25*	*19-Feb-2018 16:30*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW02_020718
Collection Date: 07-Feb-2018 13:10

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
1,1,1-Trichloroethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
1,1,2,2-Tetrachloroethane	25	U	25	25	50	ug/L	50	21-Feb-2018 13:02
1,1,2-Trichloroethane	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
1,1-Dichloroethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
1,1-Dichloroethene	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
1,1-Dichloropropene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
1,2,3-Trichlorobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
1,2,3-Trichloropropane	25	U	25	25	50	ug/L	50	21-Feb-2018 13:02
1,2,4-Trichlorobenzene	25	U	25	25	50	ug/L	50	21-Feb-2018 13:02
1,2,4-Trimethylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
1,2-Dibromo-3-chloropropane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
1,2-Dibromoethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
1,2-Dichlorobenzene	25	U	25	25	50	ug/L	50	21-Feb-2018 13:02
1,2-Dichloroethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
1,2-Dichloropropane	25	U	25	25	50	ug/L	50	21-Feb-2018 13:02
1,3,5-Trimethylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
1,3-Dichlorobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
1,3-Dichloropropane	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
1,4-Dichlorobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
2,2-Dichloropropane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
2-Butanone	50	U	25	50	100	ug/L	50	21-Feb-2018 13:02
2-Chlorotoluene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
2-Hexanone	50	U	50	50	100	ug/L	50	21-Feb-2018 13:02
4-Chlorotoluene	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
4-Isopropyltoluene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
4-Methyl-2-pentanone	50	U	35	50	100	ug/L	50	21-Feb-2018 13:02
Acetone	50	U	20	50	100	ug/L	50	21-Feb-2018 13:02
Benzene	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
Bromobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
Bromochloromethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
Bromodichloromethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
Bromoform	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
Bromomethane	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
Carbon disulfide	50	U	30	50	100	ug/L	50	21-Feb-2018 13:02
Carbon tetrachloride	25	U	25	25	50	ug/L	50	21-Feb-2018 13:02
Chlorobenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Chloroethane	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW02_020718
Collection Date: 07-Feb-2018 13:10

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
Chloromethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
cis-1,2-Dichloroethene	**12,000**		**100**	**250**	**500**	**ug/L**	500	21-Feb-2018 04:34
cis-1,3-Dichloropropene	25	U	5.0	25	50	ug/L	50	21-Feb-2018 13:02
Dibromochloromethane	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Dibromomethane	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
Dichlorodifluoromethane	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Ethylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Hexachlorobutadiene	25	U	50	25	50	ug/L	50	21-Feb-2018 13:02
Isopropylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
m,p-Xylene	50	U	25	50	100	ug/L	50	21-Feb-2018 13:02
Methylene chloride	50	U	20	50	100	ug/L	50	21-Feb-2018 13:02
n-Butylbenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 13:02
n-Propylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Naphthalene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
o-Xylene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
sec-Butylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Styrene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
tert-Butylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Tetrachloroethene	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Toluene	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
trans-1,2-Dichloroethene	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
trans-1,3-Dichloropropene	25	U	10	25	50	ug/L	50	21-Feb-2018 13:02
Trichloroethene	**19,000**		**100**	**250**	**500**	**ug/L**	500	21-Feb-2018 04:34
Trichlorofluoromethane	25	U	15	25	50	ug/L	50	21-Feb-2018 13:02
Vinyl chloride	**320**		**10**	**25**	**50**	**ug/L**	50	21-Feb-2018 13:02
Surr: 1,2-Dichloroethane-d4	*86.9*			**0**	*81-118*	*%REC*	*500*	*21-Feb-2018 04:34*
Surr: 1,2-Dichloroethane-d4	*89.2*			**0**	*81-118*	*%REC*	*50*	*21-Feb-2018 13:02*
Surr: 4-Bromofluorobenzene	*98.3*			**0**	*85-114*	*%REC*	*500*	*21-Feb-2018 04:34*
Surr: 4-Bromofluorobenzene	*97.3*			**0**	*85-114*	*%REC*	*50*	*21-Feb-2018 13:02*
Surr: Dibromofluoromethane	*87.4*			**0**	*80-119*	*%REC*	*500*	*21-Feb-2018 04:34*
Surr: Dibromofluoromethane	*85.7*			**0**	*80-119*	*%REC*	*50*	*21-Feb-2018 13:02*
Surr: Toluene-d8	*108*			**0**	*89-112*	*%REC*	*500*	*21-Feb-2018 04:34*
Surr: Toluene-d8	*108*			**0**	*89-112*	*%REC*	*50*	*21-Feb-2018 13:02*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW03_020718
Collection Date: 07-Feb-2018 13:20

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
1,1,1-Trichloroethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
1,1,2,2-Tetrachloroethane	25	U	25	25	50	ug/L	50	21-Feb-2018 16:28
1,1,2-Trichloroethane	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
1,1-Dichloroethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
1,1-Dichloroethene	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
1,1-Dichloropropene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
1,2,3-Trichlorobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
1,2,3-Trichloropropane	25	U	25	25	50	ug/L	50	21-Feb-2018 16:28
1,2,4-Trichlorobenzene	25	U	25	25	50	ug/L	50	21-Feb-2018 16:28
1,2,4-Trimethylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
1,2-Dibromo-3-chloropropane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
1,2-Dibromoethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
1,2-Dichlorobenzene	25	U	25	25	50	ug/L	50	21-Feb-2018 16:28
1,2-Dichloroethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
1,2-Dichloropropane	25	U	25	25	50	ug/L	50	21-Feb-2018 16:28
1,3,5-Trimethylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
1,3-Dichlorobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
1,3-Dichloropropane	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
1,4-Dichlorobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
2,2-Dichloropropane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
2-Butanone	50	U	25	50	100	ug/L	50	21-Feb-2018 16:28
2-Chlorotoluene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
2-Hexanone	50	U	50	50	100	ug/L	50	21-Feb-2018 16:28
4-Chlorotoluene	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
4-Isopropyltoluene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
4-Methyl-2-pentanone	50	U	35	50	100	ug/L	50	21-Feb-2018 16:28
Acetone	50	U	20	50	100	ug/L	50	21-Feb-2018 16:28
Benzene	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
Bromobenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
Bromochloromethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
Bromodichloromethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
Bromoform	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
Bromomethane	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
Carbon disulfide	50	U	30	50	100	ug/L	50	21-Feb-2018 16:28
Carbon tetrachloride	25	U	25	25	50	ug/L	50	21-Feb-2018 16:28
Chlorobenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Chloroethane	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW03_020718
Collection Date: 07-Feb-2018 13:20

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
Chloromethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
cis-1,2-Dichloroethene	**7,400**		**10**	**25**	**50**	**ug/L**	50	21-Feb-2018 16:28
cis-1,3-Dichloropropene	25	U	5.0	25	50	ug/L	50	21-Feb-2018 16:28
Dibromochloromethane	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Dibromomethane	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
Dichlorodifluoromethane	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Ethylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Hexachlorobutadiene	25	U	50	25	50	ug/L	50	21-Feb-2018 16:28
Isopropylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
m,p-Xylene	50	U	25	50	100	ug/L	50	21-Feb-2018 16:28
Methylene chloride	50	U	20	50	100	ug/L	50	21-Feb-2018 16:28
n-Butylbenzene	25	U	20	25	50	ug/L	50	21-Feb-2018 16:28
n-Propylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Naphthalene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
o-Xylene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
sec-Butylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Styrene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
tert-Butylbenzene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Tetrachloroethene	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Toluene	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
trans-1,2-Dichloroethene	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
trans-1,3-Dichloropropene	25	U	10	25	50	ug/L	50	21-Feb-2018 16:28
Trichloroethene	**24,000**		**100**	**250**	**500**	**ug/L**	500	21-Feb-2018 05:25
Trichlorofluoromethane	25	U	15	25	50	ug/L	50	21-Feb-2018 16:28
Vinyl chloride	**79**		**10**	**25**	**50**	**ug/L**	50	21-Feb-2018 16:28
Surr: 1,2-Dichloroethane-d4	*84.4*			**0**	*81-118*	*%REC*	*500*	*21-Feb-2018 05:25*
Surr: 1,2-Dichloroethane-d4	*89.4*			**0**	*81-118*	*%REC*	*50*	*21-Feb-2018 16:28*
Surr: 4-Bromofluorobenzene	*96.6*			**0**	*85-114*	*%REC*	*500*	*21-Feb-2018 05:25*
Surr: 4-Bromofluorobenzene	*96.6*			**0**	*85-114*	*%REC*	*50*	*21-Feb-2018 16:28*
Surr: Dibromofluoromethane	*85.3*			**0**	*80-119*	*%REC*	*500*	*21-Feb-2018 05:25*
Surr: Dibromofluoromethane	*85.2*			**0**	*80-119*	*%REC*	*50*	*21-Feb-2018 16:28*
Surr: Toluene-d8	*107*			**0**	*89-112*	*%REC*	*500*	*21-Feb-2018 05:25*
Surr: Toluene-d8	*110*			**0**	*89-112*	*%REC*	*50*	*21-Feb-2018 16:28*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW04_020718
Collection Date: 07-Feb-2018 13:50

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-04
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 12:20
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Feb-2018 12:20
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Feb-2018 12:20
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 12:20
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Feb-2018 12:20
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW04_020718
Collection Date: 07-Feb-2018 13:50

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-04
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
cis-1,2-Dichloroethene	**47**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 12:20
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 12:20
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 12:20
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 12:20
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Trichloroethene	**67**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 12:20
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 12:20
Surr: 1,2-Dichloroethane-d4	*88.4*			**0**	*81-118*	*%REC*	*1*	*20-Feb-2018 12:20*
Surr: 4-Bromofluorobenzene	*98.0*			**0**	*85-114*	*%REC*	*1*	*20-Feb-2018 12:20*
Surr: Dibromofluoromethane	*86.3*			**0**	*80-119*	*%REC*	*1*	*20-Feb-2018 12:20*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*20-Feb-2018 12:20*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW05_020718
Collection Date: 07-Feb-2018 12:38

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-05
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 11:55
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Feb-2018 11:55
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Feb-2018 11:55
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 11:55
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Feb-2018 11:55
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW05_020718
Collection Date: 07-Feb-2018 12:38

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-05
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
cis-1,2-Dichloroethene	**76**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 11:55
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 11:55
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 11:55
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:55
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Trichloroethene	**100**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 11:55
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:55
Vinyl chloride	**40**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 11:55
Surr: 1,2-Dichloroethane-d4	*88.4*			**0**	*81-118*	*%REC*	*1*	*20-Feb-2018 11:55*
Surr: 4-Bromofluorobenzene	*97.5*			**0**	*85-114*	*%REC*	*1*	*20-Feb-2018 11:55*
Surr: Dibromofluoromethane	*85.5*			**0**	*80-119*	*%REC*	*1*	*20-Feb-2018 11:55*
Surr: Toluene-d8	*107*			**0**	*89-112*	*%REC*	*1*	*20-Feb-2018 11:55*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW05_020718_a
Collection Date: 07-Feb-2018 12:38

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-06
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,2-Dichloroethane	**1.2**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 13:12
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 13:12
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Feb-2018 13:12
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Feb-2018 13:12
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 13:12
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Feb-2018 13:12
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW05_020718_a
Collection Date: 07-Feb-2018 12:38

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-06
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
cis-1,2-Dichloroethene	**190**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 13:12
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 13:12
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 13:12
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 13:12
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Trichloroethene	**280**		**2.0**	**5.0**	**10**	**ug/L**	10	20-Feb-2018 13:39
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 13:12
Vinyl chloride	**110**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 13:12
Surr: 1,2-Dichloroethane-d4	*86.7*			**0**	*81-118*	*%REC*	*1*	*20-Feb-2018 13:12*
Surr: 1,2-Dichloroethane-d4	*85.9*			**0**	*81-118*	*%REC*	*10*	*20-Feb-2018 13:39*
Surr: 4-Bromofluorobenzene	*97.0*			**0**	*85-114*	*%REC*	*10*	*20-Feb-2018 13:39*
Surr: 4-Bromofluorobenzene	*98.6*			**0**	*85-114*	*%REC*	*1*	*20-Feb-2018 13:12*
Surr: Dibromofluoromethane	*85.5*			**0**	*80-119*	*%REC*	*1*	*20-Feb-2018 13:12*
Surr: Dibromofluoromethane	*86.2*			**0**	*80-119*	*%REC*	*10*	*20-Feb-2018 13:39*
Surr: Toluene-d8	*109*			**0**	*89-112*	*%REC*	*10*	*20-Feb-2018 13:39*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*20-Feb-2018 13:12*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW06_020718
Collection Date: 07-Feb-2018 13:00

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-07
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,2-Dichloroethane	**1.9**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 14:03
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 14:03
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Feb-2018 14:03
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Feb-2018 14:03
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 14:03
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Feb-2018 14:03
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW06_020718
Collection Date: 07-Feb-2018 13:00

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-07
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	**0.60**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 14:03
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
cis-1,2-Dichloroethene	**570**		**2.0**	**5.0**	**10**	**ug/L**	10	20-Feb-2018 14:30
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 14:03
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 14:03
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:03
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Trichloroethene	**660**		**2.0**	**5.0**	**10**	**ug/L**	10	20-Feb-2018 14:30
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:03
Vinyl chloride	**2.4**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 14:03
Surr: 1,2-Dichloroethane-d4	*89.8*			**0**	*81-118*	*%REC*	*1*	*20-Feb-2018 14:03*
Surr: 1,2-Dichloroethane-d4	*89.4*			**0**	*81-118*	*%REC*	*10*	*20-Feb-2018 14:30*
Surr: 4-Bromofluorobenzene	*97.0*			**0**	*85-114*	*%REC*	*10*	*20-Feb-2018 14:30*
Surr: 4-Bromofluorobenzene	*98.5*			**0**	*85-114*	*%REC*	*1*	*20-Feb-2018 14:03*
Surr: Dibromofluoromethane	*86.3*			**0**	*80-119*	*%REC*	*1*	*20-Feb-2018 14:03*
Surr: Dibromofluoromethane	*84.8*			**0**	*80-119*	*%REC*	*10*	*20-Feb-2018 14:30*
Surr: Toluene-d8	*111*			**0**	*89-112*	*%REC*	*10*	*20-Feb-2018 14:30*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*20-Feb-2018 14:03*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW07_020718
Collection Date: 07-Feb-2018 13:30

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-08
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 14:55
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Feb-2018 14:55
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Feb-2018 14:55
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 14:55
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Feb-2018 14:55
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW07_020718
Collection Date: 07-Feb-2018 13:30

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-08
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
cis-1,2-Dichloroethene	**230**		**2.0**	**5.0**	**10**	**ug/L**	10	20-Feb-2018 15:22
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 14:55
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 14:55
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 14:55
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Trichloroethene	**130**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 14:55
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 14:55
Vinyl chloride	**1.3**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 14:55
Surr: 1,2-Dichloroethane-d4	*88.5*			**0**	*81-118*	*%REC*	*1*	*20-Feb-2018 14:55*
Surr: 1,2-Dichloroethane-d4	*86.5*			**0**	*81-118*	*%REC*	*10*	*20-Feb-2018 15:22*
Surr: 4-Bromofluorobenzene	*96.6*			**0**	*85-114*	*%REC*	*10*	*20-Feb-2018 15:22*
Surr: 4-Bromofluorobenzene	*97.8*			**0**	*85-114*	*%REC*	*1*	*20-Feb-2018 14:55*
Surr: Dibromofluoromethane	*86.6*			**0**	*80-119*	*%REC*	*1*	*20-Feb-2018 14:55*
Surr: Dibromofluoromethane	*84.6*			**0**	*80-119*	*%REC*	*10*	*20-Feb-2018 15:22*
Surr: Toluene-d8	*112*			**0**	*89-112*	*%REC*	*10*	*20-Feb-2018 15:22*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*20-Feb-2018 14:55*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW08_020718
Collection Date: 07-Feb-2018 13:40

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-09
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 15:47
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Feb-2018 15:47
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Feb-2018 15:47
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 15:47
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Feb-2018 15:47
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: 16EW08_020718
Collection Date: 07-Feb-2018 13:40

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-09
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
cis-1,2-Dichloroethene	**150**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 15:47
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 15:47
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 15:47
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 15:47
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Trichloroethene	**460**		**2.0**	**5.0**	**10**	**ug/L**	10	20-Feb-2018 16:14
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 15:47
Vinyl chloride	**1.3**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Feb-2018 15:47
Surr: 1,2-Dichloroethane-d4	*88.2*			**0**	*81-118*	*%REC*	*1*	*20-Feb-2018 15:47*
Surr: 1,2-Dichloroethane-d4	*85.0*			**0**	*81-118*	*%REC*	*10*	*20-Feb-2018 16:14*
Surr: 4-Bromofluorobenzene	*98.6*			**0**	*85-114*	*%REC*	*10*	*20-Feb-2018 16:14*
Surr: 4-Bromofluorobenzene	*96.2*			**0**	*85-114*	*%REC*	*1*	*20-Feb-2018 15:47*
Surr: Dibromofluoromethane	*86.0*			**0**	*80-119*	*%REC*	*1*	*20-Feb-2018 15:47*
Surr: Dibromofluoromethane	*83.3*			**0**	*80-119*	*%REC*	*10*	*20-Feb-2018 16:14*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*20-Feb-2018 15:47*
Surr: Toluene-d8	*110*			**0**	*89-112*	*%REC*	*10*	*20-Feb-2018 16:14*
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	16-Feb-2018 13:58

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: Trip Blank
Collection Date: 07-Feb-2018 00:01

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-10
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 11:06
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Feb-2018 11:06
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Feb-2018 11:06
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 11:06
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Feb-2018 11:06
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
Sample ID: Trip Blank
Collection Date: 07-Feb-2018 00:01

ANALYTICAL REPORT
WorkOrder:HS18020534
Lab ID:HS18020534-10
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Feb-2018 11:06
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Feb-2018 11:06
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Feb-2018 11:06
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	20-Feb-2018 11:06
Surr: 1,2-Dichloroethane-d4	*84.5*			**0**	*81-118*	*%REC*	*1*	*20-Feb-2018 11:06*
Surr: 4-Bromofluorobenzene	*91.7*			**0**	*85-114*	*%REC*	*1*	*20-Feb-2018 11:06*
Surr: Dibromofluoromethane	*85.0*			**0**	*80-119*	*%REC*	*1*	*20-Feb-2018 11:06*
Surr: Toluene-d8	*111*			**0**	*89-112*	*%REC*	*1*	*20-Feb-2018 11:06*

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R310951	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Groundwater		
HS18020534-01	16EW01_020718	07 Feb 2018 12:25			16 Feb 2018 13:58	1
HS18020534-02	16EW02_020718	07 Feb 2018 13:10			16 Feb 2018 13:58	1
HS18020534-03	16EW03_020718	07 Feb 2018 13:20			16 Feb 2018 13:58	1
HS18020534-04	16EW04_020718	07 Feb 2018 13:50			16 Feb 2018 13:58	1
HS18020534-05	16EW05_020718	07 Feb 2018 12:38			16 Feb 2018 13:58	1
HS18020534-06	16EW05_020718_a	07 Feb 2018 12:38			16 Feb 2018 13:58	1
HS18020534-07	16EW06_020718	07 Feb 2018 13:00			16 Feb 2018 13:58	1
HS18020534-08	16EW07_020718	07 Feb 2018 13:30			16 Feb 2018 13:58	1
HS18020534-09	16EW08_020718	07 Feb 2018 13:40			16 Feb 2018 13:58	1
Batch ID R311113	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Groundwater		
HS18020534-01	16EW01_020718	07 Feb 2018 12:25			19 Feb 2018 16:30	25
HS18020534-01	16EW01_020718	07 Feb 2018 12:25			19 Feb 2018 14:30	1
Batch ID R311205	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18020534-10	Trip Blank	07 Feb 2018 00:01			20 Feb 2018 11:06	1
Batch ID R311205	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Groundwater		
HS18020534-04	16EW04_020718	07 Feb 2018 13:50			20 Feb 2018 12:20	1
HS18020534-05	16EW05_020718	07 Feb 2018 12:38			20 Feb 2018 11:55	1
HS18020534-06	16EW05_020718_a	07 Feb 2018 12:38			20 Feb 2018 13:39	10
HS18020534-06	16EW05_020718_a	07 Feb 2018 12:38			20 Feb 2018 13:12	1
HS18020534-07	16EW06_020718	07 Feb 2018 13:00			20 Feb 2018 14:30	10
HS18020534-07	16EW06_020718	07 Feb 2018 13:00			20 Feb 2018 14:03	1
HS18020534-08	16EW07_020718	07 Feb 2018 13:30			20 Feb 2018 15:22	10
HS18020534-08	16EW07_020718	07 Feb 2018 13:30			20 Feb 2018 14:55	1
HS18020534-09	16EW08_020718	07 Feb 2018 13:40			20 Feb 2018 16:14	10
HS18020534-09	16EW08_020718	07 Feb 2018 13:40			20 Feb 2018 15:47	1
Batch ID R311214	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Groundwater		
HS18020534-02	16EW02_020718	07 Feb 2018 13:10			21 Feb 2018 04:34	500
HS18020534-03	16EW03_020718	07 Feb 2018 13:20			21 Feb 2018 05:25	500
Batch ID R311248	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Groundwater		
HS18020534-02	16EW02_020718	07 Feb 2018 13:10			21 Feb 2018 13:02	50
HS18020534-03	16EW03_020718	07 Feb 2018 13:20			21 Feb 2018 16:28	50

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180219** Units: **ug/L** Analysis Date: **19-Feb-2018 10:34**
Client ID: Run ID: **VOA2_311113** SeqNo: **4442251** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180219** Units: **ug/L** Analysis Date: **19-Feb-2018 10:34**
Client ID: Run ID: **VOA2_311113** SeqNo: **4442251** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*43.37*	*1.0*	*50*	*0*	*86.7*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.69*	*1.0*	*50*	*0*	*99.4*	*85 - 114*				
Surr: Dibromofluoromethane	*42.52*	*1.0*	*50*	*0*	*85.0*	*80 - 119*				
Surr: Toluene-d8	*53.5*	*1.0*	*50*	*0*	*107*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180219** Units: **ug/L** Analysis Date: **19-Feb-2018 09:45**
Client ID: Run ID: **VOA2_311113** SeqNo: **4442250** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	45.97	1.0	50	0	91.9	78 - 124				
1,1,1-Trichloroethane	47.01	1.0	50	0	94.0	74 - 131				
1,1,2,2-Tetrachloroethane	42.55	1.0	50	0	85.1	71 - 121				
1,1,2-Trichloroethane	46.16	1.0	50	0	92.3	80 - 119				
1,1-Dichloroethane	46.17	1.0	50	0	92.3	77 - 125				
1,1-Dichloroethene	48.16	1.0	50	0	96.3	71 - 131				
1,1-Dichloropropene	48.32	1.0	50	0	96.6	79 - 125				
1,2,3-Trichlorobenzene	47.31	1.0	50	0	94.6	69 - 129				
1,2,3-Trichloropropane	43.91	1.0	50	0	87.8	73 - 122				
1,2,4-Trichlorobenzene	46.99	1.0	50	0	94.0	69 - 130				
1,2,4-Trimethylbenzene	46.85	1.0	50	0	93.7	76 - 124				
1,2-Dibromo-3-chloropropane	46.09	1.0	50	0	92.2	62 - 128				
1,2-Dibromoethane	47.88	1.0	50	0	95.8	77 - 121				
1,2-Dichlorobenzene	42.31	1.0	50	0	84.6	80 - 119				
1,2-Dichloroethane	46.37	1.0	50	0	92.7	73 - 128				
1,2-Dichloropropane	46.76	1.0	50	0	93.5	78 - 122				
1,3,5-Trimethylbenzene	47.29	1.0	50	0	94.6	75 - 124				
1,3-Dichlorobenzene	42.73	1.0	50	0	85.5	80 - 119				
1,3-Dichloropropane	44.03	1.0	50	0	88.1	80 - 119				
1,4-Dichlorobenzene	41.64	1.0	50	0	83.3	79 - 118				
2,2-Dichloropropane	47.36	1.0	50	0	94.7	60 - 139				
2-Butanone	99.41	2.0	100	0	99.4	56 - 143				
2-Chlorotoluene	47.22	1.0	50	0	94.4	79 - 122				
2-Hexanone	96.72	2.0	100	0	96.7	57 - 139				
4-Chlorotoluene	47.81	1.0	50	0	95.6	78 - 122				
4-Isopropyltoluene	40.67	1.0	50	0	81.3	77 - 127				
4-Methyl-2-pentanone	89.77	2.0	100	0	89.8	67 - 130				
Acetone	88.35	2.0	100	0	88.3	39 - 160				
Benzene	46.21	1.0	50	0	92.4	79 - 120				
Bromobenzene	41.76	1.0	50	0	83.5	80 - 120				
Bromochloromethane	50.55	1.0	50	0	101	78 - 123				
Bromodichloromethane	40.36	1.0	50	0	80.7	79 - 125				
Bromoform	50.5	1.0	50	0	101	66 - 130				
Bromomethane	50.25	1.0	50	0	101	53 - 141				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180219** Units: **ug/L** Analysis Date: **19-Feb-2018 09:45**
Client ID: Run ID: **VOA2_311113** SeqNo: **4442250** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	93.78	2.0	100	0	93.8	64 - 133				
Carbon tetrachloride	44.08	1.0	50	0	88.2	72 - 136				
Chlorobenzene	44.18	1.0	50	0	88.4	80 - 120				
Chloroethane	43	1.0	50	0	86.0	82 - 118				
Chloroform	44.82	1.0	50	0	89.6	79 - 124				
Chloromethane	49.06	1.0	50	0	98.1	50 - 139				
cis-1,2-Dichloroethene	48.94	1.0	50	0	97.9	78 - 123				
cis-1,3-Dichloropropene	51.05	1.0	50	0	102	75 - 124				
Dibromochloromethane	48.21	1.0	50	0	96.4	74 - 126				
Dibromomethane	50.67	1.0	50	0	101	79 - 123				
Dichlorodifluoromethane	46.74	1.0	50	0	93.5	32 - 152				
Ethylbenzene	48.98	1.0	50	0	98.0	79 - 121				
Hexachlorobutadiene	43.85	1.0	50	0	87.7	66 - 134				
Isopropylbenzene	44.45	1.0	50	0	88.9	72 - 131				
m,p-Xylene	87.89	2.0	100	0	87.9	80 - 121				
Methylene chloride	42.93	2.0	50	0	85.9	74 - 124				
Naphthalene	49.74	1.0	50	0	99.5	61 - 128				
n-Butylbenzene	42.79	1.0	50	0	85.6	75 - 128				
n-Propylbenzene	41.08	1.0	50	0	82.2	76 - 126				
o-Xylene	44.84	1.0	50	0	89.7	78 - 122				
sec-Butylbenzene	42.2	1.0	50	0	84.4	77 - 126				
Styrene	45.39	1.0	50	0	90.8	78 - 128				
tert-Butylbenzene	40.73	1.0	50	0	81.5	78 - 124				
Tetrachloroethene	44.91	1.0	50	0	89.8	74 - 129				
Toluene	43.33	1.0	50	0	86.7	80 - 121				
trans-1,2-Dichloroethene	49.57	1.0	50	0	99.1	75 - 124				
trans-1,3-Dichloropropene	52.73	1.0	50	0	105	73 - 127				
Trichloroethene	48.43	1.0	50	0	96.9	79 - 123				
Trichlorofluoromethane	45.72	1.0	50	0	91.4	65 - 141				
Vinyl chloride	47.26	1.0	50	0	94.5	58 - 137				
Surr: 1,2-Dichloroethane-d4	*45.18*	*1.0*	*50*	*0*	*90.4*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.13*	*1.0*	*50*	*0*	*100*	*85 - 114*				
Surr: Dibromofluoromethane	*42.06*	*1.0*	*50*	*0*	*84.1*	*80 - 119*				
Surr: Toluene-d8	*51.44*	*1.0*	*50*	*0*	*103*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18020534-01MS** Units: **ug/L** Analysis Date: **19-Feb-2018 14:55**
Client ID: **16EW01_020718** Run ID: **VOA2_311113** SeqNo: **4442253** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	45.38	1.0	50	0	90.8	78 - 124				
1,1,1-Trichloroethane	49.9	1.0	50	0	99.8	74 - 131				
1,1,2,2-Tetrachloroethane	42.82	1.0	50	0	85.6	71 - 121				
1,1,2-Trichloroethane	45.61	1.0	50	0	91.2	80 - 119				
1,1-Dichloroethane	46.12	1.0	50	0	92.2	77 - 125				
1,1-Dichloroethene	62.89	1.0	50	10.99	104	71 - 131				
1,1-Dichloropropene	52.41	1.0	50	0	105	79 - 125				
1,2,3-Trichlorobenzene	42.64	1.0	50	0	85.3	69 - 129				
1,2,3-Trichloropropane	44.69	1.0	50	0	89.4	73 - 122				
1,2,4-Trichlorobenzene	43.3	1.0	50	0	86.6	69 - 130				
1,2,4-Trimethylbenzene	46.79	1.0	50	0	93.6	76 - 124				
1,2-Dibromo-3-chloropropane	46.61	1.0	50	0	93.2	62 - 128				
1,2-Dibromoethane	48.31	1.0	50	0	96.6	77 - 121				
1,2-Dichlorobenzene	41.04	1.0	50	0	82.1	80 - 119				
1,2-Dichloroethane	58.77	1.0	50	14.84	87.9	73 - 128				
1,2-Dichloropropane	45.2	1.0	50	0	90.4	78 - 122				
1,3,5-Trimethylbenzene	48.31	1.0	50	0	96.6	75 - 124				
1,3-Dichlorobenzene	41.58	1.0	50	0	83.2	80 - 119				
1,3-Dichloropropane	44.68	1.0	50	0	89.4	80 - 119				
1,4-Dichlorobenzene	40.95	1.0	50	0	81.9	79 - 118				
2,2-Dichloropropane	40.86	1.0	50	0	81.7	60 - 139				
2-Butanone	97.29	2.0	100	0	97.3	56 - 143				
2-Chlorotoluene	47.45	1.0	50	0	94.9	79 - 122				
2-Hexanone	103.3	2.0	100	0	103	57 - 139				
4-Chlorotoluene	47.41	1.0	50	0	94.8	78 - 122				
4-Isopropyltoluene	42.29	1.0	50	0	84.6	77 - 127				
4-Methyl-2-pentanone	95.08	2.0	100	0	95.1	67 - 130				
Acetone	95.62	2.0	100	0	95.6	39 - 160				
Benzene	46.48	1.0	50	0	93.0	79 - 120				
Bromobenzene	40.31	1.0	50	0	80.6	80 - 120				
Bromochloromethane	48.12	1.0	50	0	96.2	78 - 123				
Bromodichloromethane	46.86	1.0	50	0	93.7	79 - 125				
Bromoform	49.76	1.0	50	0	99.5	66 - 130				
Bromomethane	52.76	1.0	50	0	106	53 - 141				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18020534-01MS** Units: **ug/L** Analysis Date: **19-Feb-2018 14:55**
Client ID: **16EW01_020718** Run ID: **VOA2_311113** SeqNo: **4442253** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	99.9	2.0	100	0	99.9	64 - 133				
Carbon tetrachloride	47.23	1.0	50	0	94.5	72 - 136				
Chlorobenzene	44.55	1.0	50	0	89.1	80 - 120				
Chloroethane	41.28	1.0	50	0	82.6	82 - 118				
Chloroform	45.14	1.0	50	0.7943	88.7	79 - 124				
Chloromethane	48.52	1.0	50	0	97.0	50 - 139				
cis-1,2-Dichloroethene	2186	1.0	50	2093	185	78 - 123				SEO
cis-1,3-Dichloropropene	49.22	1.0	50	0	98.4	75 - 124				
Dibromochloromethane	46.75	1.0	50	0	93.5	74 - 126				
Dibromomethane	49.96	1.0	50	0	99.9	79 - 123				
Dichlorodifluoromethane	45.08	1.0	50	0	90.2	32 - 152				
Ethylbenzene	51.28	1.0	50	0	103	79 - 121				
Hexachlorobutadiene	38.44	1.0	50	0	76.9	66 - 134				
Isopropylbenzene	46.69	1.0	50	0	93.4	72 - 131				
m,p-Xylene	89.78	2.0	100	0	89.8	80 - 121				
Methylene chloride	42.32	2.0	50	0	84.6	74 - 124				
Naphthalene	48.02	1.0	50	0	96.0	61 - 128				
n-Butylbenzene	42.25	1.0	50	0	84.5	75 - 128				
n-Propylbenzene	42.49	1.0	50	0	85.0	76 - 126				
o-Xylene	45.06	1.0	50	0	90.1	78 - 122				
sec-Butylbenzene	44.16	1.0	50	0	88.3	77 - 126				
Styrene	44.31	1.0	50	0	88.6	78 - 128				
tert-Butylbenzene	42.9	1.0	50	0	85.8	78 - 124				
Tetrachloroethene	48.6	1.0	50	0	97.2	74 - 129				
Toluene	44.71	1.0	50	0	89.4	80 - 121				
trans-1,2-Dichloroethene	54.72	1.0	50	4.973	99.5	75 - 124				
trans-1,3-Dichloropropene	50.22	1.0	50	0	100	73 - 127				
Trichloroethene	2175	1.0	50	2105	139	79 - 123				SEO
Trichlorofluoromethane	52.3	1.0	50	0	105	65 - 141				
Vinyl chloride	79.67	1.0	50	31.05	97.2	58 - 137				
Surr: 1,2-Dichloroethane-d4	*45.34*	*1.0*	*50*	*0*	*90.7*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.94*	*1.0*	*50*	*0*	*102*	*85 - 114*				
Surr: Dibromofluoromethane	*42.12*	*1.0*	*50*	*0*	*84.2*	*80 - 119*				
Surr: Toluene-d8	*52.67*	*1.0*	*50*	*0*	*105*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18020534-01MSD** Units: **ug/L** Analysis Date: **19-Feb-2018 15:19**
Client ID: **16EW01_020718** Run ID: **VOA2_311113** SeqNo: **4442254** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.02	1.0	50	0	88.0	78 - 124	45.38	3.06	20	
1,1,1-Trichloroethane	48.68	1.0	50	0	97.4	74 - 131	49.9	2.47	20	
1,1,2,2-Tetrachloroethane	42.26	1.0	50	0	84.5	71 - 121	42.82	1.31	20	
1,1,2-Trichloroethane	44.89	1.0	50	0	89.8	80 - 119	45.61	1.6	20	
1,1-Dichloroethane	44.72	1.0	50	0	89.4	77 - 125	46.12	3.09	20	
1,1-Dichloroethene	58.98	1.0	50	10.99	96.0	71 - 131	62.89	6.42	20	
1,1-Dichloropropene	51.03	1.0	50	0	102	79 - 125	52.41	2.67	20	
1,2,3-Trichlorobenzene	43.02	1.0	50	0	86.0	69 - 129	42.64	0.875	20	
1,2,3-Trichloropropane	44.66	1.0	50	0	89.3	73 - 122	44.69	0.0792	20	
1,2,4-Trichlorobenzene	43.64	1.0	50	0	87.3	69 - 130	43.3	0.779	20	
1,2,4-Trimethylbenzene	46.08	1.0	50	0	92.2	76 - 124	46.79	1.54	20	
1,2-Dibromo-3-chloropropane	46.22	1.0	50	0	92.4	62 - 128	46.61	0.848	20	
1,2-Dibromoethane	46.49	1.0	50	0	93.0	77 - 121	48.31	3.84	20	
1,2-Dichlorobenzene	40	1.0	50	0	80.0	80 - 119	41.04	2.56	20	S
1,2-Dichloroethane	57.57	1.0	50	14.84	85.5	73 - 128	58.77	2.07	20	
1,2-Dichloropropane	43.67	1.0	50	0	87.3	78 - 122	45.2	3.45	20	
1,3,5-Trimethylbenzene	47.34	1.0	50	0	94.7	75 - 124	48.31	2.03	20	
1,3-Dichlorobenzene	41.39	1.0	50	0	82.8	80 - 119	41.58	0.462	20	
1,3-Dichloropropane	43.68	1.0	50	0	87.4	80 - 119	44.68	2.26	20	
1,4-Dichlorobenzene	40.31	1.0	50	0	80.6	79 - 118	40.95	1.6	20	
2,2-Dichloropropane	39.71	1.0	50	0	79.4	60 - 139	40.86	2.88	20	
2-Butanone	93.71	2.0	100	0	93.7	56 - 143	97.29	3.75	20	
2-Chlorotoluene	46.36	1.0	50	0	92.7	79 - 122	47.45	2.32	20	
2-Hexanone	101.8	2.0	100	0	102	57 - 139	103.3	1.5	20	
4-Chlorotoluene	46.78	1.0	50	0	93.6	78 - 122	47.41	1.33	20	
4-Isopropyltoluene	41.28	1.0	50	0	82.6	77 - 127	42.29	2.43	20	
4-Methyl-2-pentanone	93.98	2.0	100	0	94.0	67 - 130	95.08	1.16	20	
Acetone	93.88	2.0	100	0	93.9	39 - 160	95.62	1.84	20	
Benzene	45.42	1.0	50	0	90.8	79 - 120	46.48	2.32	20	
Bromobenzene	40.39	1.0	50	0	80.8	80 - 120	40.31	0.197	20	
Bromochloromethane	47.3	1.0	50	0	94.6	78 - 123	48.12	1.73	20	
Bromodichloromethane	46.59	1.0	50	0	93.2	79 - 125	46.86	0.57	20	
Bromoform	48.96	1.0	50	0	97.9	66 - 130	49.76	1.62	20	
Bromomethane	43.81	1.0	50	0	87.6	53 - 141	52.76	18.5	20	

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18020534-01MSD** Units: **ug/L** Analysis Date: **19-Feb-2018 15:19**
Client ID: **16EW01_020718** Run ID: **VOA2_311113** SeqNo: **4442254** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	96.02	2.0	100	0	96.0	64 - 133	99.9	3.97	20	
Carbon tetrachloride	47.15	1.0	50	0	94.3	72 - 136	47.23	0.17	20	
Chlorobenzene	43.25	1.0	50	0	86.5	80 - 120	44.55	2.96	20	
Chloroethane	39.04	1.0	50	0	78.1	82 - 118	41.28	5.59	20	S
Chloroform	43.16	1.0	50	0.7943	84.7	79 - 124	45.14	4.49	20	
Chloromethane	47	1.0	50	0	94.0	50 - 139	48.52	3.19	20	
cis-1,2-Dichloroethene	2124	1.0	50	2093	62.5	78 - 123	2186	2.84	20	SEO
cis-1,3-Dichloropropene	47.73	1.0	50	0	95.5	75 - 124	49.22	3.08	20	
Dibromochloromethane	46.69	1.0	50	0	93.4	74 - 126	46.75	0.131	20	
Dibromomethane	48.51	1.0	50	0	97.0	79 - 123	49.96	2.95	20	
Dichlorodifluoromethane	43	1.0	50	0	86.0	32 - 152	45.08	4.73	20	
Ethylbenzene	50.03	1.0	50	0	100	79 - 121	51.28	2.47	20	
Hexachlorobutadiene	39.51	1.0	50	0	79.0	66 - 134	38.44	2.73	20	
Isopropylbenzene	45.4	1.0	50	0	90.8	72 - 131	46.69	2.81	20	
m,p-Xylene	87.8	2.0	100	0	87.8	80 - 121	89.78	2.22	20	
Methylene chloride	42.02	2.0	50	0	84.0	74 - 124	42.32	0.703	20	
Naphthalene	49.14	1.0	50	0	98.3	61 - 128	48.02	2.31	20	
n-Butylbenzene	42.72	1.0	50	0	85.4	75 - 128	42.25	1.11	20	
n-Propylbenzene	41.8	1.0	50	0	83.6	76 - 126	42.49	1.63	20	
o-Xylene	44.6	1.0	50	0	89.2	78 - 122	45.06	1.04	20	
sec-Butylbenzene	43.46	1.0	50	0	86.9	77 - 126	44.16	1.6	20	
Styrene	43.53	1.0	50	0	87.1	78 - 128	44.31	1.76	20	
tert-Butylbenzene	42.23	1.0	50	0	84.5	78 - 124	42.9	1.57	20	
Tetrachloroethene	47.69	1.0	50	0	95.4	74 - 129	48.6	1.89	20	
Toluene	43.64	1.0	50	0	87.3	80 - 121	44.71	2.42	20	
trans-1,2-Dichloroethene	53.01	1.0	50	4.973	96.1	75 - 124	54.72	3.18	20	
trans-1,3-Dichloropropene	50.15	1.0	50	0	100	73 - 127	50.22	0.138	20	
Trichloroethene	2126	1.0	50	2105	41.2	79 - 123	2175	2.27	20	SEO
Trichlorofluoromethane	50	1.0	50	0	100	65 - 141	52.3	4.49	20	
Vinyl chloride	75	1.0	50	31.05	87.9	58 - 137	79.67	6.04	20	
Surr: 1,2-Dichloroethane-d4	*44.86*	*1.0*	*50*	*0*	*89.7*	*81 - 118*	*45.34*	*1.06*	*20*	
Surr: 4-Bromofluorobenzene	*51.12*	*1.0*	*50*	*0*	*102*	*85 - 114*	*50.94*	*0.354*	*20*	
Surr: Dibromofluoromethane	*42.03*	*1.0*	*50*	*0*	*84.1*	*80 - 119*	*42.12*	*0.21*	*20*	
Surr: Toluene-d8	*52.67*	*1.0*	*50*	*0*	*105*	*89 - 112*	*52.67*	*0.00487*	*20*	

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

ALS Group USA, Corp Date: 22-Feb-18

Client:	Bhate Environmental Associates, Inc.
Project:	LHAAP - 16 Annuals
WorkOrder:	HS18020534

QC BATCH REPORT

Batch ID: R311113 **Instrument:** VOA2 **Method:** SW8260

The following samples were analyzed in this batch: HS18020534-01

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180220** Units: **ug/L** Analysis Date: **20-Feb-2018 10:41**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444472** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180220** Units: **ug/L** Analysis Date: **20-Feb-2018 10:41**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444472** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*43.61*	*1.0*	*50*	*0*	*87.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.03*	*1.0*	*50*	*0*	*98.1*	*85 - 114*				
Surr: Dibromofluoromethane	*43.63*	*1.0*	*50*	*0*	*87.3*	*80 - 119*				
Surr: Toluene-d8	*54.02*	*1.0*	*50*	*0*	*108*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180220** Units: **ug/L** Analysis Date: **20-Feb-2018 09:53**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444470** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.22	1.0	50	0	88.4	78 - 124				
1,1,1-Trichloroethane	47.5	1.0	50	0	95.0	74 - 131				
1,1,2,2-Tetrachloroethane	42.82	1.0	50	0	85.6	71 - 121				
1,1,2-Trichloroethane	44.77	1.0	50	0	89.5	80 - 119				
1,1-Dichloroethane	43.89	1.0	50	0	87.8	77 - 125				
1,1-Dichloroethene	47.54	1.0	50	0	95.1	71 - 131				
1,1-Dichloropropene	48.8	1.0	50	0	97.6	79 - 125				
1,2,3-Trichlorobenzene	46.94	1.0	50	0	93.9	69 - 129				
1,2,3-Trichloropropane	43.14	1.0	50	0	86.3	73 - 122				
1,2,4-Trichlorobenzene	46.2	1.0	50	0	92.4	69 - 130				
1,2,4-Trimethylbenzene	47.5	1.0	50	0	95.0	76 - 124				
1,2-Dibromo-3-chloropropane	45.36	1.0	50	0	90.7	62 - 128				
1,2-Dibromoethane	46.38	1.0	50	0	92.8	77 - 121				
1,2-Dichlorobenzene	41.76	1.0	50	0	83.5	80 - 119				
1,2-Dichloroethane	45.71	1.0	50	0	91.4	73 - 128				
1,2-Dichloropropane	45.48	1.0	50	0	91.0	78 - 122				
1,3,5-Trimethylbenzene	48.22	1.0	50	0	96.4	75 - 124				
1,3-Dichlorobenzene	42.41	1.0	50	0	84.8	80 - 119				
1,3-Dichloropropane	43.23	1.0	50	0	86.5	80 - 119				
1,4-Dichlorobenzene	41.93	1.0	50	0	83.9	79 - 118				
2,2-Dichloropropane	47.37	1.0	50	0	94.7	60 - 139				
2-Butanone	98.43	2.0	100	0	98.4	56 - 143				
2-Chlorotoluene	47.25	1.0	50	0	94.5	79 - 122				
2-Hexanone	95.64	2.0	100	0	95.6	57 - 139				
4-Chlorotoluene	47.75	1.0	50	0	95.5	78 - 122				
4-Isopropyltoluene	42.91	1.0	50	0	85.8	77 - 127				
4-Methyl-2-pentanone	87.87	2.0	100	0	87.9	67 - 130				
Acetone	96.05	2.0	100	0	96.0	39 - 160				
Benzene	45.45	1.0	50	0	90.9	79 - 120				
Bromobenzene	40.99	1.0	50	0	82.0	80 - 120				
Bromochloromethane	47.88	1.0	50	0	95.8	78 - 123				
Bromodichloromethane	47.17	1.0	50	0	94.3	79 - 125				
Bromoform	49.55	1.0	50	0	99.1	66 - 130				
Bromomethane	49.43	1.0	50	0	98.9	53 - 141				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180220** Units: **ug/L** Analysis Date: **20-Feb-2018 09:53**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444470** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	92.16	2.0	100	0	92.2	64 - 133				
Carbon tetrachloride	45.74	1.0	50	0	91.5	72 - 136				
Chlorobenzene	43.6	1.0	50	0	87.2	80 - 120				
Chloroethane	42.63	1.0	50	0	85.3	82 - 118				
Chloroform	43.04	1.0	50	0	86.1	79 - 124				
Chloromethane	48.03	1.0	50	0	96.1	50 - 139				
cis-1,2-Dichloroethene	46.23	1.0	50	0	92.5	78 - 123				
cis-1,3-Dichloropropene	49.25	1.0	50	0	98.5	75 - 124				
Dibromochloromethane	46.72	1.0	50	0	93.4	74 - 126				
Dibromomethane	51.14	1.0	50	0	102	79 - 123				
Dichlorodifluoromethane	46.7	1.0	50	0	93.4	32 - 152				
Ethylbenzene	49.4	1.0	50	0	98.8	79 - 121				
Hexachlorobutadiene	47.09	1.0	50	0	94.2	66 - 134				
Isopropylbenzene	45.49	1.0	50	0	91.0	72 - 131				
m,p-Xylene	87.31	2.0	100	0	87.3	80 - 121				
Methylene chloride	43.5	2.0	50	0	87.0	74 - 124				
Naphthalene	49.67	1.0	50	0	99.3	61 - 128				
n-Butylbenzene	45.19	1.0	50	0	90.4	75 - 128				
n-Propylbenzene	42.51	1.0	50	0	85.0	76 - 126				
o-Xylene	44.33	1.0	50	0	88.7	78 - 122				
sec-Butylbenzene	44.33	1.0	50	0	88.7	77 - 126				
Styrene	44.73	1.0	50	0	89.5	78 - 128				
tert-Butylbenzene	42.11	1.0	50	0	84.2	78 - 124				
Tetrachloroethene	45.91	1.0	50	0	91.8	74 - 129				
Toluene	42.51	1.0	50	0	85.0	80 - 121				
trans-1,2-Dichloroethene	47.93	1.0	50	0	95.9	75 - 124				
trans-1,3-Dichloropropene	51.02	1.0	50	0	102	73 - 127				
Trichloroethene	48.18	1.0	50	0	96.4	79 - 123				
Trichlorofluoromethane	46.83	1.0	50	0	93.7	65 - 141				
Vinyl chloride	45.66	1.0	50	0	91.3	58 - 137				
Surr: 1,2-Dichloroethane-d4	*43.81*	*1.0*	*50*	*0*	*87.6*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.26*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*40.68*	*1.0*	*50*	*0*	*81.4*	*80 - 119*				
Surr: Toluene-d8	*51.63*	*1.0*	*50*	*0*	*103*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18020448-02MS** Units: **ug/L** Analysis Date: **20-Feb-2018 18:17**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444490** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	27.39	1.0	50	0	54.8	78 - 124				S
1,1,1-Trichloroethane	27.26	1.0	50	0	54.5	74 - 131				S
1,1,2,2-Tetrachloroethane	32.54	1.0	50	0	65.1	71 - 121				S
1,1,2-Trichloroethane	28.77	1.0	50	0	57.5	80 - 119				S
1,1-Dichloroethane	25.36	1.0	50	0	50.7	77 - 125				S
1,1-Dichloroethene	25.49	1.0	50	0	51.0	71 - 131				S
1,1-Dichloropropene	28.42	1.0	50	0	56.8	79 - 125				S
1,2,3-Trichlorobenzene	24.67	1.0	50	0	49.3	69 - 129				S
1,2,3-Trichloropropane	34.54	1.0	50	0	69.1	73 - 122				S
1,2,4-Trichlorobenzene	22.7	1.0	50	0	45.4	69 - 130				S
1,2,4-Trimethylbenzene	26.64	1.0	50	0	53.3	76 - 124				S
1,2-Dibromo-3-chloropropane	40.23	1.0	50	0	80.5	62 - 128				
1,2-Dibromoethane	31.96	1.0	50	0	63.9	77 - 121				S
1,2-Dichlorobenzene	24.44	1.0	50	0	48.9	80 - 119				S
1,2-Dichloroethane	27.31	1.0	50	0	54.6	73 - 128				S
1,2-Dichloropropane	26.57	1.0	50	0	53.1	78 - 122				S
1,3,5-Trimethylbenzene	26.83	1.0	50	0	53.7	75 - 124				S
1,3-Dichlorobenzene	24.23	1.0	50	0	48.5	80 - 119				S
1,3-Dichloropropane	27.84	1.0	50	0	55.7	80 - 119				S
1,4-Dichlorobenzene	23.65	1.0	50	0	47.3	79 - 118				S
2,2-Dichloropropane	26.75	1.0	50	0	53.5	60 - 139				S
2-Butanone	85.26	2.0	100	0	85.3	56 - 143				
2-Chlorotoluene	26.95	1.0	50	0	53.9	79 - 122				S
2-Hexanone	88.38	2.0	100	0	88.4	57 - 139				
4-Chlorotoluene	26.68	1.0	50	0	53.4	78 - 122				S
4-Isopropyltoluene	23.09	1.0	50	0	46.2	77 - 127				S
4-Methyl-2-pentanone	79.17	2.0	100	0	79.2	67 - 130				
Acetone	102.3	2.0	100	20.47	81.9	39 - 160				
Benzene	27.13	1.0	50	0.6473	53.0	79 - 120				S
Bromobenzene	24.04	1.0	50	0	48.1	80 - 120				S
Bromochloromethane	27.98	1.0	50	0	56.0	78 - 123				S
Bromodichloromethane	27.58	1.0	50	0	55.2	79 - 125				S
Bromoform	34.11	1.0	50	0	68.2	66 - 130				
Bromomethane	19.75	1.0	50	0	39.5	53 - 141				S

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18020448-02MS** Units: **ug/L** Analysis Date: **20-Feb-2018 18:17**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444490** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	53.76	2.0	100	0	53.8	64 - 133				S
Carbon tetrachloride	28.18	1.0	50	0	56.4	72 - 136				S
Chlorobenzene	25.58	1.0	50	0	51.2	80 - 120				S
Chloroethane	161.5	1.0	50	0	323	82 - 118				S
Chloroform	24.88	1.0	50	0	49.8	79 - 124				S
Chloromethane	26.79	1.0	50	0	53.6	50 - 139				
cis-1,2-Dichloroethene	26.85	1.0	50	0	53.7	78 - 123				S
cis-1,3-Dichloropropene	28.69	1.0	50	0	57.4	75 - 124				S
Dibromochloromethane	28.52	1.0	50	0	57.0	74 - 126				S
Dibromomethane	30.71	1.0	50	0	61.4	79 - 123				S
Dichlorodifluoromethane	18.47	1.0	50	0	36.9	32 - 152				
Ethylbenzene	28.1	1.0	50	0	56.2	79 - 121				S
Hexachlorobutadiene	19.03	1.0	50	0	38.1	66 - 134				S
Isopropylbenzene	26.38	1.0	50	0	52.8	72 - 131				S
m,p-Xylene	51.98	2.0	100	0	52.0	80 - 121				S
Methylene chloride	24.84	2.0	50	0	49.7	74 - 124				S
Naphthalene	38.12	1.0	50	0	76.2	61 - 128				
n-Butylbenzene	22.4	1.0	50	0	44.8	75 - 128				S
n-Propylbenzene	24.2	1.0	50	0	48.4	76 - 126				S
o-Xylene	26.29	1.0	50	0	52.6	78 - 122				S
sec-Butylbenzene	24.16	1.0	50	0	48.3	77 - 126				S
Styrene	26.18	1.0	50	0	52.4	78 - 128				S
tert-Butylbenzene	23.97	1.0	50	0	47.9	78 - 124				S
Tetrachloroethene	26.52	1.0	50	0	53.0	74 - 129				S
Toluene	25.78	1.0	50	0	51.6	80 - 121				S
trans-1,2-Dichloroethene	26.82	1.0	50	0	53.6	75 - 124				S
trans-1,3-Dichloropropene	29.92	1.0	50	0	59.8	73 - 127				S
Trichloroethene	28.08	1.0	50	0	56.2	79 - 123				S
Trichlorofluoromethane	25.26	1.0	50	0	50.5	65 - 141				S
Vinyl chloride	24.75	1.0	50	0	49.5	58 - 137				S
Surr: 1,2-Dichloroethane-d4	*45.73*	*1.0*	*50*	*0*	*91.5*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.04*	*1.0*	*50*	*0*	*100*	*85 - 114*				
Surr: Dibromofluoromethane	*42.37*	*1.0*	*50*	*0*	*84.7*	*80 - 119*				
Surr: Toluene-d8	*53.21*	*1.0*	*50*	*0*	*106*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18020448-02MSD** Units: **ug/L** Analysis Date: **20-Feb-2018 18:41**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444491** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	31.36	1.0	50	0	62.7	78 - 124	27.39	13.5	20	S
1,1,1-Trichloroethane	30.07	1.0	50	0	60.1	74 - 131	27.26	9.81	20	S
1,1,2,2-Tetrachloroethane	36.82	1.0	50	0	73.6	71 - 121	32.54	12.4	20	
1,1,2-Trichloroethane	33.16	1.0	50	0	66.3	80 - 119	28.77	14.2	20	S
1,1-Dichloroethane	29.44	1.0	50	0	58.9	77 - 125	25.36	14.9	20	S
1,1-Dichloroethene	28.16	1.0	50	0	56.3	71 - 131	25.49	9.94	20	S
1,1-Dichloropropene	29.18	1.0	50	0	58.4	79 - 125	28.42	2.61	20	S
1,2,3-Trichlorobenzene	30.68	1.0	50	0	61.4	69 - 129	24.67	21.7	20	SR
1,2,3-Trichloropropane	37.83	1.0	50	0	75.7	73 - 122	34.54	9.1	20	
1,2,4-Trichlorobenzene	27.82	1.0	50	0	55.6	69 - 130	22.7	20.2	20	SR
1,2,4-Trimethylbenzene	30.76	1.0	50	0	61.5	76 - 124	26.64	14.4	20	S
1,2-Dibromo-3-chloropropane	45.88	1.0	50	0	91.8	62 - 128	40.23	13.1	20	
1,2-Dibromoethane	35.35	1.0	50	0	70.7	77 - 121	31.96	10.1	20	S
1,2-Dichlorobenzene	28.4	1.0	50	0	56.8	80 - 119	24.44	15	20	S
1,2-Dichloroethane	31.25	1.0	50	0	62.5	73 - 128	27.31	13.5	20	S
1,2-Dichloropropane	30.38	1.0	50	0	60.8	78 - 122	26.57	13.4	20	S
1,3,5-Trimethylbenzene	30.17	1.0	50	0	60.3	75 - 124	26.83	11.7	20	S
1,3-Dichlorobenzene	28.02	1.0	50	0	56.0	80 - 119	24.23	14.5	20	S
1,3-Dichloropropane	33.09	1.0	50	0	66.2	80 - 119	27.84	17.2	20	S
1,4-Dichlorobenzene	27.31	1.0	50	0	54.6	79 - 118	23.65	14.4	20	S
2,2-Dichloropropane	28.96	1.0	50	0	57.9	60 - 139	26.75	7.91	20	S
2-Butanone	91.77	2.0	100	0	91.8	56 - 143	85.26	7.35	20	
2-Chlorotoluene	30.63	1.0	50	0	61.3	79 - 122	26.95	12.8	20	S
2-Hexanone	95.94	2.0	100	0	95.9	57 - 139	88.38	8.21	20	
4-Chlorotoluene	31.29	1.0	50	0	62.6	78 - 122	26.68	15.9	20	S
4-Isopropyltoluene	26.02	1.0	50	0	52.0	77 - 127	23.09	11.9	20	S
4-Methyl-2-pentanone	87.44	2.0	100	0	87.4	67 - 130	79.17	9.92	20	
Acetone	113	2.0	100	20.47	92.5	39 - 160	102.3	9.85	20	
Benzene	30.44	1.0	50	0.6473	59.6	79 - 120	27.13	11.5	20	S
Bromobenzene	28.1	1.0	50	0	56.2	80 - 120	24.04	15.6	20	S
Bromochloromethane	32.64	1.0	50	0	65.3	78 - 123	27.98	15.4	20	S
Bromodichloromethane	32.04	1.0	50	0	64.1	79 - 125	27.58	15	20	S
Bromoform	39.48	1.0	50	0	79.0	66 - 130	34.11	14.6	20	
Bromomethane	25.36	1.0	50	0	50.7	53 - 141	19.75	24.9	20	SR

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18020448-02MSD** Units: **ug/L** Analysis Date: **20-Feb-2018 18:41**
Client ID: Run ID: **VOA2_311205** SeqNo: **4444491** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	58.94	2.0	100	0	58.9	64 - 133	53.76	9.19	20	S
Carbon tetrachloride	28.51	1.0	50	0	57.0	72 - 136	28.18	1.19	20	S
Chlorobenzene	29.93	1.0	50	0	59.9	80 - 120	25.58	15.7	20	S
Chloroethane	94.74	1.0	50	0	189	82 - 118	161.5	52.1	20	SR
Chloroform	28.91	1.0	50	0	57.8	79 - 124	24.88	15	20	S
Chloromethane	21.87	1.0	50	0	43.7	50 - 139	26.79	20.2	20	SR
cis-1,2-Dichloroethene	31.52	1.0	50	0	63.0	78 - 123	26.85	16	20	S
cis-1,3-Dichloropropene	32.31	1.0	50	0	64.6	75 - 124	28.69	11.9	20	S
Dibromochloromethane	33.83	1.0	50	0	67.7	74 - 126	28.52	17	20	S
Dibromomethane	35.44	1.0	50	0	70.9	79 - 123	30.71	14.3	20	S
Dichlorodifluoromethane	19.2	1.0	50	0	38.4	32 - 152	18.47	3.91	20	
Ethylbenzene	31.84	1.0	50	0	63.7	79 - 121	28.1	12.5	20	S
Hexachlorobutadiene	23.09	1.0	50	0	46.2	66 - 134	19.03	19.2	20	S
Isopropylbenzene	29.09	1.0	50	0	58.2	72 - 131	26.38	9.76	20	S
m,p-Xylene	58.72	2.0	100	0	58.7	80 - 121	51.98	12.2	20	S
Methylene chloride	28.31	2.0	50	0	56.6	74 - 124	24.84	13	20	S
Naphthalene	45.23	1.0	50	0	90.5	61 - 128	38.12	17.1	20	
n-Butylbenzene	25.6	1.0	50	0	51.2	75 - 128	22.4	13.3	20	S
n-Propylbenzene	26.67	1.0	50	0	53.3	76 - 126	24.2	9.7	20	S
o-Xylene	29.82	1.0	50	0	59.6	78 - 122	26.29	12.6	20	S
sec-Butylbenzene	26.56	1.0	50	0	53.1	77 - 126	24.16	9.47	20	S
Styrene	30.47	1.0	50	0	60.9	78 - 128	26.18	15.2	20	S
tert-Butylbenzene	26.5	1.0	50	0	53.0	78 - 124	23.97	9.99	20	S
Tetrachloroethene	28.44	1.0	50	0	56.9	74 - 129	26.52	7	20	S
Toluene	29.25	1.0	50	0	58.5	80 - 121	25.78	12.6	20	S
trans-1,2-Dichloroethene	30.51	1.0	50	0	61.0	75 - 124	26.82	12.9	20	S
trans-1,3-Dichloropropene	35.05	1.0	50	0	70.1	73 - 127	29.92	15.8	20	S
Trichloroethene	31.51	1.0	50	0	63.0	79 - 123	28.08	11.5	20	S
Trichlorofluoromethane	25.46	1.0	50	0	50.9	65 - 141	25.26	0.8	20	S
Vinyl chloride	26.39	1.0	50	0	52.8	58 - 137	24.75	6.4	20	S
Surr: 1,2-Dichloroethane-d4	*46.82*	*1.0*	*50*	*0*	*93.6*	*81 - 118*	*45.73*	*2.36*	*20*	
Surr: 4-Bromofluorobenzene	*49.27*	*1.0*	*50*	*0*	*98.5*	*85 - 114*	*50.04*	*1.55*	*20*	
Surr: Dibromofluoromethane	*42.66*	*1.0*	*50*	*0*	*85.3*	*80 - 119*	*42.37*	*0.679*	*20*	
Surr: Toluene-d8	*53.29*	*1.0*	*50*	*0*	*107*	*89 - 112*	*53.21*	*0.165*	*20*	

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311205 **Instrument: VOA2** **Method: SW8260**

The following samples were analyzed in this batch:

HS18020534-04	HS18020534-05	HS18020534-06	HS18020534-07
HS18020534-08	HS18020534-09	HS18020534-10	

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311214 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180220** Units: **ug/L** Analysis Date: **20-Feb-2018 22:50**
Client ID: Run ID: **VOA2_311214** SeqNo: **4444681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*42.71*	*1.0*	*50*	*0*	*85.4*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.73*	*1.0*	*50*	*0*	*99.5*	*85 - 114*				
Surr: Dibromofluoromethane	*43.73*	*1.0*	*50*	*0*	*87.5*	*80 - 119*				
Surr: Toluene-d8	*53.13*	*1.0*	*50*	*0*	*106*	*89 - 112*				

LCS Sample ID: **VLCSW-180220** Units: **ug/L** Analysis Date: **20-Feb-2018 21:12**
Client ID: Run ID: **VOA2_311214** SeqNo: **4444678** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	50.05	1.0	50	0	100	78 - 123				
Trichloroethene	50.65	1.0	50	0	101	79 - 123				
Surr: 1,2-Dichloroethane-d4	*45.62*	*1.0*	*50*	*0*	*91.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.92*	*1.0*	*50*	*0*	*99.8*	*85 - 114*				
Surr: Dibromofluoromethane	*41.52*	*1.0*	*50*	*0*	*83.0*	*80 - 119*				
Surr: Toluene-d8	*51.63*	*1.0*	*50*	*0*	*103*	*89 - 112*				

MS Sample ID: **HS18020569-02MS** Units: **ug/L** Analysis Date: **21-Feb-2018 06:16**
Client ID: Run ID: **VOA2_311214** SeqNo: **4444699** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	426.8	1.0	50	387.5	78.6	78 - 123				EO
Trichloroethene	56.61	1.0	50	12.36	88.5	79 - 123				
Surr: 1,2-Dichloroethane-d4	*44.09*	*1.0*	*50*	*0*	*88.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.04*	*1.0*	*50*	*0*	*102*	*85 - 114*				
Surr: Dibromofluoromethane	*41.5*	*1.0*	*50*	*0*	*83.0*	*80 - 119*				
Surr: Toluene-d8	*51.79*	*1.0*	*50*	*0*	*104*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311214 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18020569-02MSD** Units: **ug/L** Analysis Date: **21-Feb-2018 06:41**
Client ID: Run ID: **VOA2_311214** SeqNo: **4444700** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	422.3	1.0	50	387.5	69.6	78 - 123	426.8	1.06	20	SEO
Trichloroethene	56.8	1.0	50	12.36	88.9	79 - 123	56.61	0.335	20	
Surr: 1,2-Dichloroethane-d4	*43.98*	*1.0*	*50*	*0*	*88.0*	*81 - 118*	*44.09*	*0.243*	*20*	
Surr: 4-Bromofluorobenzene	*51*	*1.0*	*50*	*0*	*102*	*85 - 114*	*51.04*	*0.0846*	*20*	
Surr: Dibromofluoromethane	*41.29*	*1.0*	*50*	*0*	*82.6*	*80 - 119*	*41.5*	*0.495*	*20*	
Surr: Toluene-d8	*52.65*	*1.0*	*50*	*0*	*105*	*89 - 112*	*51.79*	*1.65*	*20*	

The following samples were analyzed in this batch: HS18020534-02 HS18020534-03

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180221** Units: **ug/L** Analysis Date: **21-Feb-2018 11:21**
Client ID: Run ID: **VOA2_311248** SeqNo: **4445422** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180221** Units: **ug/L** Analysis Date: **21-Feb-2018 11:21**
Client ID: Run ID: **VOA2_311248** SeqNo: **4445422** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*43.48*	*1.0*	*50*	*0*	*87.0*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*48.45*	*1.0*	*50*	*0*	*96.9*	*85 - 114*				
Surr: Dibromofluoromethane	*44.4*	*1.0*	*50*	*0*	*88.8*	*80 - 119*				
Surr: Toluene-d8	*53.4*	*1.0*	*50*	*0*	*107*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180221** Units: **ug/L** Analysis Date: **21-Feb-2018 10:32**
Client ID: Run ID: **VOA2_311248** SeqNo: **4445420** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	45.08	1.0	50	0	90.2	78 - 124				
1,1,1-Trichloroethane	47.01	1.0	50	0	94.0	74 - 131				
1,1,2,2-Tetrachloroethane	42.56	1.0	50	0	85.1	71 - 121				
1,1,2-Trichloroethane	44.85	1.0	50	0	89.7	80 - 119				
1,1-Dichloroethane	44.77	1.0	50	0	89.5	77 - 125				
1,1-Dichloroethene	48.27	1.0	50	0	96.5	71 - 131				
1,1-Dichloropropene	49.17	1.0	50	0	98.3	79 - 125				
1,2,3-Trichlorobenzene	46.31	1.0	50	0	92.6	69 - 129				
1,2,3-Trichloropropane	43.51	1.0	50	0	87.0	73 - 122				
1,2,4-Trichlorobenzene	45.57	1.0	50	0	91.1	69 - 130				
1,2,4-Trimethylbenzene	46.42	1.0	50	0	92.8	76 - 124				
1,2-Dibromo-3-chloropropane	45.67	1.0	50	0	91.3	62 - 128				
1,2-Dibromoethane	47.23	1.0	50	0	94.5	77 - 121				
1,2-Dichlorobenzene	40.81	1.0	50	0	81.6	80 - 119				
1,2-Dichloroethane	46.4	1.0	50	0	92.8	73 - 128				
1,2-Dichloropropane	44.74	1.0	50	0	89.5	78 - 122				
1,3,5-Trimethylbenzene	47.4	1.0	50	0	94.8	75 - 124				
1,3-Dichlorobenzene	42.07	1.0	50	0	84.1	80 - 119				
1,3-Dichloropropane	44.32	1.0	50	0	88.6	80 - 119				
1,4-Dichlorobenzene	41.3	1.0	50	0	82.6	79 - 118				
2,2-Dichloropropane	46.91	1.0	50	0	93.8	60 - 139				
2-Butanone	103.9	2.0	100	0	104	56 - 143				
2-Chlorotoluene	46.1	1.0	50	0	92.2	79 - 122				
2-Hexanone	99.38	2.0	100	0	99.4	57 - 139				
4-Chlorotoluene	46.93	1.0	50	0	93.9	78 - 122				
4-Isopropyltoluene	41.89	1.0	50	0	83.8	77 - 127				
4-Methyl-2-pentanone	90.4	2.0	100	0	90.4	67 - 130				
Acetone	98.14	2.0	100	0	98.1	39 - 160				
Benzene	45.27	1.0	50	0	90.5	79 - 120				
Bromobenzene	40.46	1.0	50	0	80.9	80 - 120				
Bromochloromethane	49.04	1.0	50	0	98.1	78 - 123				
Bromodichloromethane	47.34	1.0	50	0	94.7	79 - 125				
Bromoform	49.87	1.0	50	0	99.7	66 - 130				
Bromomethane	50.22	1.0	50	0	100	53 - 141				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180221** Units: **ug/L** Analysis Date: **21-Feb-2018 10:32**
Client ID: Run ID: **VOA2_311248** SeqNo: **4445420** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	92.37	2.0	100	0	92.4	64 - 133				
Carbon tetrachloride	44.03	1.0	50	0	88.1	72 - 136				
Chlorobenzene	43.73	1.0	50	0	87.5	80 - 120				
Chloroethane	43.41	1.0	50	0	86.8	82 - 118				
Chloroform	43.65	1.0	50	0	87.3	79 - 124				
Chloromethane	48.28	1.0	50	0	96.6	50 - 139				
cis-1,2-Dichloroethene	46.94	1.0	50	0	93.9	78 - 123				
cis-1,3-Dichloropropene	49.43	1.0	50	0	98.9	75 - 124				
Dibromochloromethane	47.27	1.0	50	0	94.5	74 - 126				
Dibromomethane	51.04	1.0	50	0	102	79 - 123				
Dichlorodifluoromethane	46.88	1.0	50	0	93.8	32 - 152				
Ethylbenzene	49.14	1.0	50	0	98.3	79 - 121				
Hexachlorobutadiene	46.08	1.0	50	0	92.2	66 - 134				
Isopropylbenzene	45.35	1.0	50	0	90.7	72 - 131				
m,p-Xylene	87.84	2.0	100	0	87.8	80 - 121				
Methylene chloride	43.43	2.0	50	0	86.9	74 - 124				
Naphthalene	49.28	1.0	50	0	98.6	61 - 128				
n-Butylbenzene	44	1.0	50	0	88.0	75 - 128				
n-Propylbenzene	41.5	1.0	50	0	83.0	76 - 126				
o-Xylene	44.71	1.0	50	0	89.4	78 - 122				
sec-Butylbenzene	43.75	1.0	50	0	87.5	77 - 126				
Styrene	44.87	1.0	50	0	89.7	78 - 128				
tert-Butylbenzene	42.13	1.0	50	0	84.3	78 - 124				
Tetrachloroethene	45.25	1.0	50	0	90.5	74 - 129				
Toluene	42.53	1.0	50	0	85.1	80 - 121				
trans-1,2-Dichloroethene	48.73	1.0	50	0	97.5	75 - 124				
trans-1,3-Dichloropropene	51.56	1.0	50	0	103	73 - 127				
Trichlorofluoromethane	45.83	1.0	50	0	91.7	65 - 141				
Vinyl chloride	46.45	1.0	50	0	92.9	58 - 137				
Surr: 1,2-Dichloroethane-d4	*44.28*	*1.0*	*50*	*0*	*88.6*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.44*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*41.9*	*1.0*	*50*	*0*	*83.8*	*80 - 119*				
Surr: Toluene-d8	*51.43*	*1.0*	*50*	*0*	*103*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18020569-06MS** Units: **ug/L** Analysis Date: **21-Feb-2018 15:09**
Client ID: Run ID: **VOA2_311248** SeqNo: **4447039** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.68	1.0	50	0	87.4	78 - 124				
1,1,1-Trichloroethane	48.44	1.0	50	0	96.9	74 - 131				
1,1,2,2-Tetrachloroethane	40.48	1.0	50	0	81.0	71 - 121				
1,1,2-Trichloroethane	42.45	1.0	50	0	84.9	80 - 119				
1,1-Dichloroethane	44.58	1.0	50	0	89.2	77 - 125				
1,1-Dichloroethene	49.52	1.0	50	0	99.0	71 - 131				
1,1-Dichloropropene	49.15	1.0	50	0	98.3	79 - 125				
1,2,3-Trichlorobenzene	44.29	1.0	50	0	88.6	69 - 129				
1,2,3-Trichloropropane	41.09	1.0	50	0	82.2	73 - 122				
1,2,4-Trichlorobenzene	43.58	1.0	50	0	87.2	69 - 130				
1,2,4-Trimethylbenzene	46.09	1.0	50	0	92.2	76 - 124				
1,2-Dibromo-3-chloropropane	43.44	1.0	50	0	86.9	62 - 128				
1,2-Dibromoethane	44.57	1.0	50	0	89.1	77 - 121				
1,2-Dichlorobenzene	40.37	1.0	50	0	80.7	80 - 119				
1,2-Dichloroethane	43.58	1.0	50	0	87.2	73 - 128				
1,2-Dichloropropane	43.8	1.0	50	0	87.6	78 - 122				
1,3,5-Trimethylbenzene	47.17	1.0	50	0	94.3	75 - 124				
1,3-Dichlorobenzene	40.55	1.0	50	0	81.1	80 - 119				
1,3-Dichloropropane	41.86	1.0	50	0	83.7	80 - 119				
1,4-Dichlorobenzene	40.02	1.0	50	0	80.0	79 - 118				
2,2-Dichloropropane	40.35	1.0	50	0	80.7	60 - 139				
2-Butanone	96.67	2.0	100	0	96.7	56 - 143				
2-Chlorotoluene	45.35	1.0	50	0	90.7	79 - 122				
2-Hexanone	95.56	2.0	100	0	95.6	57 - 139				
4-Chlorotoluene	45.89	1.0	50	0	91.8	78 - 122				
4-Isopropyltoluene	41.94	1.0	50	0	83.9	77 - 127				
4-Methyl-2-pentanone	87.79	2.0	100	0	87.8	67 - 130				
Acetone	94.23	2.0	100	0	94.2	39 - 160				
Benzene	45.05	1.0	50	0	90.1	79 - 120				
Bromobenzene	39.79	1.0	50	0	79.6	80 - 120				S
Bromochloromethane	46.8	1.0	50	0	93.6	78 - 123				
Bromodichloromethane	45.84	1.0	50	0	91.7	79 - 125				
Bromoform	47.12	1.0	50	0	94.2	66 - 130				
Bromomethane	47.7	1.0	50	0	95.4	53 - 141				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18020569-06MS** Units: **ug/L** Analysis Date: **21-Feb-2018 15:09**
Client ID: Run ID: **VOA2_311248** SeqNo: **4447039** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	97.64	2.0	100	0	97.6	64 - 133				
Carbon tetrachloride	50.05	1.0	50	0	100	72 - 136				
Chlorobenzene	42.59	1.0	50	0	85.2	80 - 120				
Chloroethane	39.83	1.0	50	0	79.7	82 - 118				S
Chloroform	42.24	1.0	50	0	84.5	79 - 124				
Chloromethane	42.9	1.0	50	0	85.8	50 - 139				
cis-1,2-Dichloroethene	49.3	1.0	50	0	98.6	78 - 123				
cis-1,3-Dichloropropene	45.34	1.0	50	0	90.7	75 - 124				
Dibromochloromethane	44.83	1.0	50	0	89.7	74 - 126				
Dibromomethane	46.09	1.0	50	0	92.2	79 - 123				
Dichlorodifluoromethane	43.07	1.0	50	0	86.1	32 - 152				
Ethylbenzene	48.79	1.0	50	0	97.6	79 - 121				
Hexachlorobutadiene	43.43	1.0	50	0	86.9	66 - 134				
Isopropylbenzene	45.15	1.0	50	0	90.3	72 - 131				
m,p-Xylene	86.86	2.0	100	0	86.9	80 - 121				
Methylene chloride	42.07	2.0	50	0	84.1	74 - 124				
Naphthalene	48.27	1.0	50	0	96.5	61 - 128				
n-Butylbenzene	43.37	1.0	50	0	86.7	75 - 128				
n-Propylbenzene	41.45	1.0	50	0	82.9	76 - 126				
o-Xylene	43.95	1.0	50	0	87.9	78 - 122				
sec-Butylbenzene	43.99	1.0	50	0	88.0	77 - 126				
Styrene	42.28	1.0	50	0	84.6	78 - 128				
tert-Butylbenzene	42.44	1.0	50	0	84.9	78 - 124				
Tetrachloroethene	45.41	1.0	50	0	90.8	74 - 129				
Toluene	42.64	1.0	50	0.4703	84.3	80 - 121				
trans-1,2-Dichloroethene	46.86	1.0	50	0	93.7	75 - 124				
trans-1,3-Dichloropropene	47.31	1.0	50	0	94.6	73 - 127				
Trichlorofluoromethane	49.52	1.0	50	0	99.0	65 - 141				
Vinyl chloride	49.4	1.0	50	0	98.8	58 - 137				
Surr: 1,2-Dichloroethane-d4	*44.88*	*1.0*	*50*	*0*	*89.8*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.74*	*1.0*	*50*	*0*	*99.5*	*85 - 114*				
Surr: Dibromofluoromethane	*41.61*	*1.0*	*50*	*0*	*83.2*	*80 - 119*				
Surr: Toluene-d8	*51*	*1.0*	*50*	*0*	*102*	*89 - 112*				

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18020569-06MSD** Units: **ug/L** Analysis Date: **21-Feb-2018 15:33**
Client ID: Run ID: **VOA2_311248** SeqNo: **4447040** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.41	1.0	50	0	86.8	78 - 124	43.68	0.611	20	
1,1,1-Trichloroethane	46.24	1.0	50	0	92.5	74 - 131	48.44	4.65	20	
1,1,2,2-Tetrachloroethane	40.45	1.0	50	0	80.9	71 - 121	40.48	0.0792	20	
1,1,2-Trichloroethane	42.62	1.0	50	0	85.2	80 - 119	42.45	0.397	20	
1,1-Dichloroethane	43.74	1.0	50	0	87.5	77 - 125	44.58	1.9	20	
1,1-Dichloroethene	47.33	1.0	50	0	94.7	71 - 131	49.52	4.53	20	
1,1-Dichloropropene	49.25	1.0	50	0	98.5	79 - 125	49.15	0.195	20	
1,2,3-Trichlorobenzene	44.28	1.0	50	0	88.6	69 - 129	44.29	0.0385	20	
1,2,3-Trichloropropane	41.21	1.0	50	0	82.4	73 - 122	41.09	0.302	20	
1,2,4-Trichlorobenzene	43.05	1.0	50	0	86.1	69 - 130	43.58	1.24	20	
1,2,4-Trimethylbenzene	44.05	1.0	50	0	88.1	76 - 124	46.09	4.52	20	
1,2-Dibromo-3-chloropropane	44.67	1.0	50	0	89.3	62 - 128	43.44	2.79	20	
1,2-Dibromoethane	44.99	1.0	50	0	90.0	77 - 121	44.57	0.932	20	
1,2-Dichlorobenzene	38.23	1.0	50	0	76.5	80 - 119	40.37	5.45	20	S
1,2-Dichloroethane	42.03	1.0	50	0	84.1	73 - 128	43.58	3.63	20	
1,2-Dichloropropane	42.96	1.0	50	0	85.9	78 - 122	43.8	1.93	20	
1,3,5-Trimethylbenzene	44.59	1.0	50	0	89.2	75 - 124	47.17	5.61	20	
1,3-Dichlorobenzene	39.36	1.0	50	0	78.7	80 - 119	40.55	3	20	S
1,3-Dichloropropane	41.7	1.0	50	0	83.4	80 - 119	41.86	0.401	20	
1,4-Dichlorobenzene	38.56	1.0	50	0	77.1	79 - 118	40.02	3.72	20	S
2,2-Dichloropropane	39.02	1.0	50	0	78.0	60 - 139	40.35	3.35	20	
2-Butanone	100	2.0	100	0	100	56 - 143	96.67	3.43	20	
2-Chlorotoluene	43.75	1.0	50	0	87.5	79 - 122	45.35	3.6	20	
2-Hexanone	100.8	2.0	100	0	101	57 - 139	95.56	5.34	20	
4-Chlorotoluene	43.88	1.0	50	0	87.8	78 - 122	45.89	4.46	20	
4-Isopropyltoluene	39.93	1.0	50	0	79.9	77 - 127	41.94	4.9	20	
4-Methyl-2-pentanone	91.8	2.0	100	0	91.8	67 - 130	87.79	4.46	20	
Acetone	102.1	2.0	100	0	102	39 - 160	94.23	8.02	20	
Benzene	43.8	1.0	50	0	87.6	79 - 120	45.05	2.82	20	
Bromobenzene	37.61	1.0	50	0	75.2	80 - 120	39.79	5.64	20	S
Bromochloromethane	47.32	1.0	50	0	94.6	78 - 123	46.8	1.1	20	
Bromodichloromethane	44.69	1.0	50	0	89.4	79 - 125	45.84	2.54	20	
Bromoform	48.21	1.0	50	0	96.4	66 - 130	47.12	2.3	20	
Bromomethane	45.23	1.0	50	0	90.5	53 - 141	47.7	5.32	20	

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: HS18020534

QC BATCH REPORT

Batch ID: R311248 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18020569-06MSD** Units: **ug/L** Analysis Date: **21-Feb-2018 15:33**
Client ID: Run ID: **VOA2_311248** SeqNo: **4447040** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	94.34	2.0	100	0	94.3	64 - 133	97.64	3.43	20	
Carbon tetrachloride	47.85	1.0	50	0	95.7	72 - 136	50.05	4.49	20	
Chlorobenzene	41.52	1.0	50	0	83.0	80 - 120	42.59	2.55	20	
Chloroethane	48.89	1.0	50	0	97.8	82 - 118	39.83	20.4	20	R
Chloroform	41.99	1.0	50	0	84.0	79 - 124	42.24	0.598	20	
Chloromethane	42.58	1.0	50	0	85.2	50 - 139	42.9	0.728	20	
cis-1,2-Dichloroethene	46.92	1.0	50	0	93.8	78 - 123	49.3	4.96	20	
cis-1,3-Dichloropropene	45.44	1.0	50	0	90.9	75 - 124	45.34	0.222	20	
Dibromochloromethane	44.7	1.0	50	0	89.4	74 - 126	44.83	0.303	20	
Dibromomethane	47.37	1.0	50	0	94.7	79 - 123	46.09	2.75	20	
Dichlorodifluoromethane	39.66	1.0	50	0	79.3	32 - 152	43.07	8.23	20	
Ethylbenzene	48.3	1.0	50	0	96.6	79 - 121	48.79	1.02	20	
Hexachlorobutadiene	42.74	1.0	50	0	85.5	66 - 134	43.43	1.58	20	
Isopropylbenzene	44.34	1.0	50	0	88.7	72 - 131	45.15	1.81	20	
m,p-Xylene	85.29	2.0	100	0	85.3	80 - 121	86.86	1.83	20	
Methylene chloride	41.2	2.0	50	0	82.4	74 - 124	42.07	2.08	20	
Naphthalene	49.24	1.0	50	0	98.5	61 - 128	48.27	1.99	20	
n-Butylbenzene	41.37	1.0	50	0	82.7	75 - 128	43.37	4.72	20	
n-Propylbenzene	39.56	1.0	50	0	79.1	76 - 126	41.45	4.67	20	
o-Xylene	42.8	1.0	50	0	85.6	78 - 122	43.95	2.67	20	
sec-Butylbenzene	41.64	1.0	50	0	83.3	77 - 126	43.99	5.48	20	
Styrene	41.68	1.0	50	0	83.4	78 - 128	42.28	1.43	20	
tert-Butylbenzene	40.42	1.0	50	0	80.8	78 - 124	42.44	4.87	20	
Tetrachloroethene	44.58	1.0	50	0	89.2	74 - 129	45.41	1.84	20	
Toluene	42.07	1.0	50	0.4703	83.2	80 - 121	42.64	1.34	20	
trans-1,2-Dichloroethene	46.76	1.0	50	0	93.5	75 - 124	46.86	0.233	20	
trans-1,3-Dichloropropene	47.29	1.0	50	0	94.6	73 - 127	47.31	0.0375	20	
Trichlorofluoromethane	47.69	1.0	50	0	95.4	65 - 141	49.52	3.76	20	
Vinyl chloride	47.59	1.0	50	0	95.2	58 - 137	49.4	3.74	20	
Surr: 1,2-Dichloroethane-d4	*45.42*	*1.0*	*50*	*0*	*90.8*	*81 - 118*	*44.88*	*1.19*	*20*	
Surr: 4-Bromofluorobenzene	*50.85*	*1.0*	*50*	*0*	*102*	*85 - 114*	*49.74*	*2.21*	*20*	
Surr: Dibromofluoromethane	*40.83*	*1.0*	*50*	*0*	*81.7*	*80 - 119*	*41.61*	*1.88*	*20*	
Surr: Toluene-d8	*51.55*	*1.0*	*50*	*0*	*103*	*89 - 112*	*51*	*1.08*	*20*	

The following samples were analyzed in this batch: HS18020534-02 HS18020534-03

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

ALS Group USA, Corp Date: 22-Feb-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP - 16 Annuals
WorkOrder: **HS18020534**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
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/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group USA, Corp Date: 22-Feb-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	17-027-0	27-Mar-2018
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

00884169

ALS Group USA, Corp Date: 22-Feb-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18020534
Date/Time Received: **08-Feb-2018 08:40**
Received by: **JRM**

Checklist completed by: *Paresh M. Giga* eSignature 9-Feb-2018 Date
Reviewed by: *RJ Modashia* eSignature 12-Feb-2018 Date

Matrices: **Groundwater/Water**
Carrier name: **FedEx**

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 ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.6c/2.0c U/C	IR30	
Cooler(s)/Kit(s):	24554		
Date/Time sample(s) sent to storage:	2/8/18 21:00		
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:

Corrective Action:

00884170

bhate
ENVIRONMENTAL CONSULTING FIRM

Page: 1 of 1

Project/Phase No: NWO1312.0150

COC Number(1): _____

LIMS Number: _____

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205
Tel: 205-918-4000
Fax: 205-918-4050

Chain of Custody and Analytical Request

Facility/Base I.D.: LHAAP

Project/Site Name: LHAAP – 16 Annual

Client Name:

Collected by: Scott Beesinger

Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning – ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	VOC 8620	Perchlorate 6850									Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
16EW01_020718		02-07-18	1225	-			WG	4	X	X												
16EW02_020718		02-07-18	1310	-			WG	4	X	X												
16EW03_020718		02-07-18	1320	-			WG	4	X	X												
16EW04_020718		02-07-18	1350				WG	4	X	X												
16EW05_020718		02-07-18	1238				WG	4	X	X												
16EW05_020718_a		02-07-18	1238	-			WG	4	X	X												
16EW06_020718		02-07-18	1300	-			WG	4	X	X												
16EW07_020718		02-07-18	1330	-			WG	4	X	X												
16EW08_020718		02-07-18	1340	-			WG	4	X	X												
Trip Blank				-			W	2	X													
				-																		

Sample Analysis Requested (5) | Quality Assurance Samples (6)

HS18020534

Bhate Environmental Associates, Inc.

LHAAP - 16 Annuals

COMMENTS: _____

Custody Transfers Prior to Receipt by Laboratory

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1.	Scott Beesinger	2/7/18	1430	Jim	2/8/18	08:40
2.						
3.						

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: _____ Shipped No.:

_____ Method of Shipment: _____

_____ Fed Ex _____ Airbill Number:

_____ Analytical Lab: ALS 10450 Stanfill Rd, Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: SONIA WEST Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: IN = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

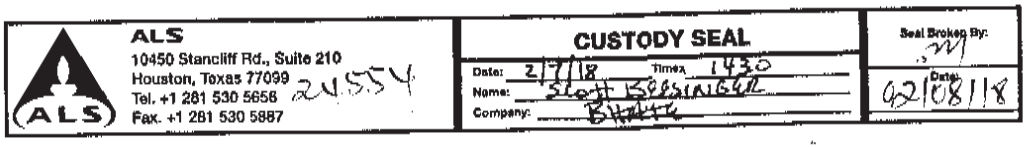
4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

Cooler - 24554
Temp 1.6 uc
1230
CF 0.4

00884171



ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

24554

CUSTODY SEAL

Date: 2/7/18 Time: 1430
Name: Scott Beesinger
Company: BHATE

Seal Broken By: [illegible]
Date: 02/08/18

24554 FEB 0 8 2018

FedEx
TRK# 0221 7376 9752 1810

THU - 08 FEB 10:30A
PRIORITY OVERNIGHT

AB SGRA 24554

77099
TX-US
IAH

FTO 5090267 07FC010 GGGA 546C1/1220/0C0A

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1803622; 1803625; 1803629; 1804064; 1804362

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2046 (208525)

General Set Information: There were thirteen field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Sample 1803625001 was analyzed and reported at a 1:1,000 dilution. Samples 1804362001/05/06 were analyzed and reported at 1:10 dilutions. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 587237) was less than 1/2 the CRDL. The recovery for the LCS (587238) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1803622001 (Client ID: LH18/24-SP650_013118). The Matrix Spike and duplicate (MS/MSD – 587239/40) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The relative percent difference (RPD) was within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: The 83/85 ion ratio failed for field samples 1804362003/04/07. No positive results were reported for these samples. These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations were performed for some of the Initial Calibration analyses (datafiles: 28NOVP01/02) along with datafiles 13FEBD02/03/14/15/17.

Thomas Bosch — February 15, 2018
Analyst — Date

ANALYTICAL REPORT

Report Date: February 16, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1804362**
Project ID: HS18020534 020718
Purchase Order: HS18020534
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
16EW01_020718	1804362001	02/07/18	02/10/18	
16EW02_020718	1804362002	02/07/18	02/10/18	
16EW03_020718	1804362003	02/07/18	02/10/18	
16EW04_020718	1804362004	02/07/18	02/10/18	
16EW05_020718	1804362005	02/07/18	02/10/18	
16EW05_020718-a	1804362006	02/07/18	02/10/18	
16EW06_020718	1804362007	02/07/18	02/10/18	
16EW07_020718	1804362008	02/07/18	02/10/18	
16EW08_020718	1804362009	02/07/18	02/10/18	

ANALYTICAL REPORT

Workorder: 34-1804362
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **16EW01_020718** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362001 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 13:56 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**130**	10	20	40	10	

Sample ID: **16EW02_020718** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362002 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 11:28 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**5.0**	1.0	2.0	4.0	1	

Sample ID: **16EW03_020718** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362003 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 11:42 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Sample ID: **16EW04_020718** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362004 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 11:57 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

ANALYTICAL REPORT

Workorder: 34-1804362
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **16EW05_020718** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362005 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 12:42 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**130**	10	20	40	10	

Sample ID: **16EW05_020718-a** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362006 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 12:57 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**110**	10	20	40	10	

Sample ID: **16EW06_020718** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362007 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 13:12 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Sample ID: **16EW07_020718** | Sampling Site: NA | Collected: 02/07/2018
Lab ID: 1804362008 | Media: 125 mL Nalgene | Received: 02/10/2018
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2046 (HBN: 208525) | **Percent Solid:** NA
Analyzed: 02/13/2018 13:27 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

ANALYTICAL REPORT

Workorder: 34-1804362
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **16EW08_020718**	Sampling Site: NA	Collected: 02/07/2018
Lab ID: 1804362009	Media: 125 mL Nalgene	Received: 02/10/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2046 (HBN: 208525)	**Percent Solid:** NA
	Analyzed: 02/13/2018 13:41	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Comments

Quality Control: EPA 6850, DoD QSM - (HBN: 208525)

Sample 1803625001 was analyzed and reported at a 1:1,000 dilution. Samples 1804362001/05/06 were analyzed and reported at 1:10 dilutions. The reporting limits have been adjusted accordingly.

The Matrix Spike and duplicate (MS/MSD – 587239/40) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 02/15/2018 10:45	/S/ Stephen Brose 02/16/2018 09:27

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1804362
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ANAB (DoD ELAP)	ADE-1420	http://www.anab.org/accredited-organizations/
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
	Kansas	E-10416	http://www.kdheks.gov/lipo/index.html
Industrial Hygiene	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
Lead Testing:			
CPSC	ANAB (ISO 17025, CPSC)	ADE-1420	http://www.anab.org/accredited-organizations/
Soil, Dust, Paint ,Air	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

Workorder: 34-1804362
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1804362

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2046 (HBN: 208525)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 587237
Analyzed: 02/13/2018 09:12
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 587238
Analyzed: 02/13/2018 09:27
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.48	5.00	89.6	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1803622001	**MS:** 587239	**MSD:** 587240
Analyzed: 02/13/2018 09:43	**Analyzed:** 02/13/2018 09:58	**Analyzed:** 02/13/2018 10:13
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	51.0	53.9	5	▲ 60.3	78.8	123.8	53.6	▲ 53.7	0.622	0.0	20.0

Continuing Calibration Verification

CCV: 587234	**CCV:** 587241	**CCV:** 587243
Analyzed: 02/13/2018 08:27	**Analyzed:** 02/13/2018 12:12	**Analyzed:** 02/13/2018 14:10
Units: ug/L	**Units:** ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	23.1	25.0	92.4	22.9	25.0	91.8	23.8	25.0	95.4

Interference Check Sample

ICSA: 587236
Analyzed: 02/13/2018 08:58
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.940	1.00	94.0

Limit of Detection Verification

LODV: 587235	**LODV:** 587242	**LODV:** 587244
Analyzed: 02/13/2018 08:43	**Analyzed:** 02/13/2018 12:26	**Analyzed:** 02/13/2018 14:25
Units: ug/L	**Units:** ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.780	1.00	78.0	0.960	1.00	96.0	0.974	1.00	97.4

Quality Control Sample Batch Report

Analysis Information

Workorder: 1804362

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2046 (HBN: 208525)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Comments

Sample 1803625001 was analyzed and reported at a 1:1,000 dilution. Samples 1804362001/05/06 were analyzed and reported at 1:10 dilutions. The reporting limits have been adjusted accordingly.

The Matrix Spike and duplicate (MS/MSD – 587239/40) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
02/15/2018 10:46	02/16/2018 09:27

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◆ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

18698/#2

1804362

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 8586

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company: ALS Houston
Contact: RJ Modashia
Address: 10450 Stancliff Rd, Ste 210
Phone: +1 281 530 5656
Email: RJ.Modashia@alsglobal.com
Alternate Contact:
Email:

INVOICE INFORMATION:

Company: ALS Houston
Contact: Accounts Payable
Address: 10450 Stancliff Rd, Ste 210
Phone: +1 281 530 5656
Reference: HS18020534
TSR: Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18020534-01**	**16EW01_020718**	**Groundwater**	**07 Feb 2018 12:25**
	SUB_Perch-6850			22 Feb 2018
2.	**HS18020534-02**	**16EW02_020718**	**Groundwater**	**07 Feb 2018 13:10**
	SUB_Perch-6850			22 Feb 2018
3.	**HS18020534-03**	**16EW03_020718**	**Groundwater**	**07 Feb 2018 13:20**
	SUB_Perch-6850			22 Feb 2018
4.	**HS18020534-04**	**16EW04_020718**	**Groundwater**	**07 Feb 2018 13:50**
	SUB_Perch-6850			22 Feb 2018
5.	**HS18020534-05**	**16EW05_020718**	**Groundwater**	**07 Feb 2018 12:38**
	SUB_Perch-6850			22 Feb 2018
6.	**HS18020534-06**	**16EW05_020718_a**	**Groundwater**	**07 Feb 2018 12:38**
	SUB_Perch-6850			22 Feb 2018
7.	**HS18020534-07**	**16EW06_020718**	**Groundwater**	**07 Feb 2018 13:00**
	SUB_Perch-6850			22 Feb 2018
8.	**HS18020534-08**	**16EW07_020718**	**Groundwater**	**07 Feb 2018 13:30**
	SUB_Perch-6850			22 Feb 2018
9.	**HS18020534-09**	**16EW08_020718**	**Groundwater**	**07 Feb 2018 13:40**

Subcontract Chain of Custody

COC ID: 8586

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
SUB_Perch-6850			22 Feb 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 2/9/18 1800

Received By: _____ Date/Time: 2/10/18

Cooler ID(s): 8240 Temperature(s): _____

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18020534	Split:	Workorder ID: 1804362	Level: ENV_LVL4	Requested Analysis
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly	
Comments:			Preservatives: COOL	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	EPA 6850, DoD QSM
1	02/07/2018 12:25	16EW01_020718	1804362001		Water	A	1	A
2	02/07/2018 13:10	16EW02_020718	1804362002		Water	A	1	A
3	02/07/2018 13:20	16EW03_020718	1804362003		Water	A	1	A
4	02/07/2018 13:50	16EW04_020718	1804362004		Water	A	1	A
5	02/07/2018 12:38	16EW05_020718	1804362005		Water	A	1	A
6	02/07/2018 12:38	16EW05_020718-a	1804362006		Water	A	1	A
7	02/07/2018 13:00	16EW06_020718	1804362007		Water	A	1	A
8	02/07/2018 13:30	16EW07_020718	1804362008		Water	A	1	A
9	02/07/2018 13:40	16EW08_020718	1804362009		Water	A	1	A
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	02/10/2018 09:20	ALS Sample Receiving	Sample Login
Julie Warath 2/12/18 500		ISC	Storage
R-33.1 2-13-18/07:52		T. Bash	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

00884184

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Hon Stor

Project/Task/Site: 1804362

Date/Time of Receipt: 2/10/18 920

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Coolant/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:								
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA		
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA		
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA		
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA		

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8240	3 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: [signature] (Signature) Mercedes Adams (Printed Name) 2/10/18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

00884186



ORIGIN ID:SGRA (281) 530-5656
SHIPPING DEPT
ALS LABORATORY GROUP
10450 STANCLIFF RD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 09FEB18
ACTWGT: 11.95 LB
CAD: 300130/CAFE3108
DIMS: 14x11x10 IN

BILL SENDER

TO **KEVIN GRIFFITHS**
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18020534 - RJ



FedEx Express



J171016102001cv

SATURDAY 12:00P
PRIORITY OVERNIGHT

TRK# 0201 **7376 9752 4327**

XO BTFA

84123
UT-US **SLC**



Batch Worklist

Batch: ELMS/ 2046 **Created:** 2/13/2018 08:15 **Instrument:** **HBN:** 208525

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1803622 [ENV_LVL4]
Workorder: 1803625 [ENV_LVL4]
Workorder: 1803629 [ENV_LVL4]
Workorder: 1804064 [ENV_LVL4]
Workorder: 1804362 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	587234	CCV for HBN 208525 [ELMS/2046]				CCV	3		E685041C3Q	5311		2/16/2018	
2	587235	LODV for HBN 208525 [ELMS/2046				LODV	3		E6850..D3Q	5311		2/16/2018	
3	587236	ICS for HBN 208525 [ELMS/2046]				ICS	3		E6850..D3Q	5311		2/16/2018	
4	587237	LMB for HBN 208525 [ELMS/2046]				LMB	3		E6850Q413Q	5311		2/16/2018	
5	587238	LCS for HBN 208525 [ELMS/2046]				LCS	3		E6850Q413Q	5311		2/16/2018	
6	1803622001	LH18/24-SP650_013118				SAMPLE	3	1803622001-A	E6850Q41.3	5480	2/28/2018	2/16/2018	
7	587239	LH18/24-SP650...(1803622001MS)				MS	3		E6850Q413Q	5311		2/16/2018	
8	587240	LH18/24-SP65...(1803622001MSD)				MSD	3		E6850Q413Q	5311		2/16/2018	
9	1803625001	LH18/24-SP140_013118				SAMPLE	3	1803625001-A	E6850Q41.3	5480	2/28/2018	2/16/2018	
10	1803629001	LH18/24-SP650_013118				SAMPLE	3	1803629001-A	E6850Q41.3	5480	2/28/2018	2/16/2018	
11	1804064001	LH18/24-SP650_020718				SAMPLE	3	1804064001-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
12	1804362001	16EW01_020718				SAMPLE	3	1804362001-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
13	1804362002	16EW02_020718				SAMPLE	3	1804362002-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
14	1804362003	16EW03_020718				SAMPLE	3	1804362003-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
15	1804362004	16EW04_020718				SAMPLE	3	1804362004-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
16	1804362005	16EW05_020718				SAMPLE	3	1804362005-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
17	1804362006	16EW05_020718-a				SAMPLE	3	1804362006-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
18	587241	CCV for HBN 208525 [ELMS/2046]				CCV	3		E685041C3Q	5311		2/16/2018	
19	587242	LODV for HBN 208525 [ELMS/2046				LODV	3		E6850..D3Q	5311		2/16/2018	
20	1804362007	16EW06_020718				SAMPLE	3	1804362007-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
21	1804362008	16EW07_020718				SAMPLE	3	1804362008-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
22	1804362009	16EW08_020718				SAMPLE	3	1804362009-A	E6850Q41.3	5480	3/7/2018	2/22/2018	
23	587243	CCV for HBN 208525 [ELMS/2046]				CCV	3		E685041C3Q	5311		2/16/2018	
24	587244	LODV for HBN 208525 [ELMS/2046				LODV	3		E6850..D3Q	5311		2/16/2018	

00884187



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1803622 (001); 1803625 (001); 1803629 (001); 1804064 (001); 1804362 (001-09)
ELMS Batch/HBN ID: 2046 (208525)
Prep Date: 02/13/2018 Analysis Date: 02/13/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\FEB\13FEB18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 11/28/2017, sequence 28NOV17P.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 587238; Target = 5.0µg/L. ASTM type II water was used for LMB 587237.

MS/MSD: MS/MSD was performed on sample 1803622001 (Client ID: LH18/24-SP650_013118). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L. Sample 1803625001 was analyzed and reported at a 1:1,000 dilution. Samples 1804362001/05/06 were analyzed and reported at 1:10 dilutions. The reporting limits have been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike and duplicate (MS/MSD – 587239/40) failed QC acceptance criteria for percent recoveries. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The ion ratio of m/z 83 to 85 often fails at levels near the reported Detection Limit (DL). The 83/85 ion ratio failed for field samples 1804362003/04/07. No positive results were reported for these samples.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\FEB\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for some of the Initial Calibration analyses (datafiles: 28NOVP01,02) along with datafiles 13FEBD02/03/14/15/17.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\208525-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 36735
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 WRK

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 36733	Created By: T. Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 5/10/2017	Expires: 10/4/2018
MFG Lot: 216095148	Lab Lot: CLO4 STOCK	Usable: Yes
Part ID: IC-PER-10X-1		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:	Lab Lot: LAB 109	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 INT

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749 | Created By: T. Bosch | Amount: 10 mL
MFG: ALS/SLC | Create Date: 05/11/2017 | Expires: 05/11/2018
MFG Lot: TNB: 05/11/2017 | Lab Lot: CLO4 QC INT 10.ug/mL | Usable: Yes
Part ID:

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:	Lab Lot: LAB 109	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK	Description - 6850 QC Stock STD 1,000ug/mL

Standard: 36748	Created By: T. Bosch	Amount: 100 mL
MFG: Ultra Scientific	Create Date: 5/11/2017	Expires: 3/31/2020
MFG Lot: CP-0860	Lab Lot: CLO4 QC STOCK	Usable: Yes
Part ID: ICC-013		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 38780	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 10/09/2017 01:10PM	Expires: 10/09/2018
MFG Lot: TNB: 10/09/17	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

00884202

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

DR-ORG/INO-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number . Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

APPENDIX E
QUALITY CONTROL SUMMARY REPORT

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QUALITY CONTROL SUMMARY REPORT
1st QUARTER (JANUARY-MARCH) 2018
GROUNDWATER TREATMENT PLANT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

May 2018

Prepared For:

Longhorn Army Ammunition Plant
Karnack, Texas

Under Contract To:

U.S. Army Corps of Engineers
Tulsa District
Tulsa, Oklahoma

Contract Number: W9128F-13-D-0012
Task Order Number: W912BV17F0150

Prepared By:

1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

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1 INTRODUCTION

Bhate reviewed 30 data packages from ALS Environmental, Houston, Texas. Groundwater samples were collected January 10, 2018 through March 28, 2018 at the Groundwater Treatment Plant (GWTP) and Site LHAAP-16 at Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Data were reviewed for conformance to the requirements of the following guidance documents: *USEPA Contract Laboratory Program* [CLP] *National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA, January 2017), *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA, January 2017) and the *Army Draft Basewide Uniform Federal Policy (UFP) – Quality Assurance Project Plan (QAPP) Longhorn Army Ammunition Plant* (Bhate, November 2017).

1.1 Intended Use of Data

The objective of sampling at the GWTP is to monitor effluent streams to confirm compliance with discharge limits.

Analyses performed include:

- SW6850 – Perchlorate
- E350.3/SM4500 NH3 – Nitrogen, Ammonia
- E365.3/SM4500 P – Orthophosphate
- E415.1/SM5310 – Total Organic Carbon
- SW8260C- Volatiles
- SW8270D SIM- 1,4-Dioxane
- SW6020A/7470 – Metals
- SW9056A – Chloride (Cl) and Sulfate (SO_4)
- SW7196A – Hexavalent Chromium
- E410.4 – Chemical Oxygen Demand
- E1664A – Oil and Grease
- TO-15 – Volatiles in Air

Table 1 lists the sample identification numbers (IDs) and their associated laboratory package.

Table 2 lists qualified results with the qualification flag and reason code.

The following narrative is a brief synopsis of data that required qualification due to quality control discrepancies.

1.2 Preservation and Holding Times

Sample identification data were evaluated for agreement with the chain-of-custody (COC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and within the required hold time with the following exception. The GWTP sample, LH18/24-SP650_020718, perchlorate container was received outside temperature range. The non-detect result for perchlorate was qualified as estimated, “UJ”.

1.3 Calibrations

All analytes reported must be present in the initial and continuing calibration. The calibrations must meet the acceptance criteria specified in Worksheet 24 (Analytical Instrument Calibration) of the QAPP. All results reported must be within the calibration range. Samples were diluted, if necessary, to bring analyte responses within the calibration range.

1.3.1 Continuing Calibration Verifications

The calibrations must meet the following criteria, otherwise the compound is qualified J or UJ: The continuing calibration verification (CCV) criteria are 20 percent difference (%D) for VOCs and SVOCs and 50% for closing CCVs. Metals and general chemistry are 10%D; perchlorate is 15%D; and volatiles in air are 30%D.

All CCVs were within acceptance criteria.

1.4 Blanks

If the analyte result for an associated sample was less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, that result was qualified "UB" and considered an artifact of blank contamination. Where the sample result for the affected analyte was non-detect or greater than 5X the amount in the blank, no qualifier was applied.

Aluminum was detected in the method blank for the quarterly effluent sample. The sample concentration was <5X the blank concentration and flagged "UB" in sample LH18/24-SP650_022818.

1.5 Surrogates

Surrogates were evaluated using limits defined by each method in the project-specific QAPP, Worksheet 28.

No surrogates were reported outside control limits.

1.6 Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

LCS/LCSD recoveries were evaluated using limits defined in the project-specific QAPP, Worksheet 15.

All sample recoveries were within control limits.

1.7 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD)

MS/MSD recoveries were evaluated using limits defined in Worksheet 15 of the project-specific QAPP. When sample results were greater than 4X the spike amount, control limits were not applicable and require no qualification. Furthermore, if a MS/MSD analyses was performed on a batched (unrelated) sample, no qualification was made to the sample data.

1.7.1 SW8260

Site LHAAP-16 reported the MSD recovery of chloroethane below control limits. This compound was qualified as estimated non-detect, "UJ", in the sample used for the spike analysis (16EW01_020718). Some other target analytes failed QC limits but the sample concentration exceeded the spike amount by a factor of four or more and required no qualification.

1.8 Internal Standards

If the percent recovery (%R) for an internal standard in a sample is not within the limit, the associated sample is qualified for those analytes associated with the internal standard(s) outside of the limit.

Internal standards were within acceptance criteria for the associated compounds.

1.9 Field Precision

Precision is the measure of variability of individual sample measurements. Evaluation of field duplicates for precision was done using the RPD. The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at <30% for groundwater and air matrices.

1.9.1 SW8260

The LHAAP-16 RPD, between 16EW05_020718 and its duplicate, was exceeded for cis-1,2-dichloroethene; trichloroethene; and vinyl chloride. These compounds were qualified as estimated, "J", in both sample and duplicate.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (see Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Packages

Client Sample ID	Lab Package	SW6850	E350.3	E365.3	E415.1	SW8270D SIM	SW8260C	SW6020A /7470	SW9056A	SW7196A	E410.4	E1664A	TO-15
GWTP Samples													
LH18/24-SP650_011018	HS18010395	X	X	X	X								
LH18/24-SP650_011018	HS18010396						X		X				
LH18/24-SP650_012518	HS18011089		X	X	X								
LH18/24-SP650_012518	HS18011091	X (rush)											
LH18/24-SP650_012518	HS18011092						X		X				
LH18/24-SP650_013118	HS18020016	X				X	X	X		X			
LH18/24-SP140_013118	HS18020020	X						X		X			
LH18/24-SP650_013118	HS18020023	X	X	X	X								
LH18/24-SP650_020718	HS18020424	X	X	X	X								
LH18/24-SP650_020718	HS18020529						X		X				
LH18/24-SP650_021418	HS18020815	X	X	X	X								
LH18/24-SP140_021418	HS18020793	X						X		X			
LH18/24-SP650_021418	HS18020787	X				X	X	X		X			
LH18/24-SP650_022118	HS18021137		X	X	X								
LH18/24-SP650_022118_BIX	1805310	X											
LH18/24-SP650_022118_AIX	1805310	X											
LH18/24-SP650_022118	HS18021169						X		X				
LH18/24-SP650_022818	HS18030029	X	X	X	X								
LH18/24-SP140_022818	HS18030054	X				X	X	X	X		X	X	
LH18/24-SP650_022818	HS18030055	X				X	X	X	X		X	X	
INF Pond-Inlet_030718	1806736	X											
INF Pond-Outlet_030718	1806736	X											
LH18/24-SP650_030718	HS18030369	X	X	X	X								
LH18/24-SP650_030718	HS18030488						X		X				
LH18/24-SP650_031418	HS18030719	X				X	X	X		X			
LH18/24-SP140_031418	HS18030722	X						X		X			
LH18/24-SP650_031418	HS18030720	X	X	X	X								
LH18/24-SP650_032118	HS18031052	X	X	X	X								
LH18/24-SP650_032118	HS18031054						X		X				
LH18/24-SP650_032818	HS18031414	X	X	X	X								
Air Samples													
LH18/24-AIR_030518_Stripper	P1801150												X
LH18/24-AIR_030518_Stripper_Dup	P1801150												X
LH18/24-AIR_030518_GWTP	P1801150												X
LH18/24-AIR_030518_Downwind	P1801150												X
LHAAP-16													
16EW01_020718	HS18020534	X					X						
16EW02_020718	HS18020534	X					X						
16EW03_020718	HS18020534	X					X						
16EW04_020718	HS18020534	X					X						
16EW05_020718	HS18020534	X					X						
16EW05_020718_a	HS18020534	X					X						
16EW06_020718	HS18020534	X					X						
16EW07_020718	HS18020534	X					X						
16EW08_020718	HS18020534	X					X						

Notes:
ID – Identification
MW – Monitoring Well
SM – Standard Method
SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
E – U.S. Environmental Protection Agency Method
HS - Houston

Table 2: Qualified Analytical Data

Client Sample ID	Laboratory Package	Analyte Name	Data Validation Qualifier	Reason for Qualification
GWTP				
LH18/24-SP650_020718	HS18011092	Perchlorate	< 4.0 UJ	Temperature
LH18/24-SP650_022818	HS18030055	Aluminum	0.0108 UB	MB
LHAAP-16				
16EW01_020718	HS18020534	Chloroethane	< 1.0 UJ	MSD <
16EW05_020718	HS18020534	cis-1,2-Dichloroethene	76 J	Dup RPD
16EW05_020718	HS18020534	Trichloroethene	100 J	Dup RPD
16EW05_020718	HS18020534	Vinyl chloride	40 J	Dup RPD
16EW05_020718_a	HS18020534	cis-1,2-Dichloroethene	190 J	Dup RPD
16EW05_020718_a	HS18020534	Trichloroethene	280 J	Dup RPD
16EW05_020718_a	HS18020534	Vinyl chloride	110 J	Dup RPD

Notes:
J – Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
UJ – The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
UB – Not detected; considered an artifact of blank contamination
MSD <– Matrix spike duplicate recovery below control limits
Dup RPD – the relative percent difference between sample and duplicate was outside control limits
MB – method blank contamination

Table 3: Completeness by Method

Method	No. of Rejected Results	% Completeness
SW6850	0	100
E350.1	0	100
E365.2	0	100
E415.1	0	100
SW8270D	0	100
SW8260B	0	100
SW6020A/7470	0	100
SW9056	0	100
SW7196A	0	100
E410.4	0	100
E1664	0	100
TO-15	0	100

APPENDIX F
AIR MONITORING DATA – 1ST QUARTER 2018

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ATTACHMENT 1: AIR MONITORING CALCULATIONS

Table 1- Appendix F
Longhorn Army Ammunition Plant -Groundwater Treatment Plant
Ambient Air Data - March 2018

Pollutant	CAS #	Short Term ESL March 2012	AMCVs (ST Health)	GWTP Ambient Air Concentrations		Status (1)	Downwind Ambient Air Concentrations		Status (1)
		µg/m^3	µg/m^3	µg/m^3			µg/m^3		
1,1-Dichloroethane	75-34-3	4,000	4,047	0.71	U	PASS	0.60	U	PASS
1,1-Dichloroethene	75-35-4	210	714	0.71	U	PASS	0.60	U	PASS
1,2-Dichloroethane	107-06-2	160	162	0.71	U	PASS	0.60	U	PASS
Acetone	67-64-1	5,900	NA	**33**		PASS	6.0	U	PASS
Benzene	71-43-2	170	575	**1.1**		PASS	0.60	U	PASS
Carbon disulfide	75-15-0	30	NA	7.1	U	PASS	6.0	U	PASS
Chloroform	67-66-3	100	98	0.71	U	PASS	0.60	U	PASS
cis-1,2-Dichloroethene	156-59-2	7,900	NA	**0.77**		PASS	0.60	U	PASS
Methylene chloride	75-09-2	3,600	12,158	0.71	U	PASS	0.60	U	PASS
Tetrachloroethene	127-18-4	2,000	6,782	0.71	U	PASS	0.60	U	PASS
trans-1,2-Dichloroethene	156-60-5	7,900	NA	0.71	U	PASS	0.60	U	PASS
Trichloroethene	79-01-6	540	537	**2.8**		PASS	0.60	U	PASS
Vinyl chloride	75-01-4	20,000	66,460	0.71	U	PASS	0.60	U	PASS
n-Hexane	110-54-3	5,300	6,336	**2.2**		PASS	0.60	U	PASS
Styrene	100-42-5	110	21,725	0.71	U	PASS	0.60	U	PASS
Toluene	108-88-3	640	15,074	**4.3**		PASS	**0.90**		PASS
Ethylbenzene	100-41-4	740	86,844	0.71	U	PASS	0.60	U	PASS
m,p-Xylenes	179601-23-1	180	7,382	**1.9**		PASS	1.2	U	PASS
o-Xylene	95-47-6	1,600	7,382	0.71	U	PASS	0.60	U	PASS
1,3-Dichlorobenzene	541-73-1	720	NA	0.71	U	PASS	0.60	U	PASS
Propene (C3 H6)	115-07-1	Asphyxiant	Asphyxiant	**0.84**		NA	0.60	U	NA
Dichlorodifluoromethane (CCl2F2)	75-71-8	50,000	49,452	**5.5**		PASS	**2.5**		PASS
Ethanol	64-17-5	18,800	NA	**54**		PASS	**6.8**		PASS
Trichlorofluoromethane (CCl3F)	75-69-4	28,000	56,184	**2.8**		PASS	**1.3**		PASS
Trichlorotrifluoroethane (C2Cl3F3)	76-13-1	38,000	NA	**3.1**		PASS	**16**		PASS
alpha-Pinene	80-56-8	60	3,499	0.71	U	PASS	**0.63**		PASS
d-Limonene	5989-27-5	1,100	NA	**2.7**		PASS	0.60	U	PASS

Notes: CAS - Chemical Abstract Service; ESL - Effects Screening Level; GWTP - Groundwater Treatment Plant; U - Non-detect; NA - Not Applicable; µg/m^3 - micrograms per meters cubed; ST - Short term

(1) Status based on comparison of air sample result to Air Monitoring Comparison Values (AMCVs). When there is no AMCV value for a chemical, the air sample concentration is compared to the short-term ESL.

ATTACHMENT 2: PID READINGS AND CALIBRATION LOGS

Table 3 - Appendix F

1st Quarter 2018 Photoionization Detector (PID) Readings

Longhorn Army Ammunition Plant - Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
1/6/2018	14:00	Outside GWTP Office	4187 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 60 degrees
1/6/2018	14:00	Downwind	4187 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 60 degrees
1/6/2018	14:00	Stripper	4187 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.8 ppm Steady State 5.9 ppm	Clear 60 degrees
1/8/2018	8:00	Outside GWTP Office	4575 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 50 degrees
1/8/2018	8:00	Downwind	4575 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 50 degrees
1/8/2018	8:00	Stripper	4575 ACFM	MiniRAE 3000	Kennie Moore	Max. 18.3 ppm Steady State 7.1 ppm	Cloudy 50 degrees
1/8/2018	14:00	Outside GWTP Office	4478 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 52 degrees
1/8/2018	14:00	Downwind	4478 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 52 degrees
1/8/2018	14:00	Stripper	4478 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.0 ppm Steady State 5.6 ppm	Cloudy 52 degrees
1/15/2018	12:00	Outside GWTP Office	4432 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 58 degrees
1/15/2018	12:00	Downwind	4432 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 58 degrees
1/15/2018	12:00	Stripper	4432 ACFM	MiniRAE 3000	Kennie Moore	Max. 16.9 ppm Steady State 4.3 ppm	Clear 58 degrees
1/15/2018	16:00	Outside GWTP Office	4393 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 60 degrees
1/15/2018	16:00	Downwind	4393 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 60 degrees
1/15/2018	16:00	Stripper	4393 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.8 ppm Steady State 5.5 ppm	Cloudy 60 degrees
1/25/2018	8:00	Outside GWTP Office	4505 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 35 degrees
1/25/2018	8:00	Downwind	4505 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 35 degrees
1/25/2018	8:00	Stripper	4505 ACFM	MiniRAE 3000	Kennie Moore	Max. 18.1 ppm Steady State 4.4 ppm	Clear 35 degrees
1/25/2018	12:00	Outside GWTP Office	4466 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 62 degrees
1/25/2018	12:00	Downwind	4466 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 62 degrees
1/25/2018	12:00	Stripper	4466 ACFM	MiniRAE 3000	Scott Beesinger	Max. 16.9 ppm Steady State 5.3 ppm	Clear 62 degrees
1/29/2018	8:00	Outside GWTP Office	4558 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 35 degrees
1/29/2018	8:00	Downwind	4558 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 35 degrees
1/29/2018	8:00	Stripper	4558 ACFM	MiniRAE 3000	Kennie Moore	Max. 17.3 ppm Steady State 6.2 ppm	Clear 35 degrees
1/29/2018	14:00	Outside GWTP Office	4357 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 57 degrees
1/29/2018	14:00	Downwind	4357 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 57 degrees
1/29/2018	14:00	Stripper	4357 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.3 ppm Steady State 8.7 ppm	Clear 57 degrees
2/5/2018	8:00	Outside GWTP Office	4661 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 33 degrees
2/5/2018	8:00	Downwind	4661 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 33 degrees
2/5/2018	8:00	Stripper	4661 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.9 ppm Steady State 9.3 ppm	Clear 33 degrees
2/5/2018	14:00	Outside GWTP Office	4613 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 55 degrees
2/5/2018	14:00	Downwind	4613 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 55 degrees

Table 3 - Appendix F

1st Quarter 2018 Photoionization Detector (PID) Readings

Longhorn Army Ammunition Plant - Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
2/5/2018	14:00	Stripper	4613 ACFM	MiniRAE 3000	Scott Beesinger	Max. 18.5 ppm Steady State 7.1 ppm	Clear 55 degrees
2/12/2018	8:00	Outside GWTP Office	4654 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 33 degrees
2/12/2018	8:00	Downwind	4654 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 33 degrees
2/12/2018	8:00	Stripper	4654 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.9 ppm Steady State 8.4 ppm	Clear 33 degrees
2/12/2018	14:00	Outside GWTP Office	4564 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 38 degrees
2/12/2018	14:00	Downwind	4564 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 38 degrees
2/12/2018	14:00	Stripper	4564 ACFM	MiniRAE 3000	Scott Beesinger	Max. 19.0 ppm Steady State 7.3 ppm	Clear 38 degrees
2/20/2018	8:00	Outside GWTP Office	4403 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 69 degrees
2/20/2018	8:00	Downwind	4403 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 69 degrees
2/20/2018	8:00	Stripper	4403 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.9 ppm Steady State 8.8 ppm	Cloudy 69 degrees
2/20/2018	14:00	Outside GWTP Office	4370 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 79 degrees
2/20/2018	14:00	Downwind	4370 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 79 degrees
2/20/2018	14:00	Stripper	4370 ACFM	MiniRAE 3000	Scott Beesinger	Max. 19.6 ppm Steady State 7.4 ppm	Cloudy 79 degrees
3/1/2018	10:00	Outside GWTP Office	4455 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Rain 62 degrees
3/1/2018	10:00	Downwind	4455 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Rain 62 degrees
3/1/2018	10:00	Stripper	4455 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.1 ppm Steady State 8.8 ppm	Rain 62 degrees
3/1/2018	14:00	Outside GWTP Office	4250 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 68 degrees
3/1/2018	14:00	Downwind	4250 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 68 degrees
3/1/2018	14:00	Stripper	4250 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.3 ppm Steady State 6.5 ppm	Clear 68 degrees
3/5/2018	8:00	Outside GWTP Office	4330 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 66 degrees
3/5/2018	8:00	Downwind	4330 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 66 degrees
3/5/2018	8:00	Stripper	4330 ACFM	MiniRAE 3000	Kennie Moore	Max. 18.3 ppm Steady State 4.9 ppm	Cloudy 66 degrees
3/5/2018	14:00	Outside GWTP Office	4263 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 74 degrees
3/5/2018	14:00	Downwind	4263 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 74 degrees
3/5/2018	14:00	Stripper	4263 ACFM	MiniRAE 3000	Scott Beesinger	Max. 23.6 ppm Steady State 5.1 ppm	Cloudy 74 degrees
3/12/2018	8:00	Outside GWTP Office	4561 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 42 degrees
3/12/2018	8:00	Downwind	4561 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 42 degrees
3/12/2018	8:00	Stripper	4561 ACFM	MiniRAE 3000	Kennie Moore	Max. 17.7 ppm Steady State 4.93ppm	Clear 42 degrees
3/12/2018	14:00	Outside GWTP Office	4356 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 58 degrees
3/12/2018	14:00	Downwind	4356 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 58 degrees
3/12/2018	14:00	Stripper	4356 ACFM	MiniRAE 3000	Scott Beesinger	Max. 19.1ppm Steady State 4.9 ppm	Clear 58 degrees

Table 3 - Appendix F

1st Quarter 2018 Photoionization Detector (PID) Readings

Longhorn Army Ammunition Plant - Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
3/20/2018	8:00	Outside GWTP Office	4315 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 47 degrees
3/20/2018	8:00	Downwind	4315 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 47 degrees
3/20/2018	8:00	Stripper	4315 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.2 ppm Steady State 5.4ppm	Clear 47 degrees
3/20/2018	14:00	Outside GWTP Office	4312 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 61 degrees
3/20/2018	14:00	Downwind	4312 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 61 degrees
3/20/2018	14:00	Stripper	4312 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.9 ppm Steady State 6.3 ppm	Clear 61 degrees
3/26/2018	8:00	Outside GWTP Office	4375 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 62 degrees
3/26/2018	8:00	Downwind	4375 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 62 degrees
3/26/2018	8:00	Stripper	4375 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.9 ppm Steady State 3.7 ppm	Clear 62 degrees
3/27/2018	8:00	Outside GWTP Office	4375 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 72 degrees
3/27/2018	8:00	Downwind	4375 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 72 degrees
3/27/2018	8:00	Stripper	4375 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.3 ppm Steady State 5.8 ppm	Clear 72 degrees

Notes:
ACFM - actual cubic feet per minute
GWTP - Groundwater treatment plant
ppm - parts per million

ATTACHMENT 3: AIR ANALYTICAL LABORATORY REPORT

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
T: +1 805 526 7161
F: +1 805 526 7270
www.alsglobal.com

LABORATORY REPORT

March 30, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Suite 129
Lakewood, CO 80228

RE: LHAAP GWTP / NW01312.0150

Dear Marcia:

Enclosed are the results of the samples submitted to our laboratory on March 9, 2018. For your reference, these analyses have been assigned our service request number P1801150.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Kaneko
By Kate Kaneko at 1:54 pm, 03/30/18

Kate Kaneko
Project Manager

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
T: +1 805 526 7161
F: +1 805 526 7270
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Client: Bhate Environmental Associates, Inc. Service Request No: P1801150
Project: LHAAP GWTP / NW01312.0150

CASE NARRATIVE

The samples were received intact under chain of custody on March 9, 2018 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Volatile Organic Compound Analysis

The samples were analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.1 compliance canisters were cleaned to <1/2 the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
T: +1 805 526 7161
F: +1 805 526 7270
www.alsglobal.com

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2016036
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	1347317
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-005
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-17-8
Utah DOH (NELAP)	http://health.utah.gov/lab/environmental-lab-certification/	CA016272017-8
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Bhate Environmental Associates, Inc. Service Request: P1801150
Project ID: LHAAP GWTP / NW01312.0150

Date Received: 3/9/2018
Time Received: 09:15

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pfl (psig)	TO-15 - VOC Cans
LH18/24-AIR_030518_Stripper	P1801150-001	Air	3/5/2018	14:00	SC00903	-0.39	3.53	X
LH18/24-AIR_030518_Stripper-Dup	P1801150-002	Air	3/5/2018	14:00	SC01748	0.11	3.65	X
LH18/24-AIR_030518_GWTP	P1801150-003	Air	3/5/2018	14:15	AC02340	-1.67	3.62	X
LH18/24-AIR_030518_Downwind_North	P1801150-004	Air	3/6/2018	06:30	AC01862	0.72	3.65	X

00884229

Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10-Day-Standard

ALS Project No. PDO1152

Company Name & Address (Reporting Information): BHATE ENVIRONMENTAL

Project Name: LHAAP GWTP

Project Number: NW01312.0150

Project Manager: Kim NEMMERS

P.O. # / Billing Information: BHATE ENVIRONMENTAL

Phone: (205) 918-4000

Fax:

Email Address for Result Reporting: molive@bhate.com

Sampler (Print & Sign): Scott BEESINGER Scott Beesinger

ALS Contact:

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	Analysis Method		Comments e.g. Actual Preservative or specific instructions
									TO-15		
LHAAP-AIR_030518_STRIPPER		3/5/18	1400	SC00903		-29	0	6L	✓		
LHAAP-AIR_030518_STRIPPER-DUP		3/5/18	1400	SC01748		-29	0	6L	✓		
LHAAP-AIR_030518_GWTP		3/5/18	1415	AC02340	FCA00368	-30	-4	6L	✓		
LHAAP-AIR_030518_DOWNWIND_NORTH		3/6/18	0630	AC01862	FCA00782	-29	0	6L	✓		

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Report Tier Levels - please select

Tier I - Results (Default in not specified) _____
Tier II (Results + QC Summaries _____
Tier III (Results + QC & Calibration Summaries) _____
Tier IV (Date Validation Package) 10% Surcharge _____

EDD required YES / No
Type: _____ Units: _____

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Scott Beesinger	3/6/18	07:00			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
				3-9-18	0937

Cooler / Blank Temperature _____ °C

ALS Environmental
Sample Acceptance Check Form

Client: Bhate Environmental Associates, Inc. Work order: P1801150

Project: LHAAP GWTP / NW01312.0150

Sample(s) received on: 3/9/18 Date opened: 3/9/18 by: ADAVID

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Did **sample containers** arrive in good condition?	☒	☐	☐
3	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
4	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
5	Was **sample volume** received adequate for analysis?	☒	☐	☐
6	Are samples within specified holding times?	☒	☐	☐
7	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
8	Were **custody seals** on outside of cooler/Box/Container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
9	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
10	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
11	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1801150-001.01	6.0 L Source Can					
P1801150-002.01	6.0 L Source Can					
P1801150-003.01	6.0 L Ambient Can					
P1801150-004.01	6.0 L Ambient Can					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Stripper** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-001

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0060 Liter(s)
Test Notes: 0.0030 Liter(s)
Container ID: SC00903

Initial Pressure (psig): -0.39 Final Pressure (psig): 3.53

Container Dilution Factor: 1.27

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	110	ND	62	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	110	ND	21	
74-87-3	Chloromethane	ND	110	ND	51	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	110	ND	15	
75-01-4	Vinyl Chloride	**110**	110	**43**	41	
106-99-0	1,3-Butadiene	ND	110	ND	48	
74-83-9	Bromomethane	ND	110	ND	27	
75-00-3	Chloroethane	ND	110	ND	40	
64-17-5	Ethanol	ND	1,100	ND	560	
75-05-8	Acetonitrile	ND	110	ND	63	
107-02-8	Acrolein	ND	420	ND	180	
67-64-1	Acetone	ND	1,100	ND	450	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	110	ND	19	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	1,100	ND	430	
107-13-1	Acrylonitrile	ND	110	ND	49	
75-35-4	1,1-Dichloroethene	**140**	110	**35**	27	
75-09-2	Methylene Chloride	**910**	110	**260**	30	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	110	ND	34	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**8,000**	110	**1,000**	14	
75-15-0	Carbon Disulfide	ND	1,100	ND	340	
156-60-5	trans-1,2-Dichloroethene	ND	110	ND	27	
75-34-3	1,1-Dichloroethane	ND	110	ND	26	
1634-04-4	Methyl tert-Butyl Ether	ND	110	ND	29	
108-05-4	Vinyl Acetate	ND	1,100	ND	300	
78-93-3	2-Butanone (MEK)	ND	1,100	ND	360	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Stripper** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-001

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0060 Liter(s)
Test Notes: 0.0030 Liter(s)
Container ID: SC00903

Initial Pressure (psig): -0.39 Final Pressure (psig): 3.53

Container Dilution Factor: 1.27

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**9,100**	110	**2,300**	27	
141-78-6	Ethyl Acetate	ND	210	ND	59	
110-54-3	n-Hexane	ND	110	ND	30	
67-66-3	Chloroform	ND	110	ND	22	
109-99-9	Tetrahydrofuran (THF)	ND	110	ND	36	
107-06-2	1,2-Dichloroethane	**190**	110	**46**	26	
71-55-6	1,1,1-Trichloroethane	ND	110	ND	19	
71-43-2	Benzene	ND	110	ND	33	
56-23-5	Carbon Tetrachloride	ND	110	ND	17	
110-82-7	Cyclohexane	ND	210	ND	62	
78-87-5	1,2-Dichloropropane	ND	110	ND	23	
75-27-4	Bromodichloromethane	ND	110	ND	16	
79-01-6	Trichloroethene	**26,000**	210	**4,800**	39	**D**
123-91-1	1,4-Dioxane	ND	110	ND	29	
80-62-6	Methyl Methacrylate	ND	210	ND	52	
142-82-5	n-Heptane	ND	110	ND	26	
10061-01-5	cis-1,3-Dichloropropene	ND	110	ND	23	
108-10-1	4-Methyl-2-pentanone	ND	110	ND	26	
10061-02-6	trans-1,3-Dichloropropene	ND	110	ND	23	
79-00-5	1,1,2-Trichloroethane	ND	110	ND	19	
108-88-3	Toluene	ND	110	ND	28	
591-78-6	2-Hexanone	ND	110	ND	26	
124-48-1	Dibromochloromethane	ND	110	ND	12	
106-93-4	1,2-Dibromoethane	ND	110	ND	14	
123-86-4	n-Butyl Acetate	ND	110	ND	22	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
D = The reported result is from a dilution.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Stripper** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-001

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0060 Liter(s)
Test Notes: 0.0030 Liter(s)
Container ID: SC00903

Initial Pressure (psig): -0.39 Final Pressure (psig): 3.53

Container Dilution Factor: 1.27

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	110	ND	23	
127-18-4	Tetrachloroethene	ND	110	ND	16	
108-90-7	Chlorobenzene	ND	110	ND	23	
100-41-4	Ethylbenzene	ND	110	ND	24	
179601-23-1	m,p-Xylenes	ND	210	ND	49	
75-25-2	Bromoform	ND	110	ND	10	
100-42-5	Styrene	ND	110	ND	25	
95-47-6	o-Xylene	ND	110	ND	24	
111-84-2	n-Nonane	ND	110	ND	20	
79-34-5	1,1,2,2-Tetrachloroethane	ND	110	ND	15	
98-82-8	Cumene	ND	110	ND	22	
80-56-8	alpha-Pinene	ND	110	ND	19	
103-65-1	n-Propylbenzene	ND	110	ND	22	
622-96-8	4-Ethyltoluene	ND	110	ND	22	
108-67-8	1,3,5-Trimethylbenzene	ND	110	ND	22	
95-63-6	1,2,4-Trimethylbenzene	ND	110	ND	22	
100-44-7	Benzyl Chloride	ND	210	ND	41	
541-73-1	1,3-Dichlorobenzene	ND	110	ND	18	
106-46-7	1,4-Dichlorobenzene	ND	110	ND	18	
95-50-1	1,2-Dichlorobenzene	ND	110	ND	18	
5989-27-5	d-Limonene	ND	110	ND	19	
96-12-8	1,2-Dibromo-3-chloropropane	ND	110	ND	11	
120-82-1	1,2,4-Trichlorobenzene	ND	110	ND	14	
91-20-3	Naphthalene	ND	110	ND	20	
87-68-3	Hexachlorobutadiene	ND	110	ND	9.9	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Stripper-Dup** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-002

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0060 Liter(s)
Test Notes: 0.0030 Liter(s)
Container ID: SC01748

Initial Pressure (psig): 0.11 Final Pressure (psig): 3.65

Container Dilution Factor: 1.24

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	100	ND	60	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	100	ND	21	
74-87-3	Chloromethane	ND	100	ND	50	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	100	ND	15	
75-01-4	Vinyl Chloride	**110**	100	**44**	40	
106-99-0	1,3-Butadiene	ND	100	ND	47	
74-83-9	Bromomethane	ND	100	ND	27	
75-00-3	Chloroethane	ND	100	ND	39	
64-17-5	Ethanol	ND	1,000	ND	550	
75-05-8	Acetonitrile	ND	100	ND	62	
107-02-8	Acrolein	ND	410	ND	180	
67-64-1	Acetone	ND	1,000	ND	440	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	100	ND	18	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	1,000	ND	420	
107-13-1	Acrylonitrile	ND	100	ND	48	
75-35-4	1,1-Dichloroethene	**130**	100	**33**	26	
75-09-2	Methylene Chloride	**920**	100	**270**	30	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	100	ND	33	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**8,200**	100	**1,100**	13	
75-15-0	Carbon Disulfide	ND	1,000	ND	330	
156-60-5	trans-1,2-Dichloroethene	ND	100	ND	26	
75-34-3	1,1-Dichloroethane	ND	100	ND	26	
1634-04-4	Methyl tert-Butyl Ether	ND	100	ND	29	
108-05-4	Vinyl Acetate	ND	1,000	ND	290	
78-93-3	2-Butanone (MEK)	ND	1,000	ND	350	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Stripper-Dup** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-002

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0060 Liter(s)
Test Notes: 0.0030 Liter(s)
Container ID: SC01748

Initial Pressure (psig): 0.11 Final Pressure (psig): 3.65

Container Dilution Factor: 1.24

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**9,500**	100	**2,400**	26	
141-78-6	Ethyl Acetate	ND	210	ND	57	
110-54-3	n-Hexane	ND	100	ND	29	
67-66-3	Chloroform	ND	100	ND	21	
109-99-9	Tetrahydrofuran (THF)	ND	100	ND	35	
107-06-2	1,2-Dichloroethane	**210**	100	**51**	26	
71-55-6	1,1,1-Trichloroethane	ND	100	ND	19	
71-43-2	Benzene	ND	100	ND	32	
56-23-5	Carbon Tetrachloride	ND	100	ND	16	
110-82-7	Cyclohexane	ND	210	ND	60	
78-87-5	1,2-Dichloropropane	ND	100	ND	22	
75-27-4	Bromodichloromethane	ND	100	ND	15	
79-01-6	Trichloroethene	**27,000**	210	**5,100**	38	**D**
123-91-1	1,4-Dioxane	ND	100	ND	29	
80-62-6	Methyl Methacrylate	ND	210	ND	50	
142-82-5	n-Heptane	ND	100	ND	25	
10061-01-5	cis-1,3-Dichloropropene	ND	100	ND	23	
108-10-1	4-Methyl-2-pentanone	ND	100	ND	25	
10061-02-6	trans-1,3-Dichloropropene	ND	100	ND	23	
79-00-5	1,1,2-Trichloroethane	ND	100	ND	19	
108-88-3	Toluene	ND	100	ND	27	
591-78-6	2-Hexanone	ND	100	ND	25	
124-48-1	Dibromochloromethane	ND	100	ND	12	
106-93-4	1,2-Dibromoethane	ND	100	ND	13	
123-86-4	n-Butyl Acetate	ND	100	ND	22	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
D = The reported result is from a dilution.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Stripper-Dup** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-002

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0060 Liter(s)
Test Notes: 0.0030 Liter(s)
Container ID: SC01748

Initial Pressure (psig): 0.11 Final Pressure (psig): 3.65

Container Dilution Factor: 1.24

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	100	ND	22	
127-18-4	Tetrachloroethene	ND	100	ND	15	
108-90-7	Chlorobenzene	ND	100	ND	22	
100-41-4	Ethylbenzene	ND	100	ND	24	
179601-23-1	m,p-Xylenes	ND	210	ND	48	
75-25-2	Bromoform	ND	100	ND	10	
100-42-5	Styrene	ND	100	ND	24	
95-47-6	o-Xylene	ND	100	ND	24	
111-84-2	n-Nonane	ND	100	ND	20	
79-34-5	1,1,2,2-Tetrachloroethane	ND	100	ND	15	
98-82-8	Cumene	ND	100	ND	21	
80-56-8	alpha-Pinene	ND	100	ND	19	
103-65-1	n-Propylbenzene	ND	100	ND	21	
622-96-8	4-Ethyltoluene	ND	100	ND	21	
108-67-8	1,3,5-Trimethylbenzene	ND	100	ND	21	
95-63-6	1,2,4-Trimethylbenzene	ND	100	ND	21	
100-44-7	Benzyl Chloride	ND	210	ND	40	
541-73-1	1,3-Dichlorobenzene	ND	100	ND	17	
106-46-7	1,4-Dichlorobenzene	ND	100	ND	17	
95-50-1	1,2-Dichlorobenzene	ND	100	ND	17	
5989-27-5	d-Limonene	ND	100	ND	19	
96-12-8	1,2-Dibromo-3-chloropropane	ND	100	ND	11	
120-82-1	1,2,4-Trichlorobenzene	ND	100	ND	14	
91-20-3	Naphthalene	ND	100	ND	20	
87-68-3	Hexachlorobutadiene	ND	100	ND	9.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_GWTP** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-003

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC02340

Initial Pressure (psig): -1.67 Final Pressure (psig): 3.62

Container Dilution Factor: 1.41

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**0.84**	0.71	**0.49**	0.41	
75-71-8	Dichlorodifluoromethane (CFC 12)	**5.5**	0.71	**1.1**	0.14	
74-87-3	Chloromethane	ND	0.71	ND	0.34	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.71	ND	0.10	
75-01-4	Vinyl Chloride	ND	0.71	ND	0.28	
106-99-0	1,3-Butadiene	ND	0.71	ND	0.32	
74-83-9	Bromomethane	ND	0.71	ND	0.18	
75-00-3	Chloroethane	ND	0.71	ND	0.27	
64-17-5	Ethanol	**54**	7.1	**29**	3.7	
75-05-8	Acetonitrile	**1.1**	0.71	**0.65**	0.42	
107-02-8	Acrolein	ND	2.8	ND	1.2	
67-64-1	Acetone	**33**	7.1	**14**	3.0	
75-69-4	Trichlorofluoromethane (CFC 11)	**2.8**	0.71	**0.50**	0.13	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	7.1	ND	2.9	
107-13-1	Acrylonitrile	ND	0.71	ND	0.32	
75-35-4	1,1-Dichloroethene	ND	0.71	ND	0.18	
75-09-2	Methylene Chloride	ND	0.71	ND	0.20	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.71	ND	0.23	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**3.1**	0.71	**0.40**	0.092	
75-15-0	Carbon Disulfide	ND	7.1	ND	2.3	
156-60-5	trans-1,2-Dichloroethene	ND	0.71	ND	0.18	
75-34-3	1,1-Dichloroethane	ND	0.71	ND	0.17	
1634-04-4	Methyl tert-Butyl Ether	ND	0.71	ND	0.20	
108-05-4	Vinyl Acetate	ND	7.1	ND	2.0	
78-93-3	2-Butanone (MEK)	ND	7.1	ND	2.4	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_GWTP** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-003

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC02340

Initial Pressure (psig): -1.67 Final Pressure (psig): 3.62

Container Dilution Factor: 1.41

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**0.77**	0.71	**0.19**	0.18	
141-78-6	Ethyl Acetate	**2.2**	1.4	**0.62**	0.39	
110-54-3	n-Hexane	**2.2**	0.71	**0.63**	0.20	
67-66-3	Chloroform	ND	0.71	ND	0.14	
109-99-9	Tetrahydrofuran (THF)	**5.7**	0.71	**1.9**	0.24	
107-06-2	1,2-Dichloroethane	ND	0.71	ND	0.17	
71-55-6	1,1,1-Trichloroethane	ND	0.71	ND	0.13	
71-43-2	Benzene	**1.1**	0.71	**0.35**	0.22	
56-23-5	Carbon Tetrachloride	ND	0.71	ND	0.11	
110-82-7	Cyclohexane	ND	1.4	ND	0.41	
78-87-5	1,2-Dichloropropane	ND	0.71	ND	0.15	
75-27-4	Bromodichloromethane	ND	0.71	ND	0.11	
79-01-6	Trichloroethene	**2.8**	0.71	**0.52**	0.13	
123-91-1	1,4-Dioxane	ND	0.71	ND	0.20	
80-62-6	Methyl Methacrylate	ND	1.4	ND	0.34	
142-82-5	n-Heptane	**0.92**	0.71	**0.23**	0.17	
10061-01-5	cis-1,3-Dichloropropene	ND	0.71	ND	0.16	
108-10-1	4-Methyl-2-pentanone	ND	0.71	ND	0.17	
10061-02-6	trans-1,3-Dichloropropene	ND	0.71	ND	0.16	
79-00-5	1,1,2-Trichloroethane	ND	0.71	ND	0.13	
108-88-3	Toluene	**4.3**	0.71	**1.1**	0.19	
591-78-6	2-Hexanone	ND	0.71	ND	0.17	
124-48-1	Dibromochloromethane	ND	0.71	ND	0.083	
106-93-4	1,2-Dibromoethane	ND	0.71	ND	0.092	
123-86-4	n-Butyl Acetate	ND	0.71	ND	0.15	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_GWTP** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-003

Test Code: EPA TO-15 Date Collected: 3/5/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC02340

Initial Pressure (psig): -1.67 Final Pressure (psig): 3.62

Container Dilution Factor: 1.41

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.71	ND	0.15	
127-18-4	Tetrachloroethene	ND	0.71	ND	0.10	
108-90-7	Chlorobenzene	ND	0.71	ND	0.15	
100-41-4	Ethylbenzene	ND	0.71	ND	0.16	
179601-23-1	m,p-Xylenes	**1.9**	1.4	**0.44**	0.32	
75-25-2	Bromoform	ND	0.71	ND	0.068	
100-42-5	Styrene	ND	0.71	ND	0.17	
95-47-6	o-Xylene	ND	0.71	ND	0.16	
111-84-2	n-Nonane	ND	0.71	ND	0.13	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.71	ND	0.10	
98-82-8	Cumene	ND	0.71	ND	0.14	
80-56-8	alpha-Pinene	ND	0.71	ND	0.13	
103-65-1	n-Propylbenzene	ND	0.71	ND	0.14	
622-96-8	4-Ethyltoluene	ND	0.71	ND	0.14	
108-67-8	1,3,5-Trimethylbenzene	ND	0.71	ND	0.14	
95-63-6	1,2,4-Trimethylbenzene	ND	0.71	ND	0.14	
100-44-7	Benzyl Chloride	ND	1.4	ND	0.27	
541-73-1	1,3-Dichlorobenzene	ND	0.71	ND	0.12	
106-46-7	1,4-Dichlorobenzene	ND	0.71	ND	0.12	
95-50-1	1,2-Dichlorobenzene	ND	0.71	ND	0.12	
5989-27-5	d-Limonene	**2.7**	0.71	**0.49**	0.13	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.71	ND	0.073	
120-82-1	1,2,4-Trichlorobenzene	ND	0.71	ND	0.095	
91-20-3	Naphthalene	ND	0.71	ND	0.13	
87-68-3	Hexachlorobutadiene	ND	0.71	ND	0.066	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Downwind_North** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-004

Test Code: EPA TO-15 Date Collected: 3/6/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01862

Initial Pressure (psig): 0.72 Final Pressure (psig): 3.65

Container Dilution Factor: 1.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.60	ND	0.35	
75-71-8	Dichlorodifluoromethane (CFC 12)	**2.5**	0.60	**0.50**	0.12	
74-87-3	Chloromethane	ND	0.60	ND	0.29	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.60	ND	0.085	
75-01-4	Vinyl Chloride	ND	0.60	ND	0.23	
106-99-0	1,3-Butadiene	ND	0.60	ND	0.27	
74-83-9	Bromomethane	ND	0.60	ND	0.15	
75-00-3	Chloroethane	ND	0.60	ND	0.23	
64-17-5	Ethanol	**6.8**	6.0	**3.6**	3.2	
75-05-8	Acetonitrile	ND	0.60	ND	0.35	
107-02-8	Acrolein	ND	2.4	ND	1.0	
67-64-1	Acetone	ND	6.0	ND	2.5	
75-69-4	Trichlorofluoromethane (CFC 11)	**1.3**	0.60	**0.22**	0.11	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	6.0	ND	2.4	
107-13-1	Acrylonitrile	ND	0.60	ND	0.27	
75-35-4	1,1-Dichloroethene	ND	0.60	ND	0.15	
75-09-2	Methylene Chloride	ND	0.60	ND	0.17	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.60	ND	0.19	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**16**	0.60	**2.1**	0.078	
75-15-0	Carbon Disulfide	ND	6.0	ND	1.9	
156-60-5	trans-1,2-Dichloroethene	ND	0.60	ND	0.15	
75-34-3	1,1-Dichloroethane	ND	0.60	ND	0.15	
1634-04-4	Methyl tert-Butyl Ether	ND	0.60	ND	0.17	
108-05-4	Vinyl Acetate	ND	6.0	ND	1.7	
78-93-3	2-Butanone (MEK)	ND	6.0	ND	2.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Downwind_North** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-004

Test Code: EPA TO-15 Date Collected: 3/6/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01862

Initial Pressure (psig): 0.72 Final Pressure (psig): 3.65

Container Dilution Factor: 1.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.60	ND	0.15	
141-78-6	Ethyl Acetate	**12**	1.2	**3.4**	0.33	
110-54-3	n-Hexane	ND	0.60	ND	0.17	
67-66-3	Chloroform	ND	0.60	ND	0.12	
109-99-9	Tetrahydrofuran (THF)	ND	0.60	ND	0.20	
107-06-2	1,2-Dichloroethane	ND	0.60	ND	0.15	
71-55-6	1,1,1-Trichloroethane	ND	0.60	ND	0.11	
71-43-2	Benzene	ND	0.60	ND	0.19	
56-23-5	Carbon Tetrachloride	ND	0.60	ND	0.095	
110-82-7	Cyclohexane	ND	1.2	ND	0.35	
78-87-5	1,2-Dichloropropane	ND	0.60	ND	0.13	
75-27-4	Bromodichloromethane	ND	0.60	ND	0.089	
79-01-6	Trichloroethene	ND	0.60	ND	0.11	
123-91-1	1,4-Dioxane	ND	0.60	ND	0.17	
80-62-6	Methyl Methacrylate	ND	1.2	ND	0.29	
142-82-5	n-Heptane	ND	0.60	ND	0.15	
10061-01-5	cis-1,3-Dichloropropene	ND	0.60	ND	0.13	
108-10-1	4-Methyl-2-pentanone	ND	0.60	ND	0.15	
10061-02-6	trans-1,3-Dichloropropene	ND	0.60	ND	0.13	
79-00-5	1,1,2-Trichloroethane	ND	0.60	ND	0.11	
108-88-3	Toluene	**0.90**	0.60	**0.24**	0.16	
591-78-6	2-Hexanone	ND	0.60	ND	0.15	
124-48-1	Dibromochloromethane	ND	0.60	ND	0.070	
106-93-4	1,2-Dibromoethane	ND	0.60	ND	0.077	
123-86-4	n-Butyl Acetate	ND	0.60	ND	0.13	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-AIR_030518_Downwind_North** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P1801150-004

Test Code: EPA TO-15 Date Collected: 3/6/18
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: 3/9/18
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AC01862

Initial Pressure (psig): 0.72 Final Pressure (psig): 3.65

Container Dilution Factor: 1.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.60	ND	0.13	
127-18-4	Tetrachloroethene	ND	0.60	ND	0.088	
108-90-7	Chlorobenzene	ND	0.60	ND	0.13	
100-41-4	Ethylbenzene	ND	0.60	ND	0.14	
179601-23-1	m,p-Xylenes	ND	1.2	ND	0.27	
75-25-2	Bromoform	ND	0.60	ND	0.058	
100-42-5	Styrene	ND	0.60	ND	0.14	
95-47-6	o-Xylene	ND	0.60	ND	0.14	
111-84-2	n-Nonane	ND	0.60	ND	0.11	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.60	ND	0.087	
98-82-8	Cumene	ND	0.60	ND	0.12	
80-56-8	alpha-Pinene	**0.63**	0.60	**0.11**	0.11	
103-65-1	n-Propylbenzene	ND	0.60	ND	0.12	
622-96-8	4-Ethyltoluene	ND	0.60	ND	0.12	
108-67-8	1,3,5-Trimethylbenzene	ND	0.60	ND	0.12	
95-63-6	1,2,4-Trimethylbenzene	ND	0.60	ND	0.12	
100-44-7	Benzyl Chloride	ND	1.2	ND	0.23	
541-73-1	1,3-Dichlorobenzene	ND	0.60	ND	0.099	
106-46-7	1,4-Dichlorobenzene	ND	0.60	ND	0.099	
95-50-1	1,2-Dichlorobenzene	ND	0.60	ND	0.099	
5989-27-5	d-Limonene	ND	0.60	ND	0.11	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.60	ND	0.062	
120-82-1	1,2,4-Trichlorobenzene	ND	0.60	ND	0.080	
91-20-3	Naphthalene	ND	0.60	ND	0.11	
87-68-3	Hexachlorobutadiene	ND	0.60	ND	0.056	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P180320-MB

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.50	ND	0.29	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	0.50	ND	0.10	
74-87-3	Chloromethane	ND	0.50	ND	0.24	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.50	ND	0.072	
75-01-4	Vinyl Chloride	ND	0.50	ND	0.20	
106-99-0	1,3-Butadiene	ND	0.50	ND	0.23	
74-83-9	Bromomethane	ND	0.50	ND	0.13	
75-00-3	Chloroethane	ND	0.50	ND	0.19	
64-17-5	Ethanol	ND	5.0	ND	2.7	
75-05-8	Acetonitrile	ND	0.50	ND	0.30	
107-02-8	Acrolein	ND	2.0	ND	0.87	
67-64-1	Acetone	ND	5.0	ND	2.1	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	0.50	ND	0.089	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	5.0	ND	2.0	
107-13-1	Acrylonitrile	ND	0.50	ND	0.23	
75-35-4	1,1-Dichloroethene	ND	0.50	ND	0.13	
75-09-2	Methylene Chloride	ND	0.50	ND	0.14	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.50	ND	0.16	
76-13-1	Trichlorotrifluoroethane (CFC 113)	ND	0.50	ND	0.065	
75-15-0	Carbon Disulfide	ND	5.0	ND	1.6	
156-60-5	trans-1,2-Dichloroethene	ND	0.50	ND	0.13	
75-34-3	1,1-Dichloroethane	ND	0.50	ND	0.12	
1634-04-4	Methyl tert-Butyl Ether	ND	0.50	ND	0.14	
108-05-4	Vinyl Acetate	ND	5.0	ND	1.4	
78-93-3	2-Butanone (MEK)	ND	5.0	ND	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P180320-MB

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.50	ND	0.13	
141-78-6	Ethyl Acetate	ND	1.0	ND	0.28	
110-54-3	n-Hexane	ND	0.50	ND	0.14	
67-66-3	Chloroform	ND	0.50	ND	0.10	
109-99-9	Tetrahydrofuran (THF)	ND	0.50	ND	0.17	
107-06-2	1,2-Dichloroethane	ND	0.50	ND	0.12	
71-55-6	1,1,1-Trichloroethane	ND	0.50	ND	0.092	
71-43-2	Benzene	ND	0.50	ND	0.16	
56-23-5	Carbon Tetrachloride	ND	0.50	ND	0.080	
110-82-7	Cyclohexane	ND	1.0	ND	0.29	
78-87-5	1,2-Dichloropropane	ND	0.50	ND	0.11	
75-27-4	Bromodichloromethane	ND	0.50	ND	0.075	
79-01-6	Trichloroethene	ND	0.50	ND	0.093	
123-91-1	1,4-Dioxane	ND	0.50	ND	0.14	
80-62-6	Methyl Methacrylate	ND	1.0	ND	0.24	
142-82-5	n-Heptane	ND	0.50	ND	0.12	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	ND	0.11	
108-10-1	4-Methyl-2-pentanone	ND	0.50	ND	0.12	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	ND	0.11	
79-00-5	1,1,2-Trichloroethane	ND	0.50	ND	0.092	
108-88-3	Toluene	ND	0.50	ND	0.13	
591-78-6	2-Hexanone	ND	0.50	ND	0.12	
124-48-1	Dibromochloromethane	ND	0.50	ND	0.059	
106-93-4	1,2-Dibromoethane	ND	0.50	ND	0.065	
123-86-4	n-Butyl Acetate	ND	0.50	ND	0.11	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P180320-MB

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.50	ND	0.11	
127-18-4	Tetrachloroethene	ND	0.50	ND	0.074	
108-90-7	Chlorobenzene	ND	0.50	ND	0.11	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
75-25-2	Bromoform	ND	0.50	ND	0.048	
100-42-5	Styrene	ND	0.50	ND	0.12	
95-47-6	o-Xylene	ND	0.50	ND	0.12	
111-84-2	n-Nonane	ND	0.50	ND	0.095	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	ND	0.073	
98-82-8	Cumene	ND	0.50	ND	0.10	
80-56-8	alpha-Pinene	ND	0.50	ND	0.090	
103-65-1	n-Propylbenzene	ND	0.50	ND	0.10	
622-96-8	4-Ethyltoluene	ND	0.50	ND	0.10	
108-67-8	1,3,5-Trimethylbenzene	ND	0.50	ND	0.10	
95-63-6	1,2,4-Trimethylbenzene	ND	0.50	ND	0.10	
100-44-7	Benzyl Chloride	ND	1.0	ND	0.19	
541-73-1	1,3-Dichlorobenzene	ND	0.50	ND	0.083	
106-46-7	1,4-Dichlorobenzene	ND	0.50	ND	0.083	
95-50-1	1,2-Dichlorobenzene	ND	0.50	ND	0.083	
5989-27-5	d-Limonene	ND	0.50	ND	0.090	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.50	ND	0.052	
120-82-1	1,2,4-Trichlorobenzene	ND	0.50	ND	0.067	
91-20-3	Naphthalene	ND	0.50	ND	0.095	
87-68-3	Hexachlorobutadiene	ND	0.50	ND	0.047	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Client: **Bhate Environmental Associates, Inc.**
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Project ID: P1801150

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date(s) Collected: 3/5 - 3/6/18
Analyst: Lusine Hakobyan Date(s) Received: 3/9/18
Sample Type: 6.0 L Summa Canister(s) Date(s) Analyzed: 3/20/18
Test Notes:

Client Sample ID	ALS Sample ID	1,2-Dichloroethane-d4 Percent Recovered	Toluene-d8 Percent Recovered	Bromofluorobenzene Percent Recovered	Acceptance Limits	Data Qualifier
Method Blank	P180320-MB	**104**	**101**	**93**	70-130	
Lab Control Sample	P180320-LCS	**104**	**99**	**96**	70-130	
LH18/24-AIR_030518_Stripper	P1801150-001	**101**	**98**	**93**	70-130	
LH18/24-AIR_030518_Stripper-Dup	P1801150-002	**106**	**98**	**93**	70-130	
LH18/24-AIR_030518_GWTP	P1801150-003	**116**	**96**	**95**	70-130	
LH18/24-AIR_030518_Downwind_North	P1801150-004	**115**	**96**	**94**	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P180320-LCS

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
115-07-1	Propene	210	**231**	**110**	54-133	
75-71-8	Dichlorodifluoromethane (CFC 12)	213	**207**	**97**	64-115	
74-87-3	Chloromethane	210	**219**	**104**	47-140	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	211	**201**	**95**	60-112	
75-01-4	Vinyl Chloride	211	**223**	**106**	63-127	
106-99-0	1,3-Butadiene	210	**241**	**115**	57-149	
74-83-9	Bromomethane	210	**198**	**94**	63-132	
75-00-3	Chloroethane	210	**220**	**105**	68-129	
64-17-5	Ethanol	1,040	**1140**	**110**	62-131	
75-05-8	Acetonitrile	210	**224**	**107**	56-136	
107-02-8	Acrolein	209	**214**	**102**	60-132	
67-64-1	Acetone	1,050	**1130**	**108**	63-124	
75-69-4	Trichlorofluoromethane (CFC 11)	208	**208**	**100**	65-113	
67-63-0	2-Propanol (Isopropyl Alcohol)	422	**453**	**107**	62-135	
107-13-1	Acrylonitrile	212	**230**	**108**	68-138	
75-35-4	1,1-Dichloroethene	213	**212**	**100**	72-118	
75-09-2	Methylene Chloride	213	**203**	**95**	67-116	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	212	**232**	**109**	61-143	
76-13-1	Trichlorotrifluoroethane (CFC 113)	214	**204**	**95**	68-113	
75-15-0	Carbon Disulfide	214	**223**	**104**	68-120	
156-60-5	trans-1,2-Dichloroethene	214	**229**	**107**	71-125	
75-34-3	1,1-Dichloroethane	212	**212**	**100**	68-118	
1634-04-4	Methyl tert-Butyl Ether	213	**219**	**103**	60-123	
108-05-4	Vinyl Acetate	1,060	**1320**	**125**	73-135	
78-93-3	2-Butanone (MEK)	212	**221**	**104**	70-129	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P180320-LCS

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	212	**224**	**106**	69-121	
141-78-6	Ethyl Acetate	426	**470**	**110**	66-140	
110-54-3	n-Hexane	213	**224**	**105**	61-124	
67-66-3	Chloroform	212	**208**	**98**	69-113	
109-99-9	Tetrahydrofuran (THF)	212	**219**	**103**	66-121	
107-06-2	1,2-Dichloroethane	212	**211**	**100**	62-120	
71-55-6	1,1,1-Trichloroethane	212	**213**	**100**	65-116	
71-43-2	Benzene	213	**200**	**94**	66-111	
56-23-5	Carbon Tetrachloride	214	**214**	**100**	64-122	
110-82-7	Cyclohexane	425	**437**	**103**	69-115	
78-87-5	1,2-Dichloropropane	212	**219**	**103**	69-121	
75-27-4	Bromodichloromethane	214	**228**	**107**	69-123	
79-01-6	Trichloroethene	212	**198**	**93**	69-112	
123-91-1	1,4-Dioxane	213	**221**	**104**	74-123	
80-62-6	Methyl Methacrylate	424	**465**	**110**	75-125	
142-82-5	n-Heptane	213	**227**	**107**	68-118	
10061-01-5	cis-1,3-Dichloropropene	208	**228**	**110**	74-129	
108-10-1	4-Methyl-2-pentanone	213	**243**	**114**	66-138	
10061-02-6	trans-1,3-Dichloropropene	213	**230**	**108**	75-130	
79-00-5	1,1,2-Trichloroethane	212	**218**	**103**	73-117	
108-88-3	Toluene	211	**204**	**97**	66-114	
591-78-6	2-Hexanone	211	**225**	**107**	58-146	
124-48-1	Dibromochloromethane	212	**222**	**105**	67-130	
106-93-4	1,2-Dibromoethane	211	**209**	**99**	70-127	
123-86-4	n-Butyl Acetate	215	**235**	**109**	62-140	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150** ALS Sample ID: P180320-LCS

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
111-65-9	n-Octane	212	**222**	**105**	65-121	
127-18-4	Tetrachloroethene	212	**209**	**99**	62-119	
108-90-7	Chlorobenzene	212	**201**	**95**	66-115	
100-41-4	Ethylbenzene	212	**213**	**100**	69-117	
179601-23-1	m,p-Xylenes	424	**435**	**103**	67-117	
75-25-2	Bromoform	212	**217**	**102**	67-135	
100-42-5	Styrene	211	**218**	**103**	70-128	
95-47-6	o-Xylene	211	**220**	**104**	67-118	
111-84-2	n-Nonane	212	**230**	**108**	61-127	
79-34-5	1,1,2,2-Tetrachloroethane	212	**234**	**110**	70-125	
98-82-8	Cumene	212	**217**	**102**	68-116	
80-56-8	alpha-Pinene	213	**232**	**109**	69-122	
103-65-1	n-Propylbenzene	214	**223**	**104**	70-118	
622-96-8	4-Ethyltoluene	211	**230**	**109**	69-124	
108-67-8	1,3,5-Trimethylbenzene	212	**220**	**104**	65-117	
95-63-6	1,2,4-Trimethylbenzene	212	**225**	**106**	67-124	
100-44-7	Benzyl Chloride	212	**233**	**110**	75-142	
541-73-1	1,3-Dichlorobenzene	212	**205**	**97**	70-124	
106-46-7	1,4-Dichlorobenzene	214	**201**	**94**	63-124	
95-50-1	1,2-Dichlorobenzene	214	**213**	**100**	66-125	
5989-27-5	d-Limonene	213	**244**	**115**	64-135	
96-12-8	1,2-Dibromo-3-chloropropane	210	**221**	**105**	73-136	
120-82-1	1,2,4-Trichlorobenzene	218	**196**	**90**	70-141	
91-20-3	Naphthalene	209	**167**	**80**	71-146	
87-68-3	Hexachlorobutadiene	212	**209**	**99**	63-126	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.** ALS Project ID: P1801150
Client Project ID: **LHAAP GWTP / NW01312.0150**

Internal Standard Area and RT Summary

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9 Lab File ID: 03201801.D
Analyst: Lusine Hakobyan Date Analyzed: 3/20/18
Sample Type: 6.0 L Summa Canister(s) Time Analyzed: 01:40
Test Notes:

		IS1 (BCM)		IS2 (DFB)		IS3 (CBZ)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	24 Hour Standard	146904	9.30	779041	11.26	387844	15.59
	Upper Limit	205666	9.63	1090657	11.59	542982	15.92
	Lower Limit	88142	8.97	467425	10.93	232706	15.26
	Client Sample ID						
01	Method Blank	141667	9.27	766244	11.24	368517	15.58
02	Lab Control Sample	143140	9.30	750432	11.26	376287	15.59
03	LH18/24-AIR_030518_Stripper (Dilution)	163264	9.27	866302	11.24	430489	15.59
04	LH18/24-AIR_030518_Stripper	151769	9.28	785271	11.25	394361	15.59
05	LH18/24-AIR_030518_Stripper-Dup	132497	9.28	697095	11.25	352886	15.59
06	LH18/24-AIR_030518_Stripper-Dup (Dilution)	117414	9.27	628679	11.24	321799	15.59
07	LH18/24-AIR_030518_GWTP	113947	9.27	620046	11.24	321270	15.58
08	LH18/24-AIR_030518_Downwind_North	110801	9.27	606722	11.24	312990	15.59
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = 140% of internal standard area
AREA LOWER LIMIT = 60% of internal standard area
RT UPPER LIMIT = 0.33 minutes of internal standard RT
RT LOWER LIMIT = 0.33 minutes of internal standard RT

# Column used to flag values outside QC limits with an I.
I = Internal standard not within the specified limits.

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201820.D
Acq On : 20 Mar 2018 14:22 Operator: LH
Sample : P1801150-001 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:00:50 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 3/21/18

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	9.28	130	151769	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	11.25	114	785271	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	15.59	82	394361	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	10.06	65	349363	12.617	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.96%			
57) Toluene-d8 (SS2)	13.68	98	910837	12.288	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.32%			
73) Bromofluorobenzene (SS3)	17.17	174	204975	11.630	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.04%			
Target Compounds						Qvalue
2) Propene	0.00	42	0	N.D.		
3) Dichlorodifluoromethan...	4.01	85	858	N.D.		
4) Chloromethane	4.30	50	372	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	4.57	62	16255	0.519	ng	99
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	5.48	45	8151	0.460	ng	99
11) Acetonitrile	5.71	41	437	N.D.		
12) Acrolein	0.00	56	0	N.D.		
13) Acetone	6.01	58	5129	N.D.		
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	6.35	45	1696	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.		
17) 1,1-Dichloroethene	6.85	96	10643	0.656	ng	88
18) 2-Methyl-2-Propanol (t...	6.86	59	473	N.D.		
19) Methylene Chloride	6.98	84	82121	4.310	ng	84
20) 3-Chloro-1-propene (Al...	7.06	41	107	N.D.		
21) Trichlorotrifluoroethane	7.32	151	462030	37.608	ng	93
22) Carbon Disulfide	7.29	76	7893	N.D.		
23) trans-1,2-Dichloroethene	8.01	61	2851	N.D.		
24) 1,1-Dichloroethane	8.24	63	4955	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.		
27) 2-Butanone (MEK)	8.68	72	223	N.D.		
28) cis-1,2-Dichloroethene	9.11	61	1242012	43.180	ng	90
29) Diisopropyl Ether	9.42	87	461	N.D.		
30) Ethyl Acetate	9.36	61	514	N.D.		
31) n-Hexane	0.00	57	0	N.D.		
32) Chloroform	9.41	83	5640	N.D.		
34) Tetrahydrofuran (THF)	9.86	72	117	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	10.17	62	26491	0.884	ng	98
38) 1,1,1-Trichloroethane	10.44	97	560	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	10.84	56	843	N.D.		
41) Benzene	10.90	78	2944	N.D.		
42) Carbon Tetrachloride	11.04	117	664	N.D.		
43) Cyclohexane	11.18	84	752	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	11.94	130	2219837	128.859	ng	99
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.		

Data File: I:\MS09\Data\2018_03\20\03201820.D
Acq On : 20 Mar 2018 14:22 Operator: LH
Sample : P1801150-001 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

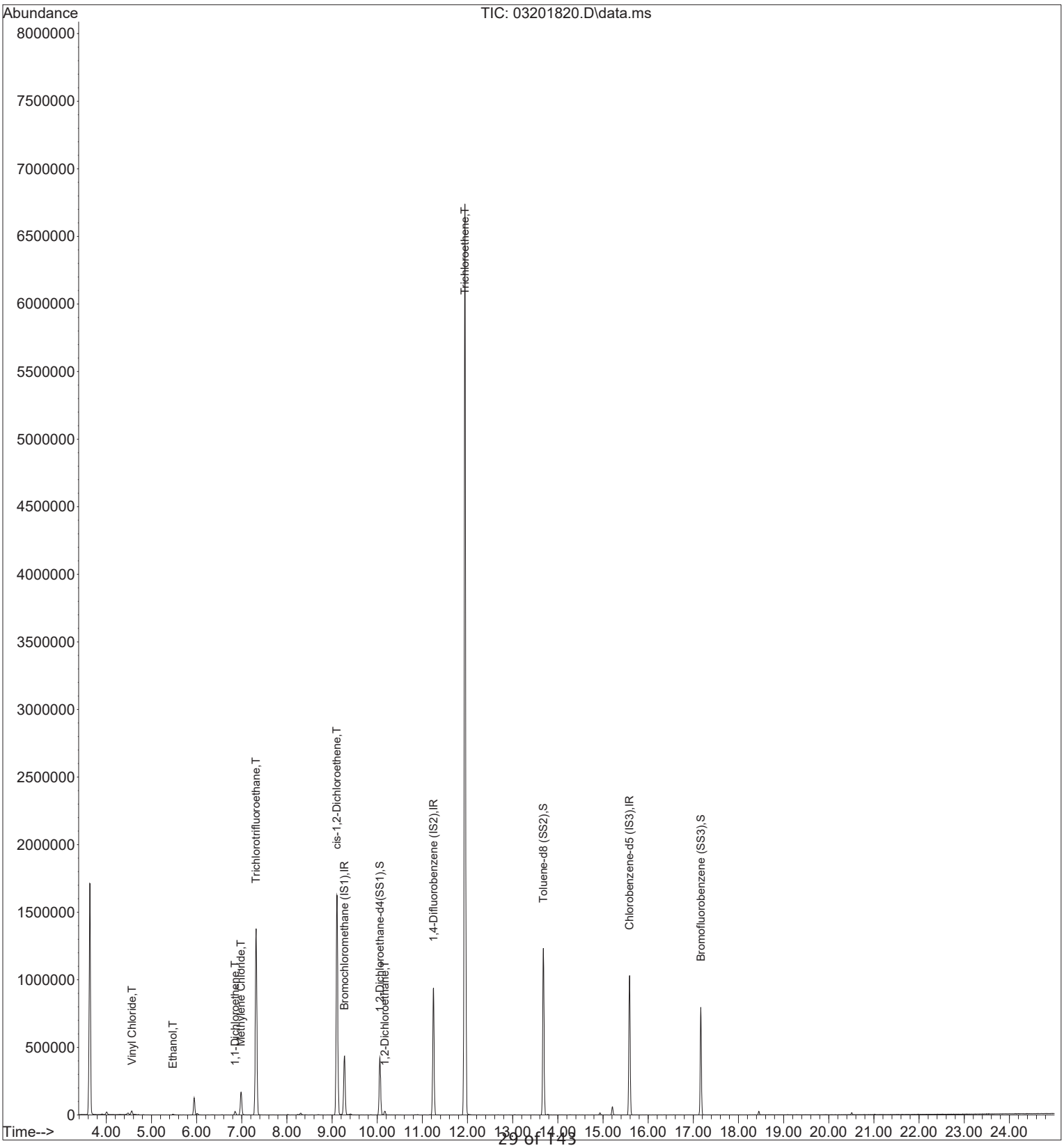
Quant Time: Mar 21 14:00:50 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.		
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	13.49	97	313	N.D.		
58) Toluene	13.78	91	3881	N.D.		
59) 2-Hexanone	14.04	43	407	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	0.00	43	0	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	14.93	166	4599	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	16.03	91	188	N.D.		
67) m- & p-Xylenes	16.21	91	364	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	16.59	104	111	N.D.		
70) o-Xylene	16.70	91	310	N.D.		
71) n-Nonane	0.00	43	0	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	0.00	105	0	N.D.		
75) alpha-Pinene	17.73	93	260	N.D.		
76) n-Propylbenzene	0.00	91	0	N.D.		
77) 3-Ethyltoluene	0.00	105	0	N.D.		
78) 4-Ethyltoluene	0.00	105	0	N.D.		
79) 1,3,5-Trimethylbenzene	0.00	105	0	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D.		
82) 1,2,4-Trimethylbenzene	0.00	105	0	N.D.		
83) n-Decane	18.60	57	158	N.D.		
84) Benzyl Chloride	0.00	91	0	N.D.		
85) 1,3-Dichlorobenzene	0.00	146	0	N.D.		
86) 1,4-Dichlorobenzene	0.00	146	0	N.D.		
87) sec-Butylbenzene	0.00	105	0	N.D.		
88) 4-Isopropyltoluene (p-...	18.93	119	323	N.D.		
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	19.08	68	574	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	19.92	57	420	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	20.99	128	729	N.D.		
96) n-Dodecane	21.02	57	1184	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	16.39	55	116	N.D.		
99) tert-Butylbenzene	18.45	119	170	N.D.		
100) n-Butylbenzene	0.00	91	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201820.D
Acq On : 20 Mar 2018 14:22 Operator: LH
Sample : P1801150-001 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:00:50 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201820.D
Acq On : 20 Mar 2018 14:22 Operator: LH
Sample : P1801150-001 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:00:50 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 3/21/18

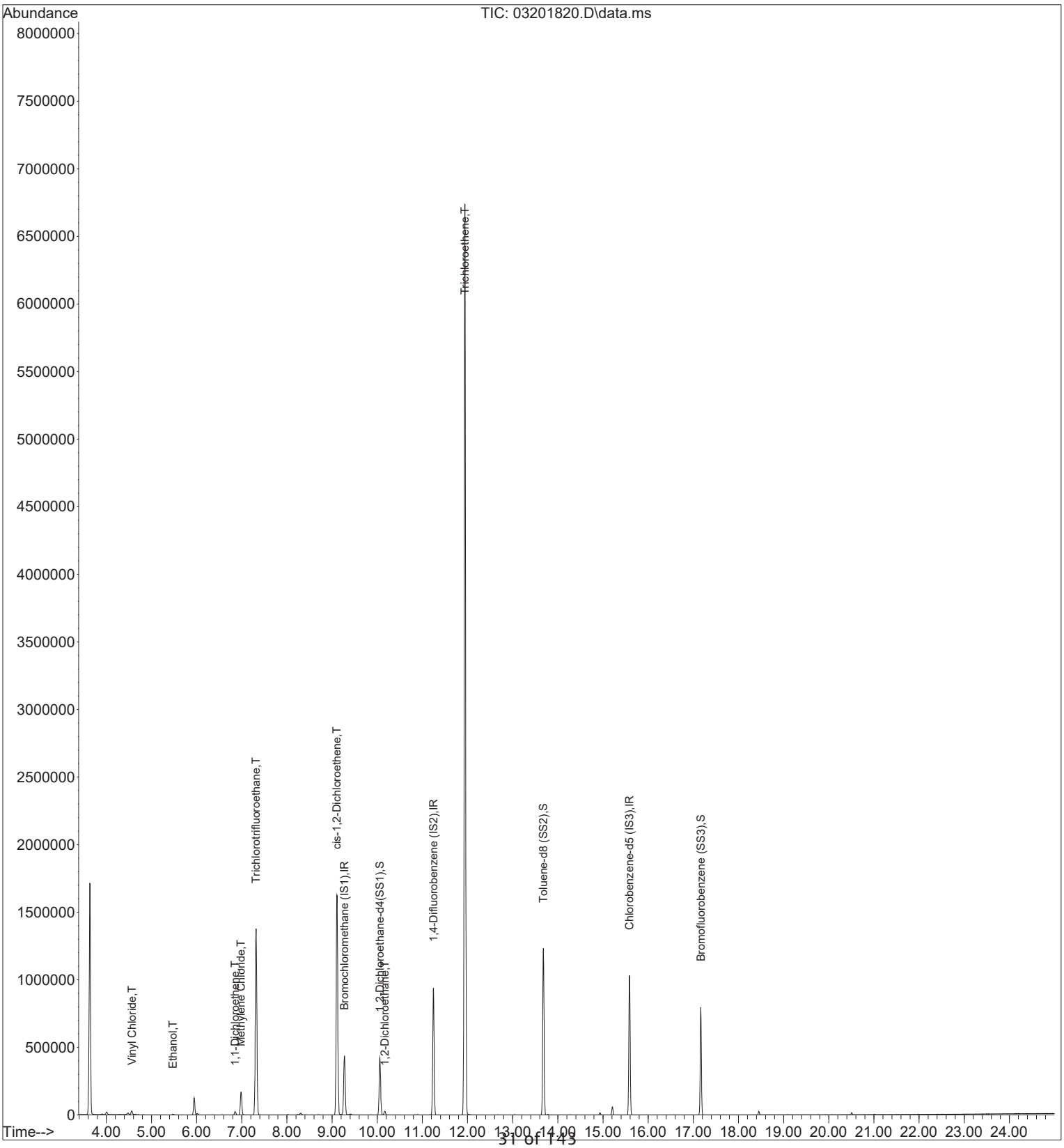
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	9.28	130	151769	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	11.25	114	785271	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	15.59	82	394361	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	10.06	65	349363	12.617	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.96%			
57) Toluene-d8 (SS2)	13.68	98	910837	12.288	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.32%			
73) Bromofluorobenzene (SS3)	17.17	174	204975	11.630	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.04%			
Target Compounds						Qvalue
6) Vinyl Chloride	4.57	62	16255	0.519	ng	99
10) Ethanol	5.48	45	8151	0.460	ng	99
17) 1,1-Dichloroethene	6.85	96	10643	0.656	ng	88
19) Methylene Chloride	6.98	84	82121	4.310	ng	84
21) Trichlorotrifluoroethane	7.32	151	462030	37.608	ng	93
28) cis-1,2-Dichloroethene	9.11	61	1242012	43.180	ng	90
36) 1,2-Dichloroethane	10.17	62	26491	0.884	ng	98
47) Trichloroethene	11.94	130	2219837	128.859	ng	99

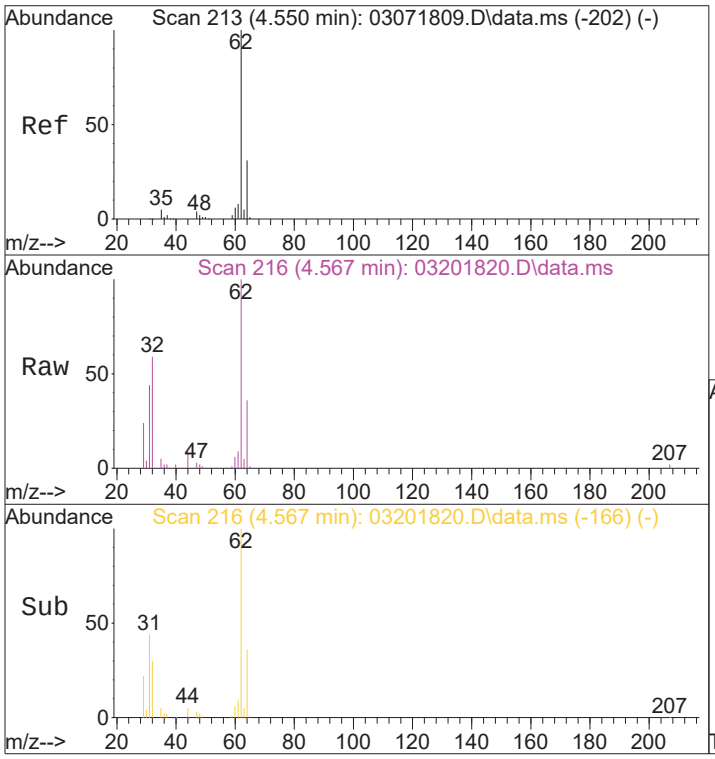
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201820.D
Acq On : 20 Mar 2018 14:22 Operator: LH
Sample : P1801150-001 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:00:50 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

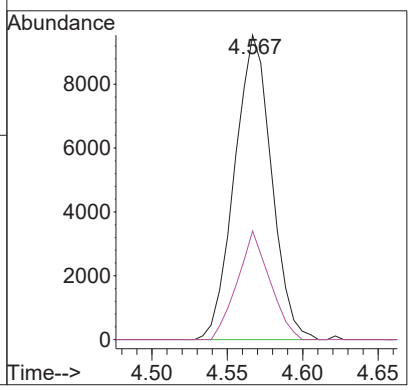


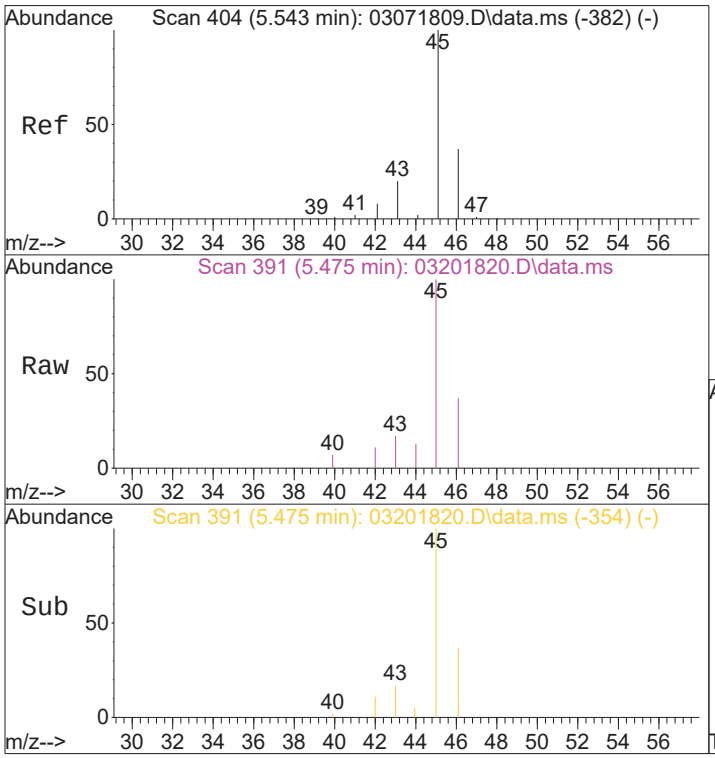


#6
Vinyl Chloride
Concen: 0.52 ng
RT: 4.57 min Scan# 216
Delta R.T. 0.022 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion: 62 Resp: 16255

Ion	Ratio	Lower	Upper
62	100		
64	31.6	12.2	52.2

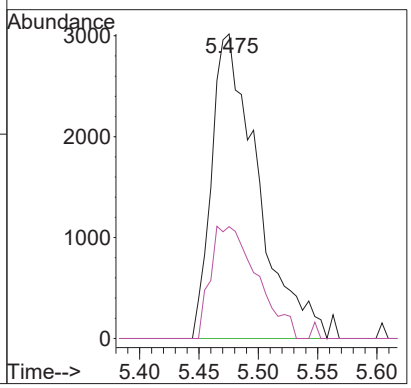


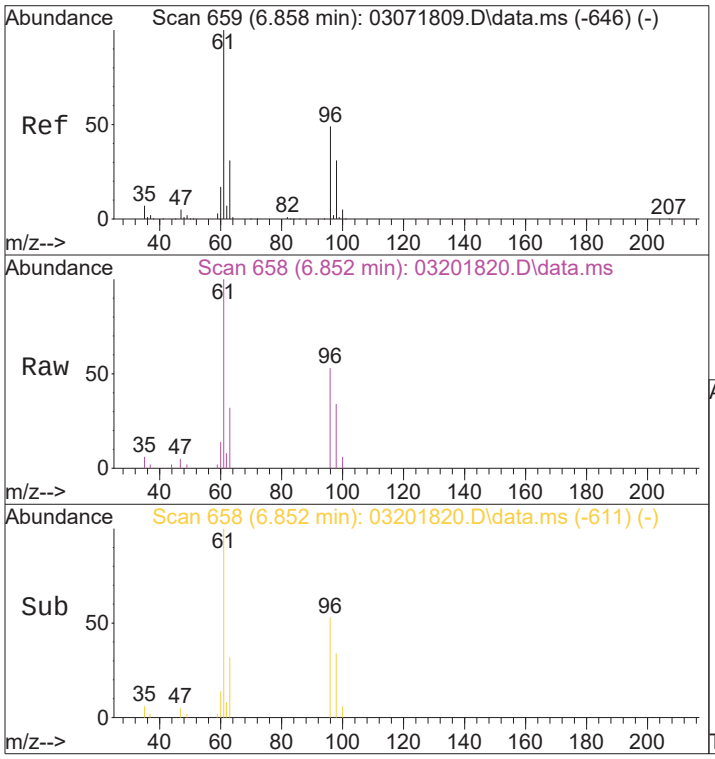


#10
Ethanol
Concen: 0.46 ng
RT: 5.48 min Scan# 391
Delta R.T. -0.062 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion: 45 Resp: 8151

Ion	Ratio	Lower	Upper
45	100		
46	37.1	17.5	57.5

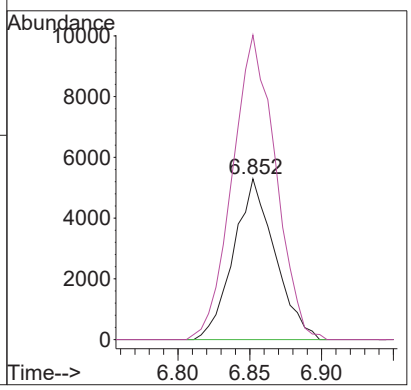


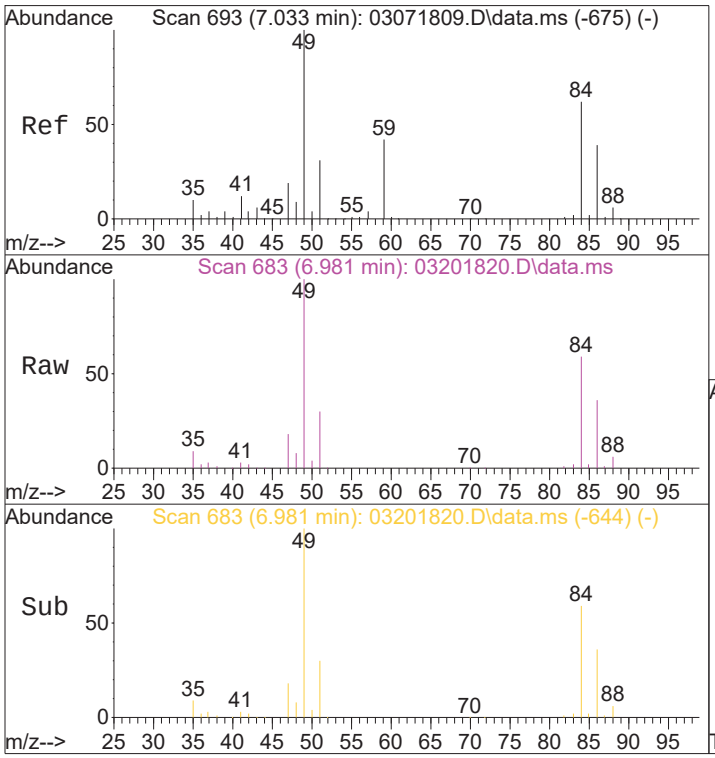


#17
1,1-Dichloroethene
Concen: 0.66 ng
RT: 6.85 min Scan# 658
Delta R.T. -0.005 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion: 96 Resp: 10643

Ion	Ratio	Lower	Upper
96	100		
61	196.9	159.3	199.3

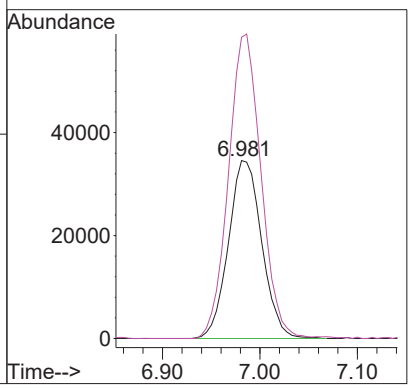


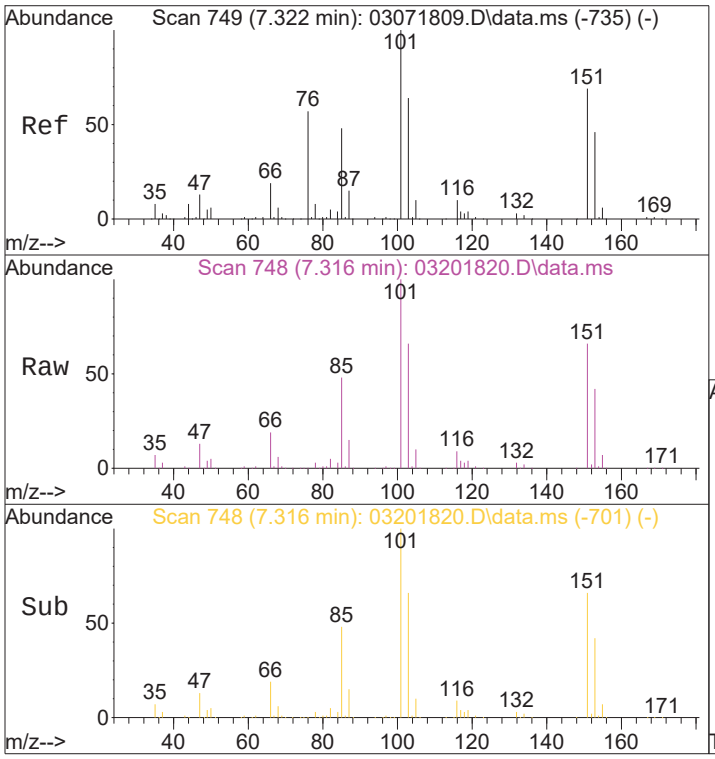


#19
Methylene Chloride
Concen: 4.31 ng
RT: 6.98 min Scan# 683
Delta R.T. -0.047 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion: 84 Resp: 82121

Ion	Ratio	Lower	Upper
84	100		
49	167.2	121.8	171.8

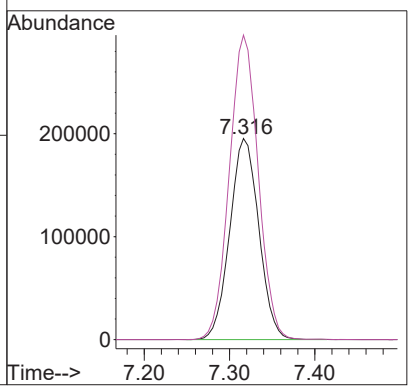


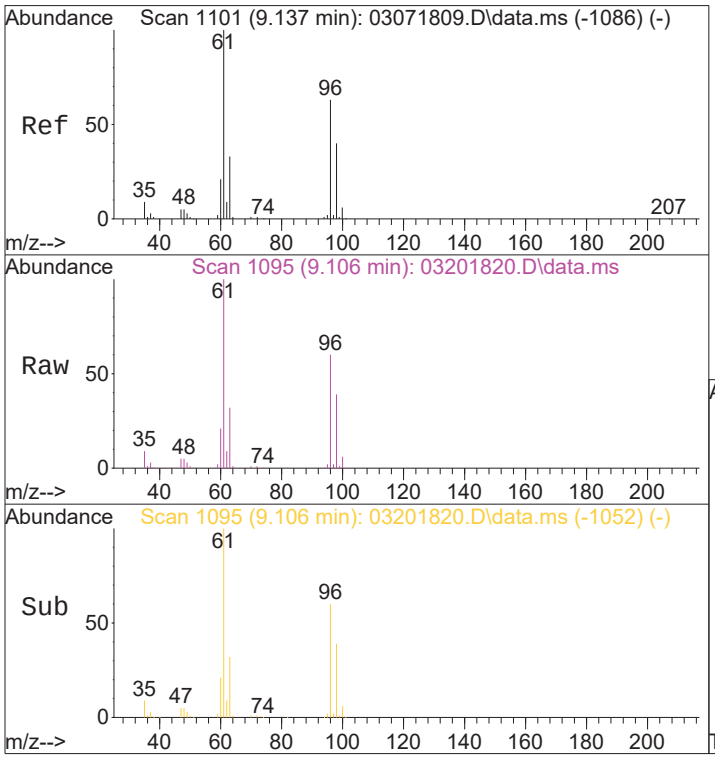


#21
Trichlorotrifluoroethane
Concen: 37.61 ng
RT: 7.32 min Scan# 748
Delta R.T. -0.005 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion:151 Resp: 462030

Ion	Ratio	Lower	Upper
151	100		
101	150.5	122.5	162.5

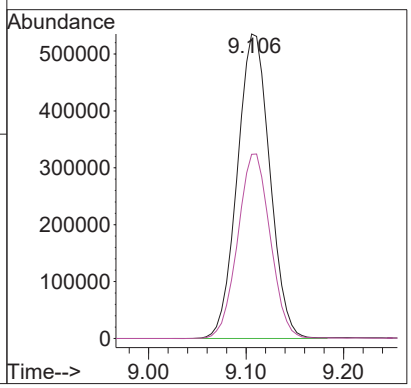


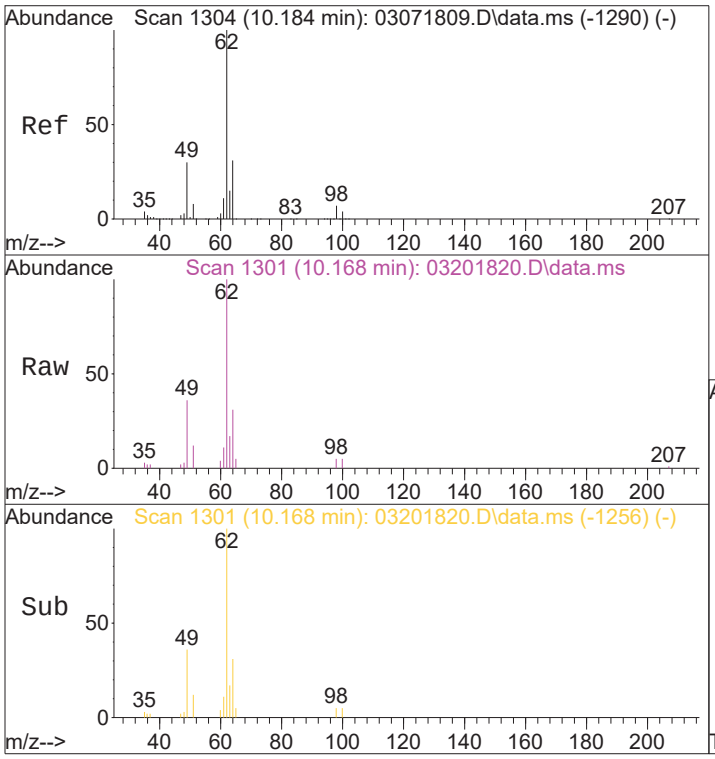


#28
cis-1,2-Dichloroethene
Concen: 43.18 ng
RT: 9.11 min Scan# 1095
Delta R.T. -0.026 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion: 61 Resp: 1242012

Ion	Ratio	Lower	Upper
61	100		
96	60.6	48.4	88.4

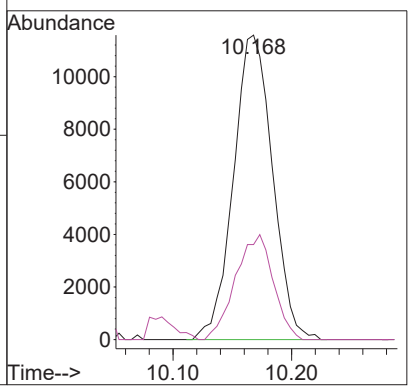


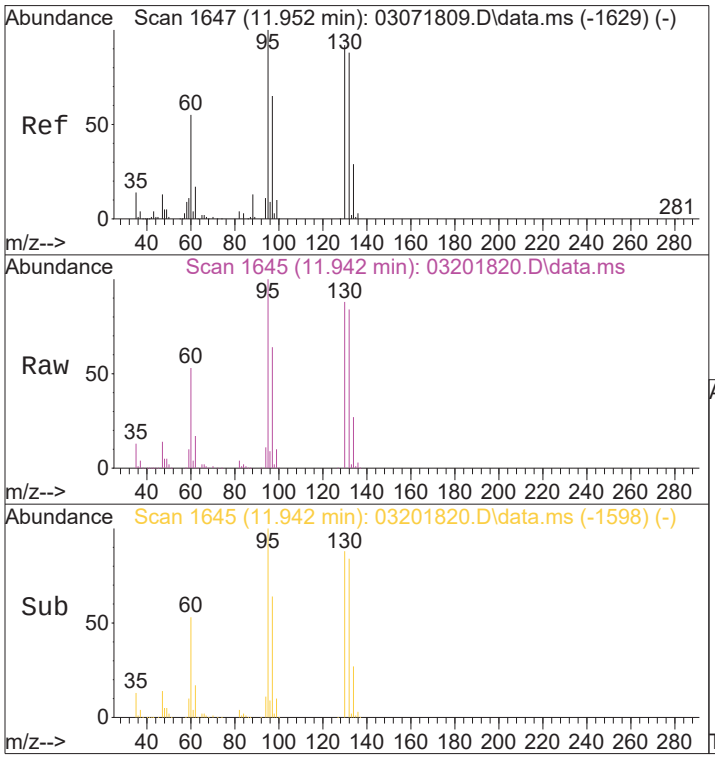


#36
1,2-Dichloroethane
Concen: 0.88 ng
RT: 10.17 min Scan# 1301
Delta R.T. -0.016 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion: 62 Resp: 26491

Ion	Ratio	Lower	Upper
62	100		
64	33.3	12.2	52.2

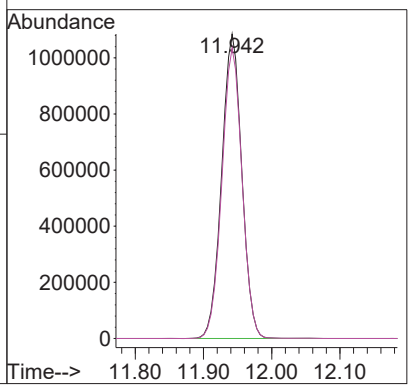




#47
Trichloroethene
Concen: 128.86 ng
RT: 11.94 min Scan# 1645
Delta R.T. -0.005 min
Lab File: 03201820.D
Acq: 20 Mar 2018 14:22

Tgt Ion:130 Resp: 2219837

Ion	Ratio	Lower	Upper
130	100		
132	95.6	74.9	114.9



Data File: I:\MS09\Data\2018_03\20\03201819.D
Acq On : 20 Mar 2018 13:48 Operator: LH
Sample : P1801150-001dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:00:28 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018 LH 3/21/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	163264	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	866302	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	430489	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	10.05	65	371447	12.470	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.76%			
57) Toluene-d8 (SS2)	13.68	98	1000944	12.370	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.96%			
73) Bromofluorobenzene (SS3)	17.17	174	226341	11.764	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.08%			
Target Compounds						Qvalue
2) Propene	3.99	42	3683	N.D.		
3) Dichlorodifluoromethan...	4.00	85	576	N.D.		
4) Chloromethane	4.29	50	303	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	4.57	62	8459	N.D.		
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	5.47	45	29133	1.529	ng	100
11) Acetonitrile	5.70	41	857	N.D.		
12) Acrolein	5.85	56	156	N.D.		
13) Acetone	6.00	58	5691	N.D.		
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	6.34	45	2534	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.		
17) 1,1-Dichloroethene	6.85	96	5775	N.D.		
18) 2-Methyl-2-Propanol (t...	7.03	59	332	N.D.		
19) Methylene Chloride	6.98	84	44927	2.192	ng	83
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.		
21) Trichlorotrifluoroethane	7.32	151	243622	18.434	ng	92
22) Carbon Disulfide	7.29	76	6379	N.D.		
23) trans-1,2-Dichloroethene	8.02	61	1493	N.D.		
24) 1,1-Dichloroethane	8.23	63	2423	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.		
27) 2-Butanone (MEK)	8.69	72	491	N.D.		
28) cis-1,2-Dichloroethene	9.11	61	657953	21.264	ng	91
29) Diisopropyl Ether	9.40	87	125	N.D.		
30) Ethyl Acetate	9.42	61	109	N.D.		
31) n-Hexane	9.35	57	118	N.D.		
32) Chloroform	9.41	83	3109	N.D.		
34) Tetrahydrofuran (THF)	0.00	72	0	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	10.16	62	14033	N.D.		
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	10.83	56	1382	N.D.		
41) Benzene	10.89	78	2560	N.D.		
42) Carbon Tetrachloride	11.04	117	242	N.D.		
43) Cyclohexane	11.17	84	565	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	11.94	130	1155824	60.819	ng	100
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.		

Data File: I:\MS09\Data\2018_03\20\03201819.D
Acq On : 20 Mar 2018 13:48 Operator: LH
Sample : P1801150-001dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

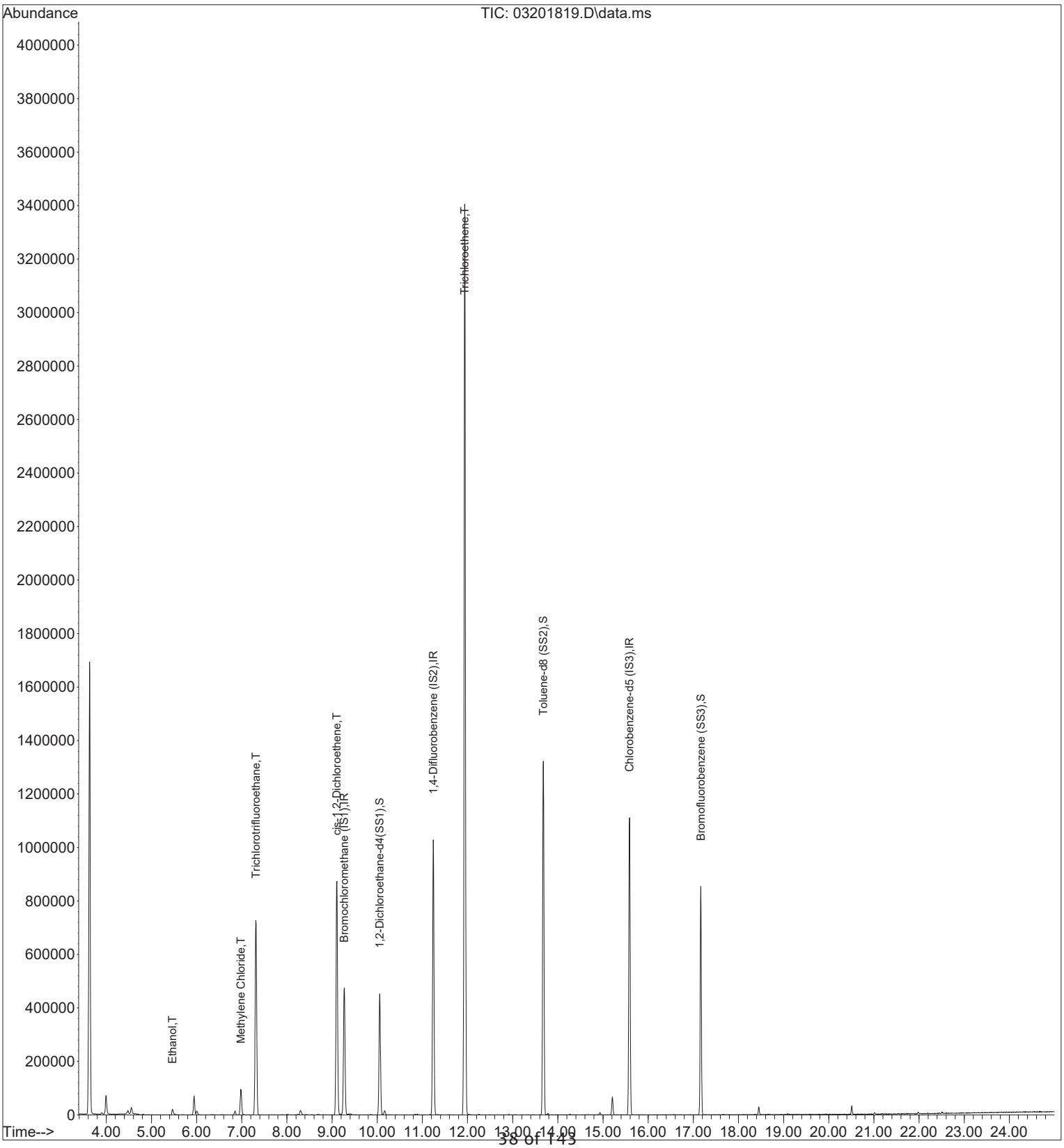
Quant Time: Mar 21 14:00:28 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.		
51) n-Heptane	12.26	71	427	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	13.47	97	106	N.D.		
58) Toluene	13.78	91	4029	N.D.		
59) 2-Hexanone	14.04	43	535	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	14.67	43	240	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	14.93	166	2580	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	16.04	91	278	N.D.		
67) m- & p-Xylenes	16.24	91	123	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	0.00	104	0	N.D.		
70) o-Xylene	16.71	91	241	N.D.		
71) n-Nonane	16.93	43	164	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	0.00	105	0	N.D.		
75) alpha-Pinene	17.71	93	227	N.D.		
76) n-Propylbenzene	17.87	91	171	N.D.		
77) 3-Ethyltoluene	0.00	105	0	N.D.		
78) 4-Ethyltoluene	0.00	105	0	N.D.		
79) 1,3,5-Trimethylbenzene	0.00	105	0	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D.		
82) 1,2,4-Trimethylbenzene	18.48	105	313	N.D.		
83) n-Decane	18.60	57	385	N.D.		
84) Benzyl Chloride	0.00	91	0	N.D.		
85) 1,3-Dichlorobenzene	0.00	146	0	N.D.		
86) 1,4-Dichlorobenzene	0.00	146	0	N.D.		
87) sec-Butylbenzene	0.00	105	0	N.D.		
88) 4-Isopropyltoluene (p-...	18.94	119	611	N.D.		
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	19.09	68	1168	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	19.93	57	678	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	21.00	128	869	N.D.		
96) n-Dodecane	21.01	57	1980	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	16.38	55	447	N.D.		
99) tert-Butylbenzene	0.00	119	0	N.D.		
100) n-Butylbenzene	0.00	91	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

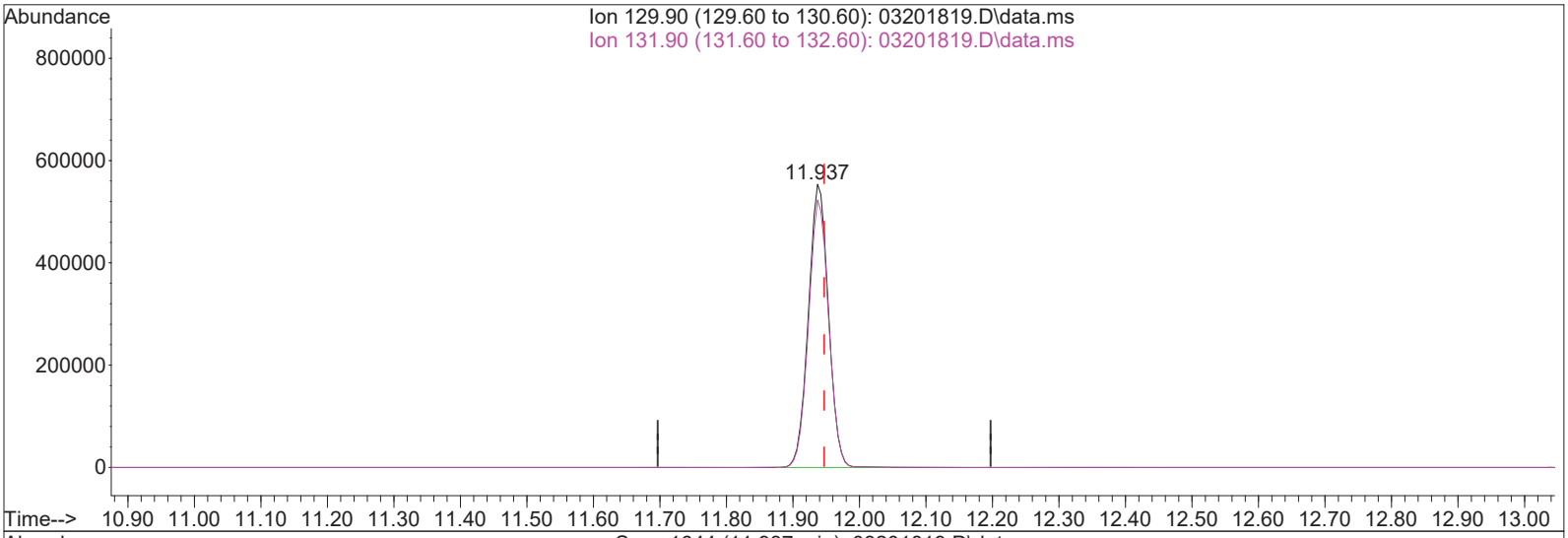
Data File: I:\MS09\Data\2018_03\20\03201819.D
Acq On : 20 Mar 2018 13:48 Operator: LH
Sample : P1801150-001dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

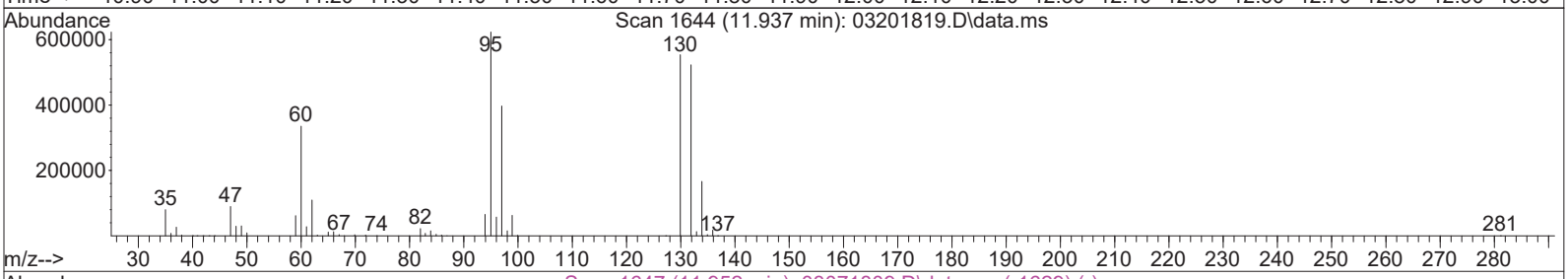
Quant Time: Mar 21 14:00:28 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

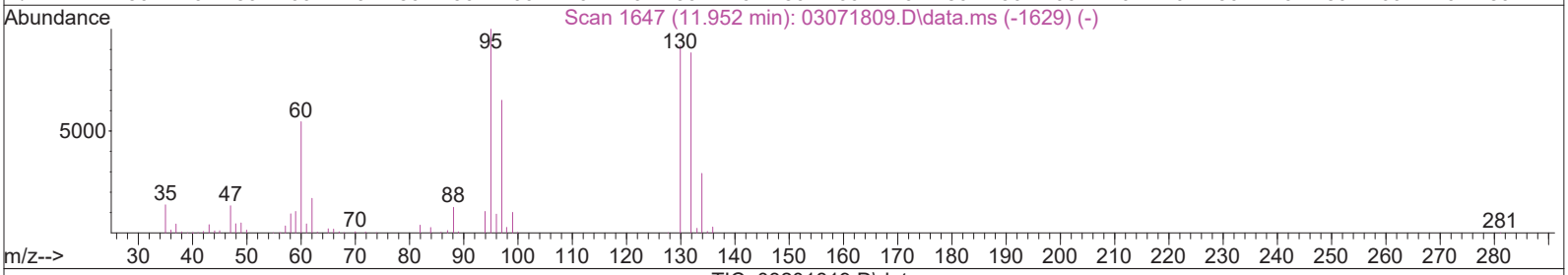


Data File: I:\MS09\Data\2018_03\20\03201819.D
Acq On : 20 Mar 2018 13:48 Operator: LH
Sample : P1801150-001dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 20 14:55:13 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201819.D\data.ms

(47) Trichloroethene (T)

11.937min (-0.010) 60.82ng

response 1155824

Ion	Exp%	Act%
129.90	100	100
131.90	94.90	94.68
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201821.D
Acq On : 20 Mar 2018 14:55 Operator: LH
Sample : P1801150-002 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:02:01 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS) LH 3/21/18
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.28	130	132497	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	11.25	114	697095	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	15.59	82	352886	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.06	65	321030	13.280	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 106.24%				
57) Toluene-d8 (SS2)	13.68	98	808693	12.192	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.52%				
73) Bromofluorobenzene (SS3)	17.17	174	182914	11.598	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 92.80%				
Target Compounds							Qvalue
2) Propene	0.00	42	0	N.D.			
3) Dichlorodifluoromethan...	4.00	85	809	N.D.			
4) Chloromethane	4.29	50	279	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.			
6) Vinyl Chloride	4.57	62	14998	0.549	ng		100
7) 1,3-Butadiene	0.00	54	0	N.D.			
8) Bromomethane	0.00	94	0	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.48	45	5480	N.D.			
11) Acetonitrile	5.71	41	485	N.D.			
12) Acrolein	0.00	56	0	N.D.			
13) Acetone	6.02	58	4618	N.D.			
14) Trichlorofluoromethane	0.00	101	0	N.D.			
15) 2-Propanol (Isopropanol)	6.37	45	897	N.D.			
16) Acrylonitrile	0.00	53	0	N.D.			
17) 1,1-Dichloroethene	6.85	96	9019	0.637	ng	#	74
18) 2-Methyl-2-Propanol (t...	6.85	59	591	N.D.			
19) Methylene Chloride	6.99	84	74136	4.456	ng		82
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.			
21) Trichlorotrifluoroethane	7.32	151	427197	39.831	ng		93
22) Carbon Disulfide	7.29	76	3219	N.D.			
23) trans-1,2-Dichloroethene	8.02	61	2955	N.D.			
24) 1,1-Dichloroethane	8.24	63	4415	N.D.			
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.			
26) Vinyl Acetate	0.00	86	0	N.D.			
27) 2-Butanone (MEK)	8.69	72	1425	N.D.			
28) cis-1,2-Dichloroethene	9.11	61	1157826	46.108	ng		89
29) Diisopropyl Ether	9.41	87	277	N.D.			
30) Ethyl Acetate	9.28	61	329	N.D.			
31) n-Hexane	0.00	57	0	N.D.			
32) Chloroform	9.41	83	5471	N.D.			
34) Tetrahydrofuran (THF)	0.00	72	0	N.D.			
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	10.17	62	26053	0.996	ng		99
38) 1,1,1-Trichloroethane	10.44	97	485	N.D.			
39) Isopropyl Acetate	0.00	61	0	N.D.			
40) 1-Butanol	10.83	56	786	N.D.			
41) Benzene	10.89	78	2595	N.D.			
42) Carbon Tetrachloride	11.05	117	576	N.D.			
43) Cyclohexane	11.18	84	673	N.D.			
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.			
46) Bromodichloromethane	0.00	83	0	N.D.	d		
47) Trichloroethene	11.94	130	2067203	135.178	ng		99
48) 1,4-Dioxane	0.00	88	0	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.			

Data File: I:\MS09\Data\2018_03\20\03201821.D
Acq On : 20 Mar 2018 14:55 Operator: LH
Sample : P1801150-002 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

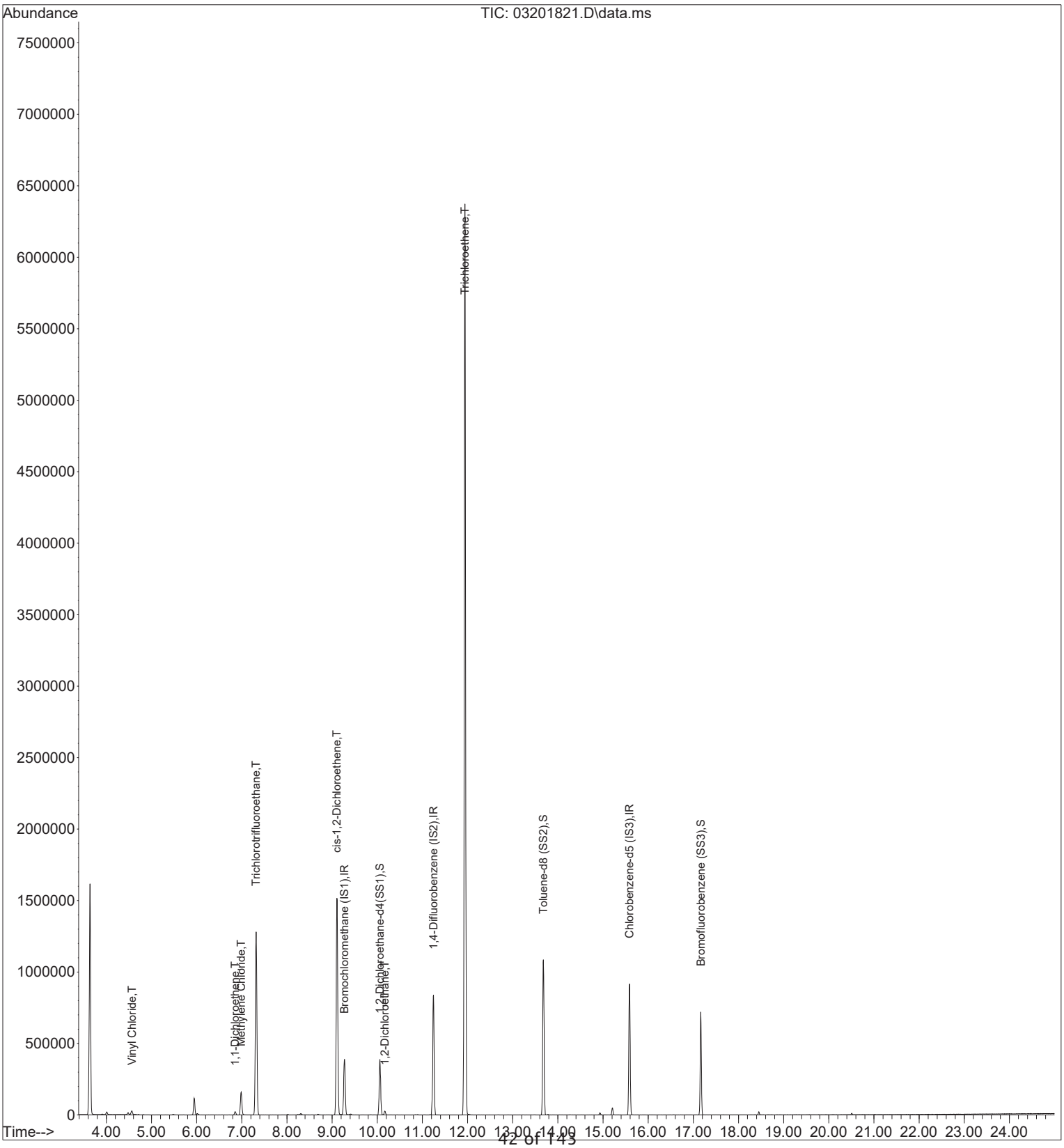
Quant Time: Mar 21 14:02:01 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.
51) n-Heptane	0.00	71	0	N.D.
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.
55) 1,1,2-Trichloroethane	13.48	97	399	N.D.
58) Toluene	13.78	91	3272	N.D.
59) 2-Hexanone	14.05	43	582	N.D.
60) Dibromochloromethane	0.00	129	0	N.D.
61) 1,2-Dibromoethane	0.00	107	0	N.D.
62) n-Butyl Acetate	0.00	43	0	N.D.
63) n-Octane	0.00	57	0	N.D.
64) Tetrachloroethene	14.93	166	4219	N.D.
65) Chlorobenzene	0.00	112	0	N.D.
66) Ethylbenzene	16.03	91	254	N.D.
67) m- & p-Xylenes	0.00	91	0	N.D.
68) Bromoform	0.00	173	0	N.D.
69) Styrene	16.59	104	155	N.D.
70) o-Xylene	0.00	91	0	N.D.
71) n-Nonane	0.00	43	0	N.D.
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.
74) Cumene	0.00	105	0	N.D.
75) alpha-Pinene	0.00	93	0	N.D.
76) n-Propylbenzene	0.00	91	0	N.D.
77) 3-Ethyltoluene	0.00	105	0	N.D.
78) 4-Ethyltoluene	0.00	105	0	N.D.
79) 1,3,5-Trimethylbenzene	0.00	105	0	N.D.
80) alpha-Methylstyrene	0.00	118	0	N.D.
81) 2-Ethyltoluene	0.00	105	0	N.D.
82) 1,2,4-Trimethylbenzene	0.00	105	0	N.D.
83) n-Decane	18.67	57	517	N.D.
84) Benzyl Chloride	0.00	91	0	N.D.
85) 1,3-Dichlorobenzene	0.00	146	0	N.D.
86) 1,4-Dichlorobenzene	0.00	146	0	N.D.
87) sec-Butylbenzene	0.00	105	0	N.D.
88) 4-Isopropyltoluene (p-...	0.00	119	0	N.D.
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.
91) d-Limonene	19.10	68	365	N.D.
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.
93) n-Undecane	19.93	57	235	N.D.
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.
95) Naphthalene	20.99	128	322	N.D.
96) n-Dodecane	21.01	57	675	N.D.
97) Hexachlorobutadiene	0.00	225	0	N.D.
98) Cyclohexanone	0.00	55	0	N.D.
99) tert-Butylbenzene	18.44	119	159	N.D.
100) n-Butylbenzene	0.00	91	0	N.D.

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201821.D
Acq On : 20 Mar 2018 14:55 Operator: LH
Sample : P1801150-002 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:02:01 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201821.D
Acq On : 20 Mar 2018 14:55 Operator: LH
Sample : P1801150-002 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:02:01 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

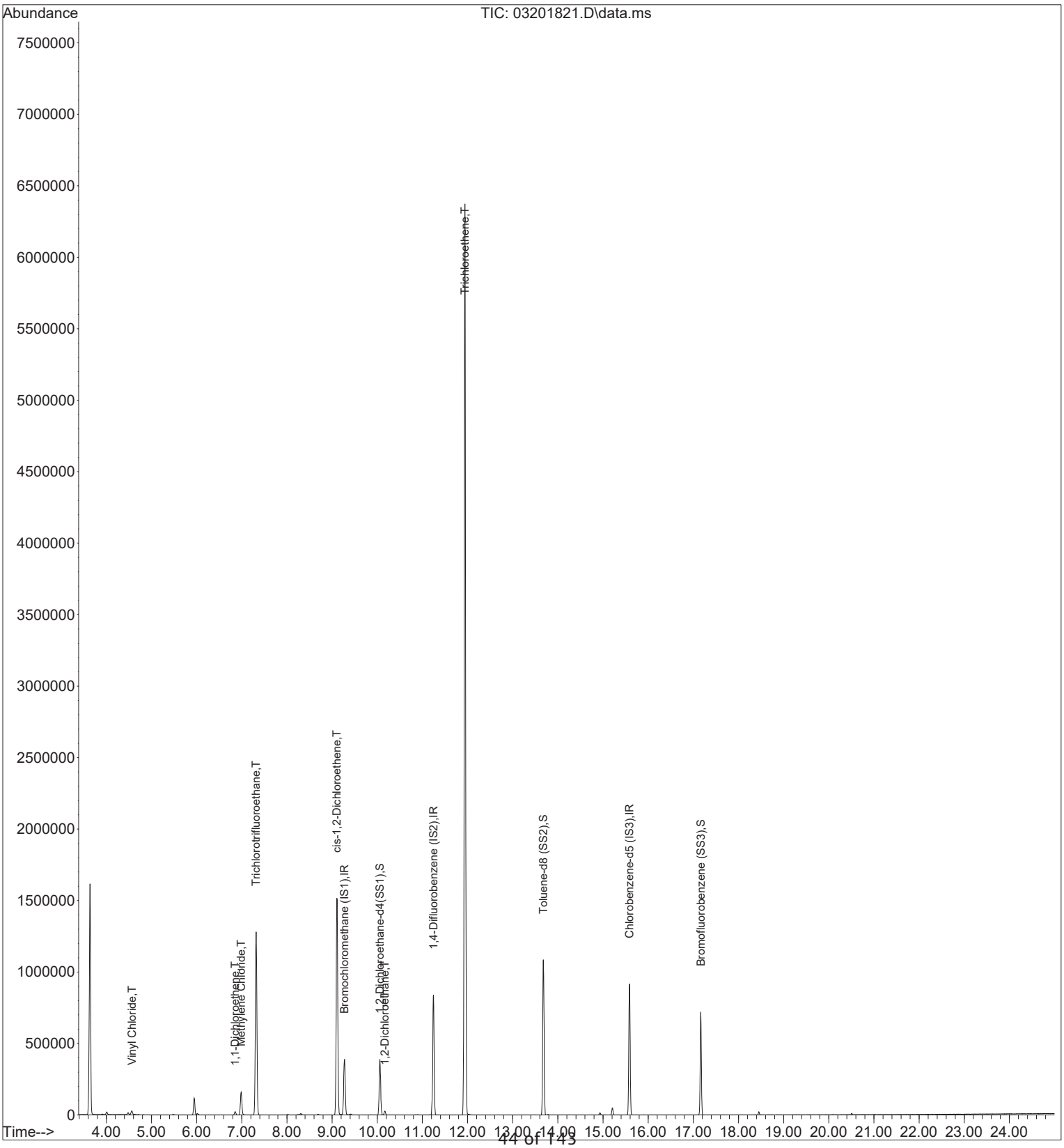
LH 3/21/18

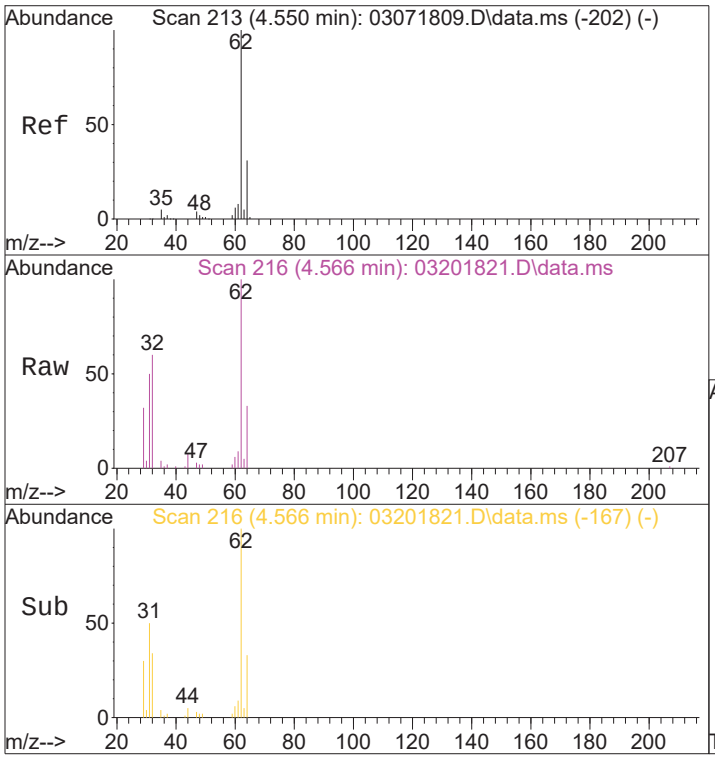
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.28	130	132497	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	11.25	114	697095	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	15.59	82	352886	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.06	65	321030	13.280	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 106.24%				
57) Toluene-d8 (SS2)	13.68	98	808693	12.192	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.52%				
73) Bromofluorobenzene (SS3)	17.17	174	182914	11.598	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 92.80%				
Target Compounds							Qvalue
6) Vinyl Chloride	4.57	62	14998	0.549	ng		100
17) 1,1-Dichloroethene	6.85	96	9019	0.637	ng	#	74
19) Methylene Chloride	6.99	84	74136	4.456	ng		82
21) Trichlorotrifluoroethane	7.32	151	427197	39.831	ng		93
28) cis-1,2-Dichloroethene	9.11	61	1157826	46.108	ng		89
36) 1,2-Dichloroethane	10.17	62	26053	0.996	ng		99
47) Trichloroethene	11.94	130	2067203	135.178	ng		99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201821.D
Acq On : 20 Mar 2018 14:55 Operator: LH
Sample : P1801150-002 (6.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:02:01 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

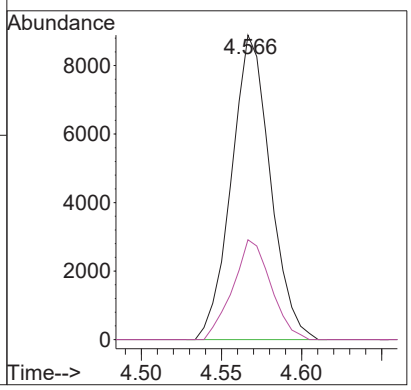


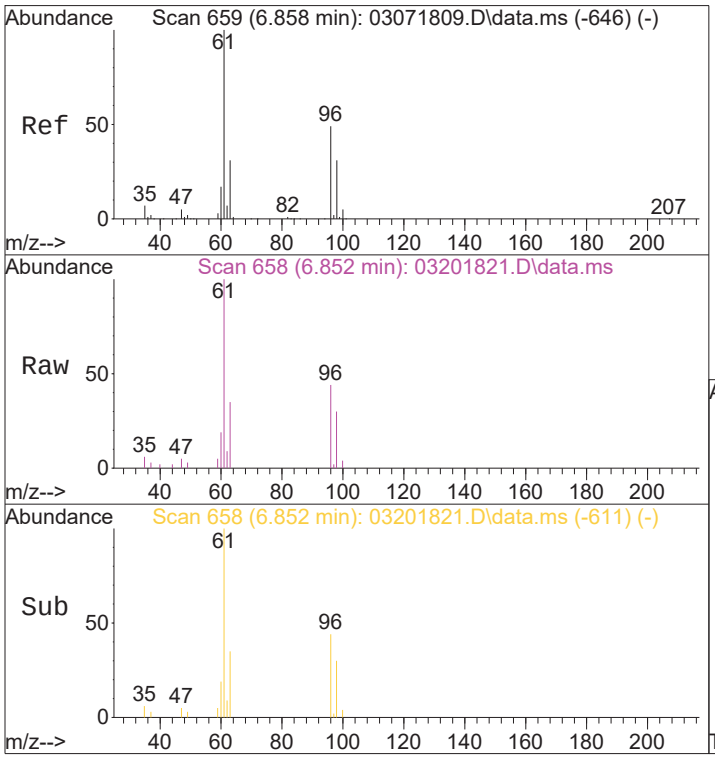


#6
Vinyl Chloride
Concen: 0.55 ng
RT: 4.57 min Scan# 216
Delta R.T. 0.022 min
Lab File: 03201821.D
Acq: 20 Mar 2018 14:55

Tgt Ion: 62 Resp: 14998

Ion	Ratio	Lower	Upper
62	100		
64	32.1	12.2	52.2

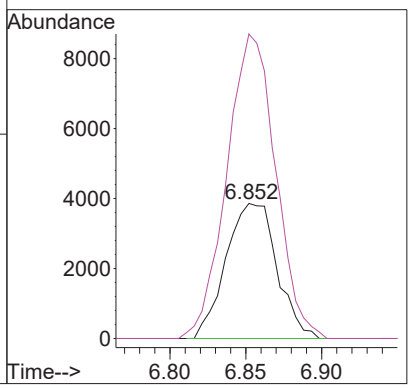


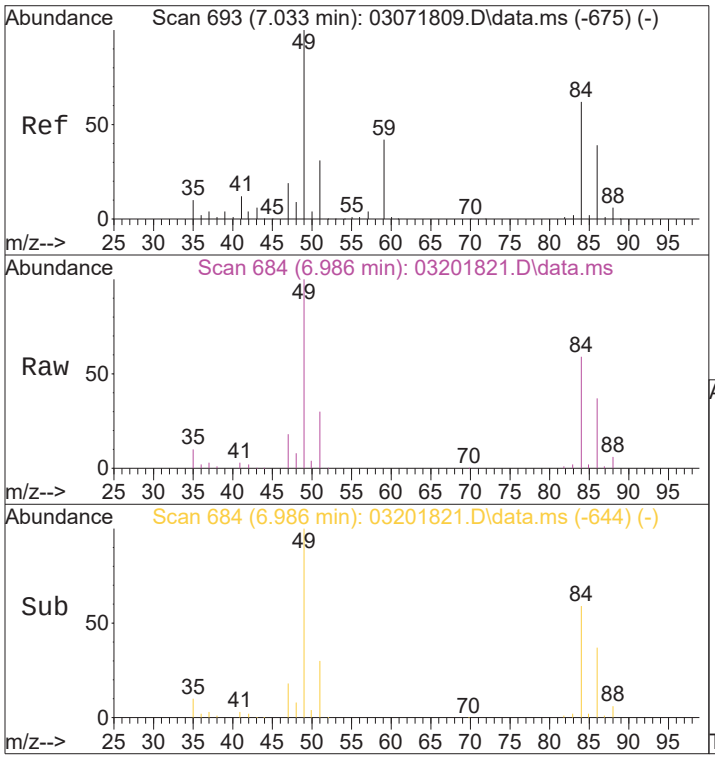


#17
1,1-Dichloroethene
Concen: 0.64 ng
RT: 6.85 min Scan# 658
Delta R.T. -0.006 min
Lab File: 03201821.D
Acq: 20 Mar 2018 14:55

Tgt Ion: 96 Resp: 9019

Ion	Ratio	Lower	Upper
96	100		
61	216.3	159.3	199.3#

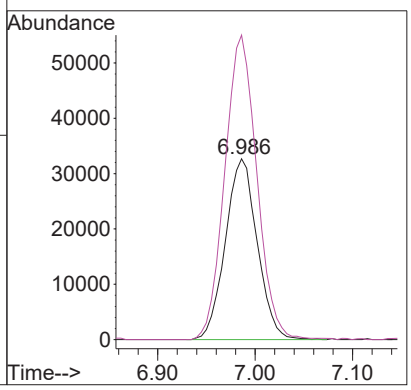


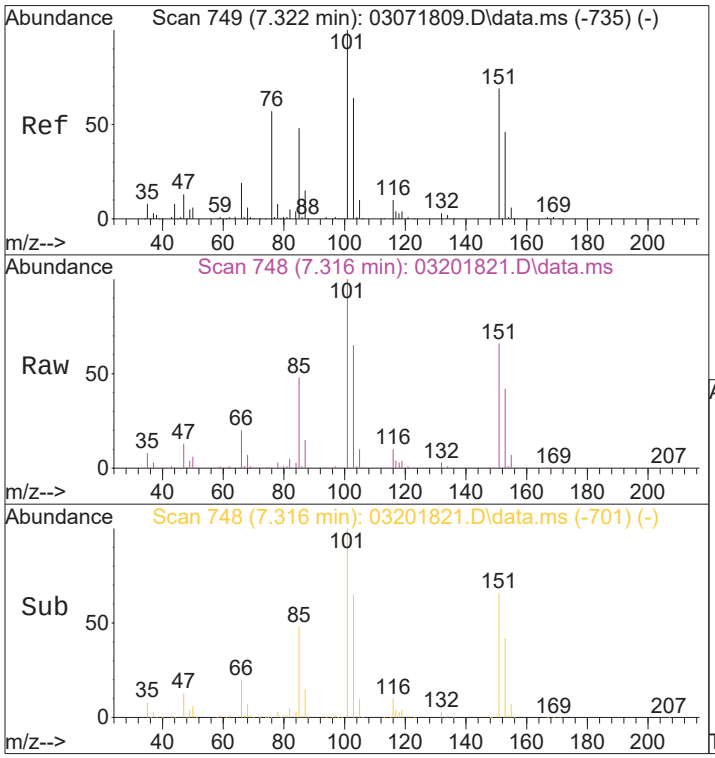


#19
Methylene Chloride
Concen: 4.46 ng
RT: 6.99 min Scan# 684
Delta R.T. -0.042 min
Lab File: 03201821.D
Acq: 20 Mar 2018 14:55

Tgt Ion: 84 Resp: 74136

Ion	Ratio	Lower	Upper
84	100		
49	169.5	121.8	171.8

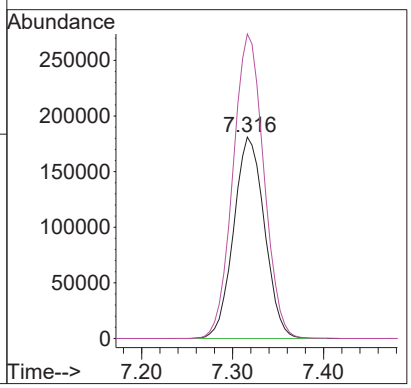


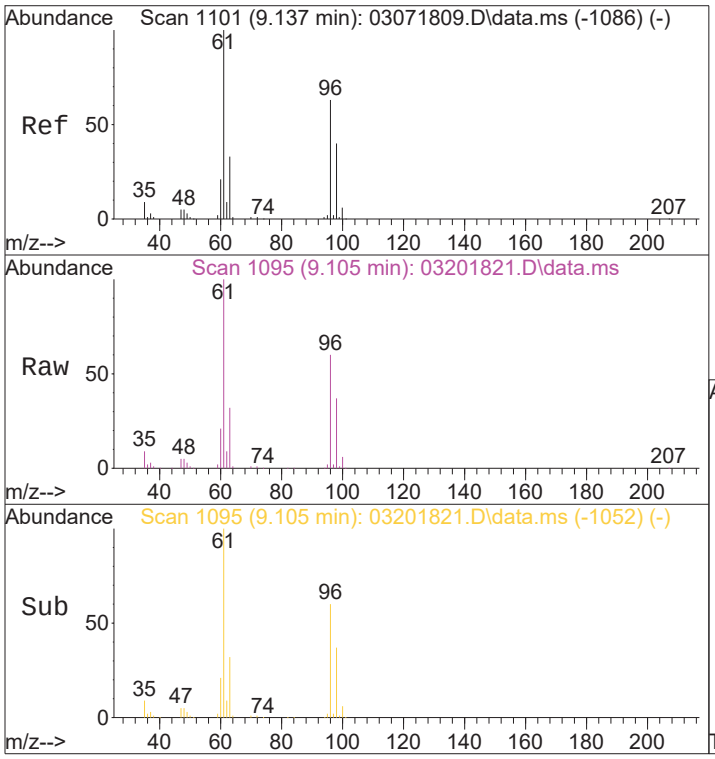


#21
Trichlorotrifluoroethane
Concen: 39.83 ng
RT: 7.32 min Scan# 748
Delta R.T. -0.006 min
Lab File: 03201821.D
Acq: 20 Mar 2018 14:55

Tgt Ion:151 Resp: 427197

Ion	Ratio	Lower	Upper
151	100		
101	150.9	122.5	162.5

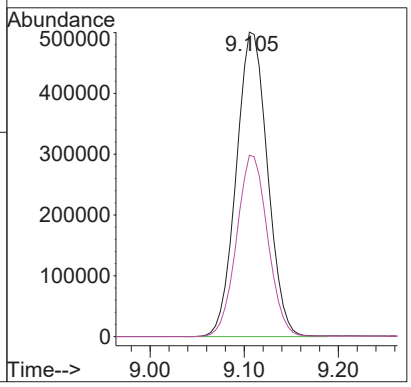


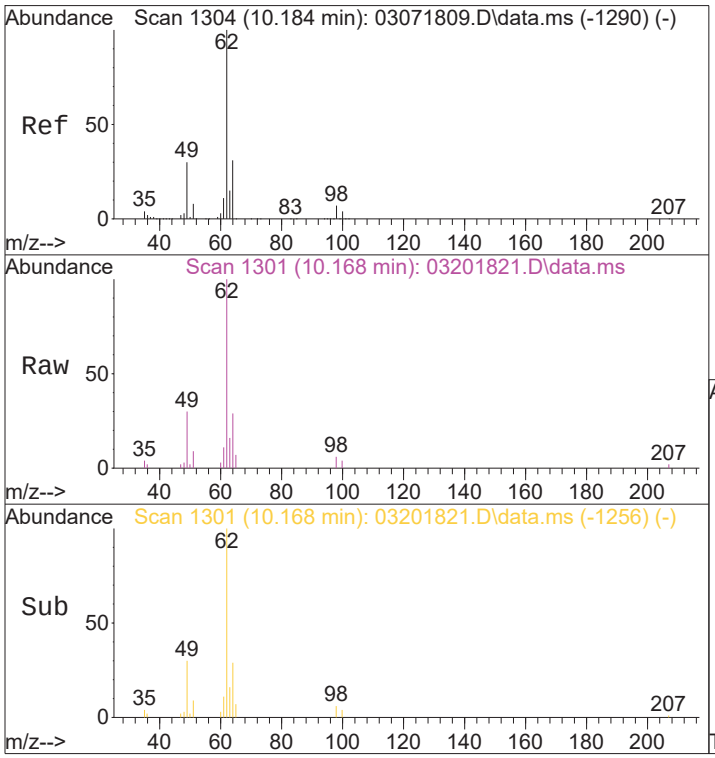


#28
cis-1,2-Dichloroethene
Concen: 46.11 ng
RT: 9.11 min Scan# 1095
Delta R.T. -0.026 min
Lab File: 03201821.D
Acq: 20 Mar 2018 14:55

Tgt Ion: 61 Resp: 1157826

Ion	Ratio	Lower	Upper
61	100		
96	59.5	48.4	88.4

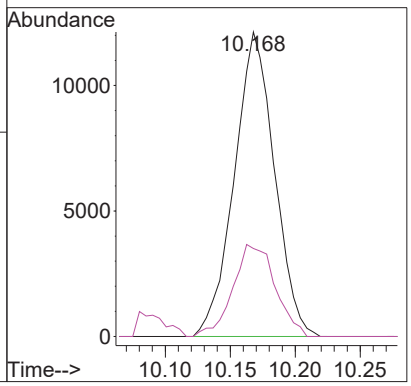


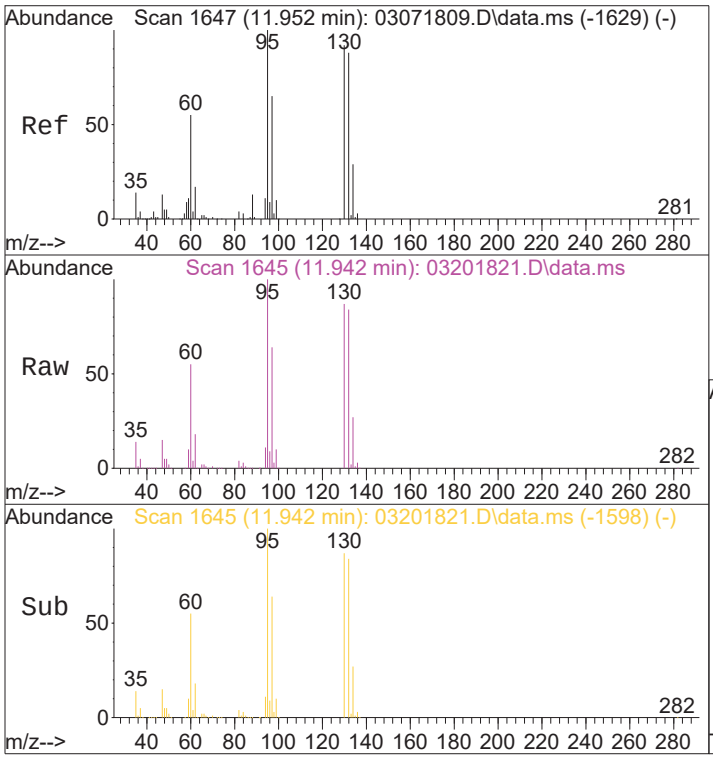


#36
1,2-Dichloroethane
Concen: 1.00 ng
RT: 10.17 min Scan# 1301
Delta R.T. -0.016 min
Lab File: 03201821.D
Acq: 20 Mar 2018 14:55

Tgt Ion: 62 Resp: 26053

Ion	Ratio	Lower	Upper
62	100		
64	31.8	12.2	52.2

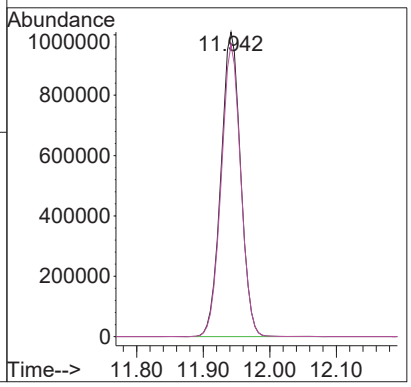




#47
Trichloroethene
Concen: 135.18 ng
RT: 11.94 min Scan# 1645
Delta R.T. -0.005 min
Lab File: 03201821.D
Acq: 20 Mar 2018 14:55

Tgt Ion:130 Resp: 2067203

Ion	Ratio	Lower	Upper
130	100		
132	95.5	74.9	114.9



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201822.D
Acq On : 20 Mar 2018 15:30 Operator: LH
Sample : P1801150-002dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 21 14:02:32 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS) LH 3/21/18
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	117414	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	628679	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	321799	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	296779	13.854	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 110.80%				
57) Toluene-d8 (SS2)	13.68	98	737546	12.193	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.52%				
73) Bromofluorobenzene (SS3)	17.17	174	167026	11.614	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 92.88%				
Target Compounds							Qvalue
2) Propene	4.00	42	2101	N.D.			
3) Dichlorodifluoromethan...	4.01	85	398	N.D.			
4) Chloromethane	4.29	50	201	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.			
6) Vinyl Chloride	4.57	62	6700	N.D.			
7) 1,3-Butadiene	0.00	54	0	N.D.			
8) Bromomethane	0.00	94	0	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.49	45	2724	N.D.			
11) Acetonitrile	5.70	41	377	N.D.			
12) Acrolein	0.00	56	0	N.D.			
13) Acetone	6.01	58	3932	N.D.			
14) Trichlorofluoromethane	0.00	101	0	N.D.			
15) 2-Propanol (Isopropanol)	6.35	45	218	N.D.			
16) Acrylonitrile	0.00	53	0	N.D.			
17) 1,1-Dichloroethene	6.85	96	4127	N.D.			
18) 2-Methyl-2-Propanol (t...	6.85	59	105	N.D.			
19) Methylene Chloride	6.99	84	34579	2.346	ng	#	79
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.			
21) Trichlorotrifluoroethane	7.32	151	191692	20.169	ng		92
22) Carbon Disulfide	7.29	76	2704	N.D.			
23) trans-1,2-Dichloroethene	8.01	61	1060	N.D.			
24) 1,1-Dichloroethane	8.23	63	1983	N.D.			
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.			
26) Vinyl Acetate	0.00	86	0	N.D.			
27) 2-Butanone (MEK)	8.69	72	663	N.D.			
28) cis-1,2-Dichloroethene	9.11	61	529358	23.789	ng		89
29) Diisopropyl Ether	0.00	87	0	N.D.			
30) Ethyl Acetate	9.37	61	502	N.D.			
31) n-Hexane	0.00	57	0	N.D.			
32) Chloroform	9.42	83	2429	N.D.			
34) Tetrahydrofuran (THF)	0.00	72	0	N.D.			
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	10.16	62	12052	0.520	ng		97
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.			
39) Isopropyl Acetate	0.00	61	0	N.D.			
40) 1-Butanol	10.83	56	349	N.D.			
41) Benzene	10.89	78	1725	N.D.			
42) Carbon Tetrachloride	11.04	117	182	N.D.			
43) Cyclohexane	11.16	84	222	N.D.			
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.			
46) Bromodichloromethane	0.00	83	0	N.D.	d		
47) Trichloroethene	11.94	130	910455	66.015	ng		99
48) 1,4-Dioxane	0.00	88	0	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.			

Data File: I:\MS09\Data\2018_03\20\03201822.D
Acq On : 20 Mar 2018 15:30 Operator: LH
Sample : P1801150-002dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

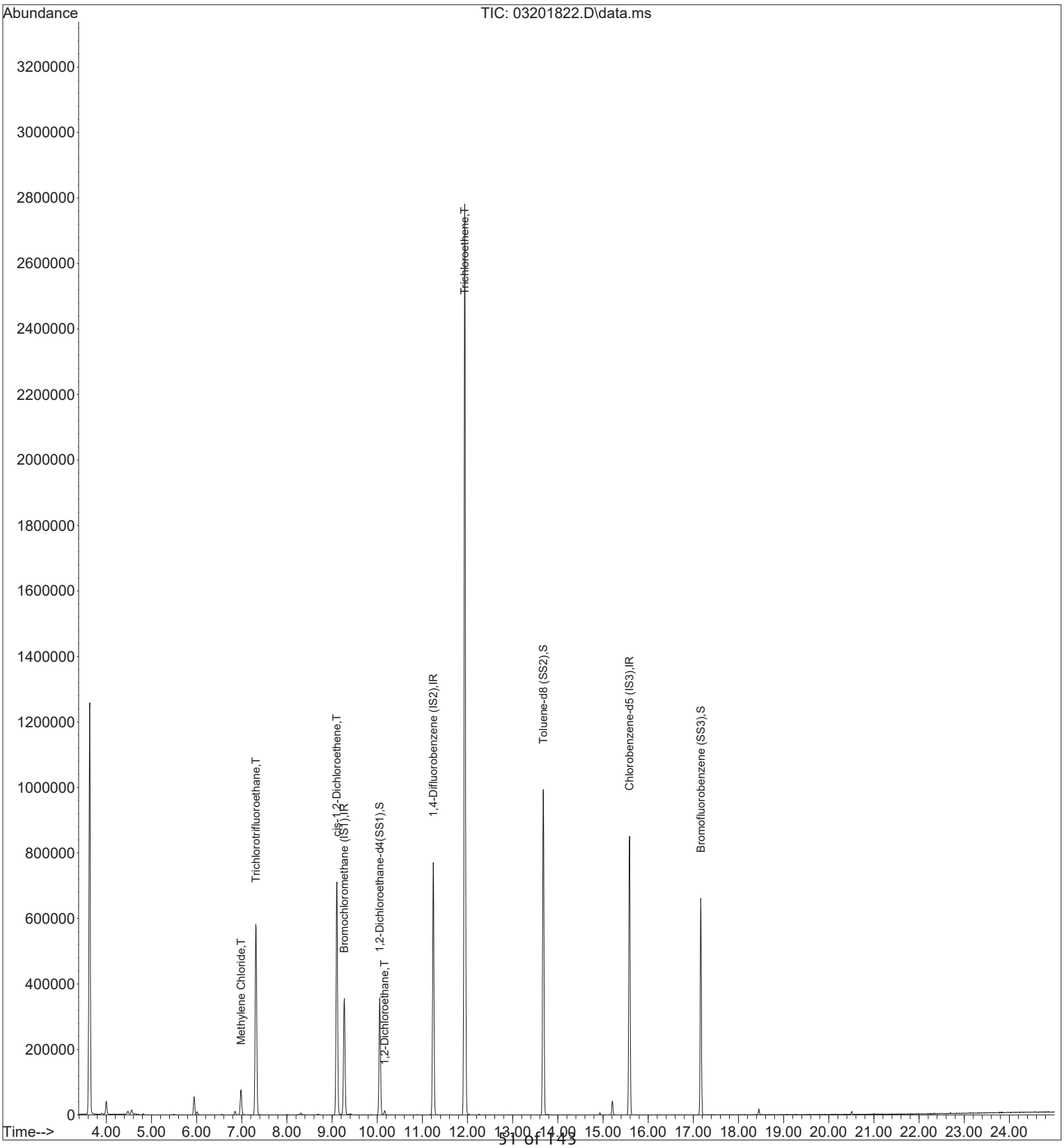
Quant Time: Mar 21 14:02:32 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.		
51) n-Heptane	12.25	71	163	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	13.78	91	2039	N.D.		
59) 2-Hexanone	14.05	43	287	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	0.00	43	0	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	14.93	166	1842	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	0.00	91	0	N.D.		
67) m- & p-Xylenes	0.00	91	0	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	0.00	104	0	N.D.		
70) o-Xylene	0.00	91	0	N.D.		
71) n-Nonane	0.00	43	0	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	0.00	105	0	N.D.		
75) alpha-Pinene	0.00	93	0	N.D.		
76) n-Propylbenzene	0.00	91	0	N.D.		
77) 3-Ethyltoluene	0.00	105	0	N.D.		
78) 4-Ethyltoluene	0.00	105	0	N.D.		
79) 1,3,5-Trimethylbenzene	0.00	105	0	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D.		
82) 1,2,4-Trimethylbenzene	0.00	105	0	N.D.		
83) n-Decane	18.59	57	108	N.D.		
84) Benzyl Chloride	0.00	91	0	N.D.		
85) 1,3-Dichlorobenzene	0.00	146	0	N.D.		
86) 1,4-Dichlorobenzene	0.00	146	0	N.D.		
87) sec-Butylbenzene	0.00	105	0	N.D.		
88) 4-Isopropyltoluene (p-...	18.93	119	106	N.D.		
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	19.08	68	123	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	0.00	57	0	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	20.99	128	530	N.D.		
96) n-Dodecane	21.01	57	634	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.		
99) tert-Butylbenzene	0.00	119	0	N.D.		
100) n-Butylbenzene	0.00	91	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

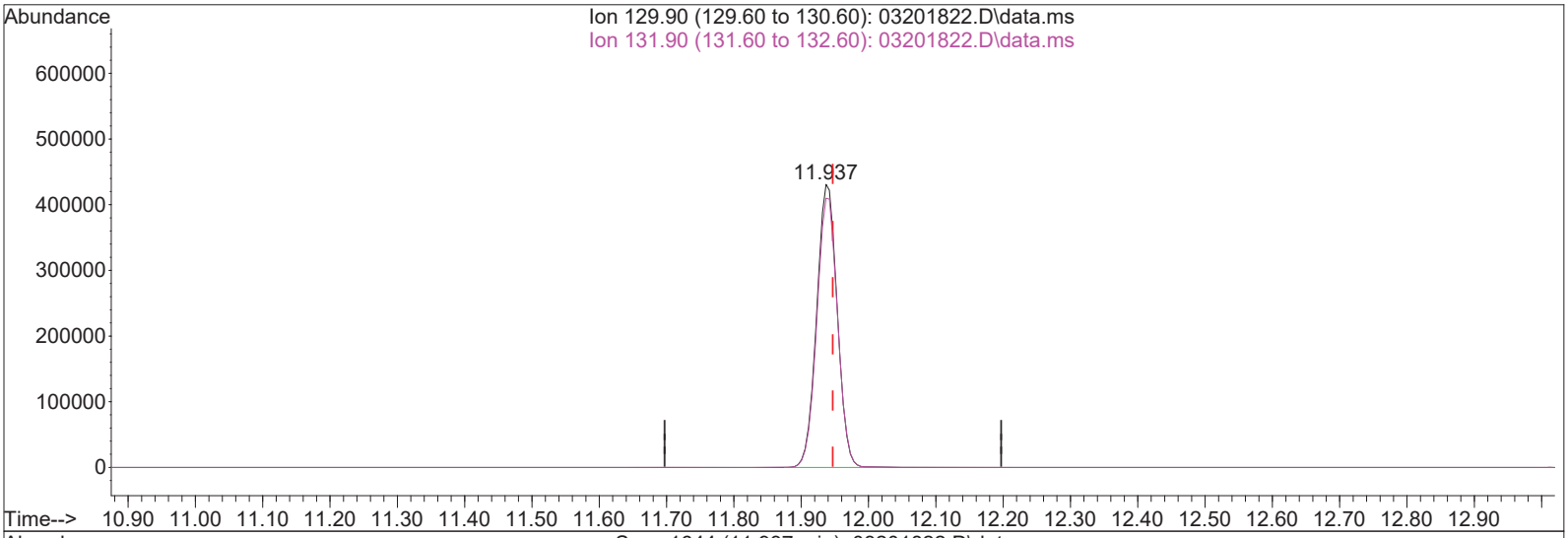
Data File: I:\MS09\Data\2018_03\20\03201822.D
Acq On : 20 Mar 2018 15:30 Operator: LH
Sample : P1801150-002dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

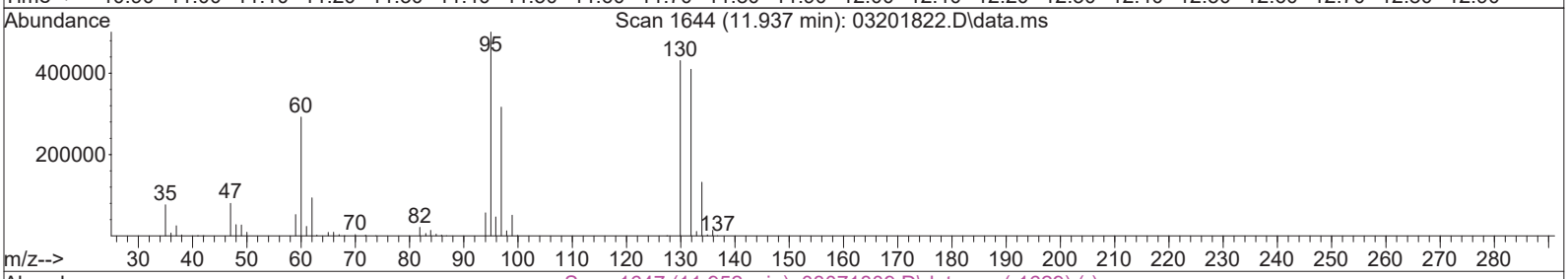
Quant Time: Mar 21 14:02:32 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

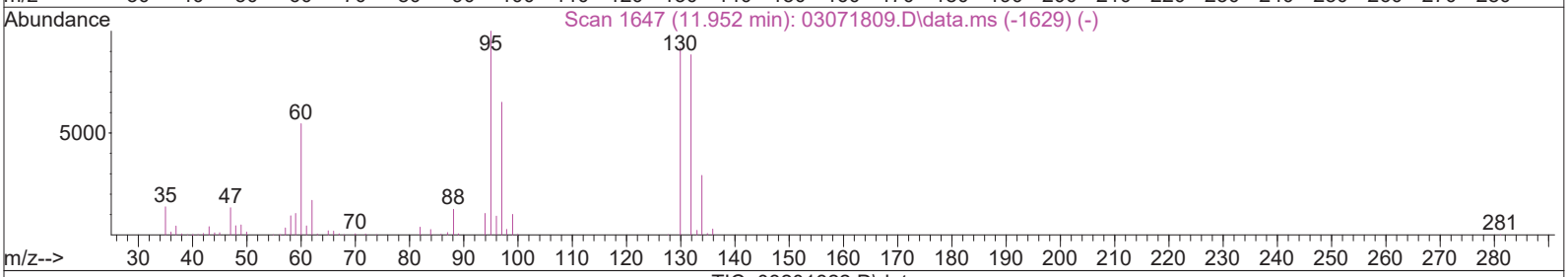


Data File: I:\MS09\Data\2018_03\20\03201822.D
Acq On : 20 Mar 2018 15:30 Operator: LH
Sample : P1801150-002dil (3.0mL)
Misc : S31-03061806
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Mar 20 17:39:21 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201822.D\data.ms

(47) Trichloroethene (T)

11.937min (-0.010) 66.02ng

response 910455

Ion	Exp%	Act%
129.90	100	100
131.90	94.90	96.03
0.00	0.00	0.00
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 21 14:04:17 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 3/21/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	113947	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	620046	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.58	82	321270	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	302648	14.558	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 116.48%				
57) Toluene-d8 (SS2)	13.67	98	725454	12.013	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.08%				
73) Bromofluorobenzene (SS3)	17.17	174	171056	11.913	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.28%				
Target Compounds							Qvalue
2) Propene	3.95	42	12127m	0.596	ng		
3) Dichlorodifluoromethan...	4.06	85	116709	3.929	ng		99
4) Chloromethane	4.25	50	11684	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	4.44	135	650	N.D.			
6) Vinyl Chloride	4.54	62	330	N.D.			
7) 1,3-Butadiene	4.72	54	260	N.D.			
8) Bromomethane	5.03	94	105	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.50	45	506364m	38.087	ng		
11) Acetonitrile	5.68	41	26874	0.771	ng		94
12) Acrolein	5.81	56	8732	0.858	ng		98
13) Acetone	5.96	58	273244	23.213	ng	#	56
14) Trichlorofluoromethane	6.14	101	47335	2.007	ng		99
15) 2-Propanol (Isopropanol)	6.31	45	54557	1.165	ng		97
16) Acrylonitrile	6.51	53	666	N.D.			
17) 1,1-Dichloroethene	0.00	96	0	N.D.			
18) 2-Methyl-2-Propanol (t...	6.98	59	12091	N.D.			
19) Methylene Chloride	6.99	84	4994	N.D.			
20) 3-Chloro-1-propene (Al...	7.12	41	122	N.D.			
21) Trichlorotrifluoroethane	7.32	151	20131	2.183	ng		96
22) Carbon Disulfide	7.28	76	7867	N.D.			
23) trans-1,2-Dichloroethene	0.00	61	0	N.D.			
24) 1,1-Dichloroethane	0.00	63	0	N.D.			
25) Methyl tert-Butyl Ether	8.28	73	462	N.D.			
26) Vinyl Acetate	8.39	86	2943	1.159	ng	#	64
27) 2-Butanone (MEK)	8.66	72	28471	2.840	ng	#	61
28) cis-1,2-Dichloroethene	9.11	61	11741	0.544	ng		90
29) Diisopropyl Ether	9.36	87	313	N.D.			
30) Ethyl Acetate	9.36	61	8937	1.573	ng		92
31) n-Hexane	9.35	57	44228	1.563	ng		97
32) Chloroform	9.42	83	2749	N.D.			
34) Tetrahydrofuran (THF)	9.81	72	40154	4.037	ng	#	72
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	10.17	62	1035	N.D.			
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.			
39) Isopropyl Acetate	10.88	61	171	N.D.			
40) 1-Butanol	0.00	56	0	N.D. d			
41) Benzene	10.88	78	49239	0.783	ng		99
42) Carbon Tetrachloride	11.03	117	5970	N.D.			
43) Cyclohexane	11.16	84	5501	N.D.			
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.			
46) Bromodichloromethane	11.90	83	597	N.D.			
47) Trichloroethene	11.94	130	26818	1.972	ng		97
48) 1,4-Dioxane	0.00	88	0	N.D.			
49) 2,2,4-Trimethylpentane...	12.00	57	30950	N.D.			

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

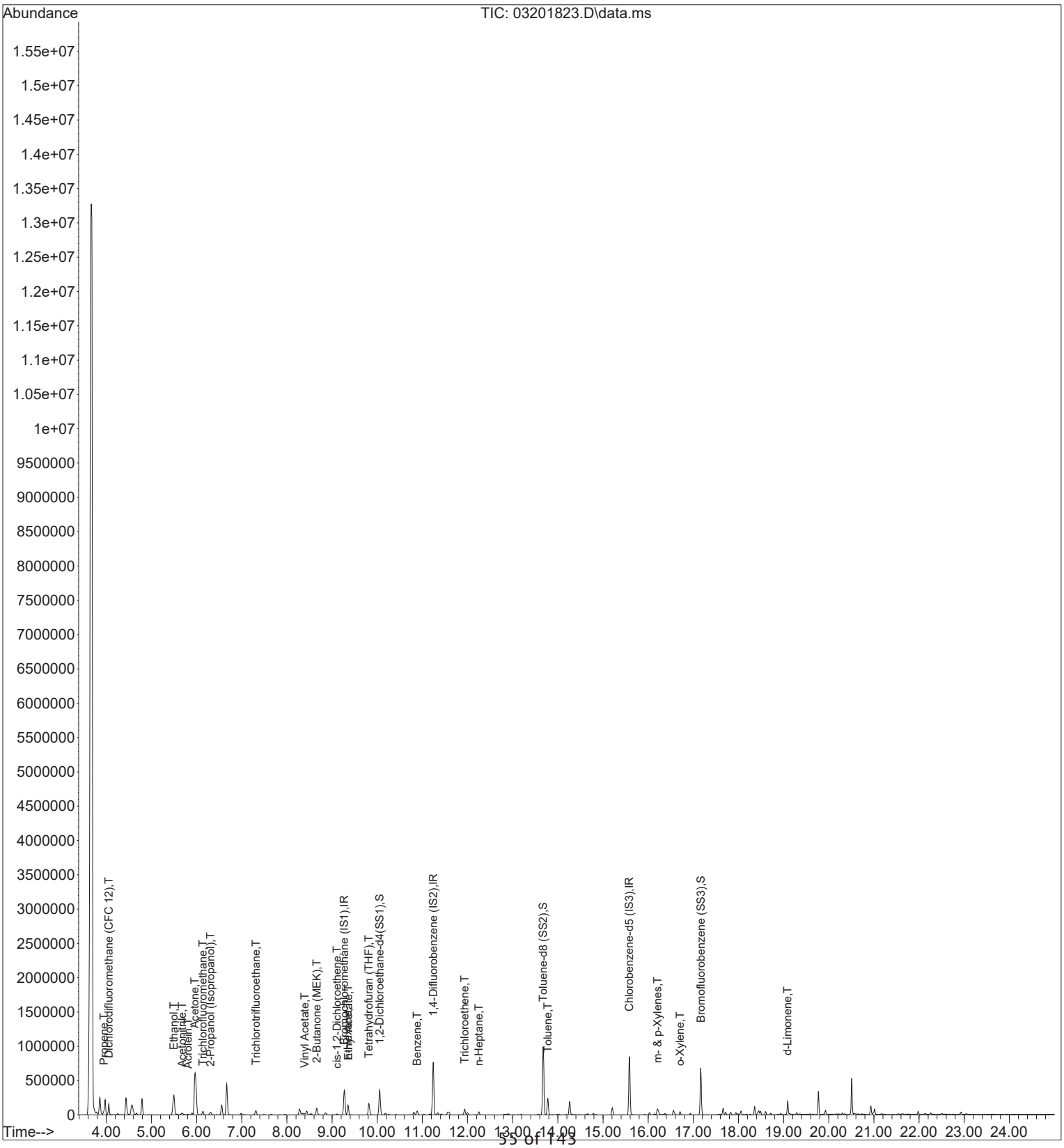
Quant Time: Mar 21 14:04:17 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.	
51) n-Heptane	12.25	71	9978	0.655 ng	94
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	12.83	58	3196	N.D.	
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.	
58) Toluene	13.78	91	189322	3.017 ng	99
59) 2-Hexanone	14.03	43	7880	N.D.	
60) Dibromochloromethane	0.00	129	0	N.D.	
61) 1,2-Dibromoethane	0.00	107	0	N.D.	
62) n-Butyl Acetate	14.66	43	16511	N.D.	
63) n-Octane	14.78	57	3454	N.D.	
64) Tetrachloroethene	0.00	166	0	N.D.	
65) Chlorobenzene	15.63	112	560	N.D.	
66) Ethylbenzene	16.03	91	26239	N.D.	
67) m- & p-Xylenes	16.21	91	73427	1.359 ng	96
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	16.59	104	8444	N.D.	
70) o-Xylene	16.71	91	26219	0.478 ng	92
71) n-Nonane	16.93	43	10767	N.D.	
72) 1,1,2,2-Tetrachloroethane	16.72	83	362	N.D.	
74) Cumene	17.31	105	2105	N.D.	
75) alpha-Pinene	17.72	93	14661	N.D.	
76) n-Propylbenzene	17.84	91	9437	N.D.	
77) 3-Ethyltoluene	17.94	105	16625	N.D.	
78) 4-Ethyltoluene	17.99	105	7062	N.D.	
79) 1,3,5-Trimethylbenzene	18.06	105	6195	N.D.	
80) alpha-Methylstyrene	18.22	118	323	N.D.	
81) 2-Ethyltoluene	18.26	105	5762	N.D.	
82) 1,2,4-Trimethylbenzene	18.49	105	23734	N.D.	
83) n-Decane	18.60	57	16155	N.D.	
84) Benzyl Chloride	18.62	91	573	N.D.	
85) 1,3-Dichlorobenzene	18.71	146	8278	N.D.	
86) 1,4-Dichlorobenzene	18.71	146	8278	N.D.	
87) sec-Butylbenzene	18.77	105	700	N.D.	
88) 4-Isopropyltoluene (p-...	18.94	119	5118	N.D.	
89) 1,2,3-Trimethylbenzene	18.93	105	5618	N.D.	
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.	
91) d-Limonene	19.09	68	50817	1.917 ng	95
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.	
93) n-Undecane	0.00	57	0	N.D. d	
94) 1,2,4-Trichlorobenzene	20.87	180	123	N.D.	
95) Naphthalene	20.99	128	17224	N.D.	
96) n-Dodecane	0.00	57	0	N.D. d	
97) Hexachlorobutadiene	0.00	225	0	N.D.	
98) Cyclohexanone	16.37	55	11391	N.D.	
99) tert-Butylbenzene	18.49	119	2914	N.D.	
100) n-Butylbenzene	19.37	91	4332	N.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 21 14:04:17 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 21 14:04:17 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 3/21/18

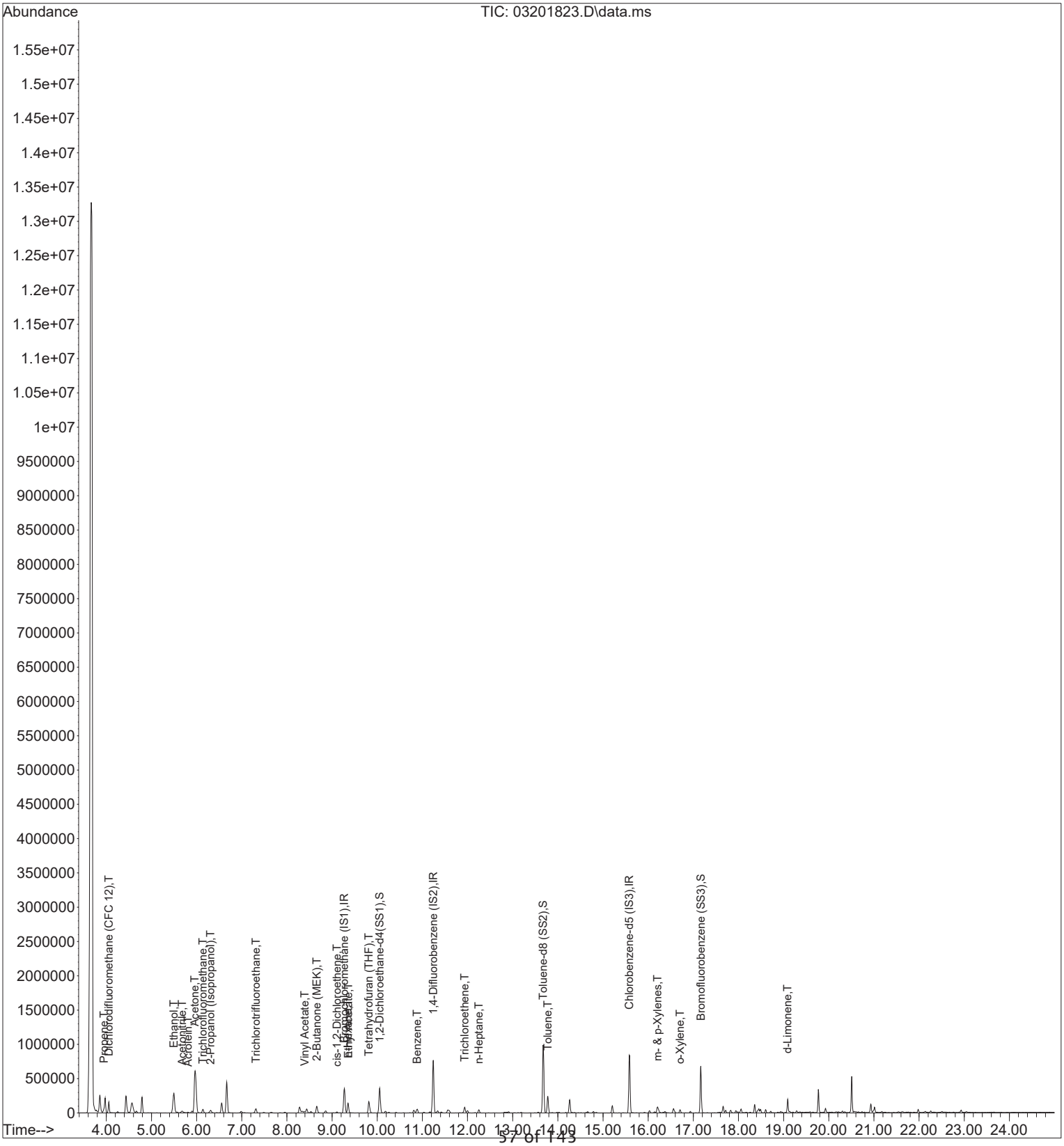
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	113947	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	620046	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.58	82	321270	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	302648	14.558	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 116.48%				
57) Toluene-d8 (SS2)	13.67	98	725454	12.013	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.08%				
73) Bromofluorobenzene (SS3)	17.17	174	171056	11.913	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.28%				
Target Compounds							Qvalue
2) Propene	3.95	42	12127m	0.596	ng		
3) Dichlorodifluoromethan...	4.06	85	116709	3.929	ng		99
10) Ethanol	5.50	45	506364m	38.087	ng		
11) Acetonitrile	5.68	41	26874	0.771	ng		94
12) Acrolein	5.81	56	8732	0.858	ng		98
13) Acetone	5.96	58	273244	23.213	ng	#	56
14) Trichlorofluoromethane	6.14	101	47335	2.007	ng		99
15) 2-Propanol (Isopropanol)	6.31	45	54557	1.165	ng		97
21) Trichlorotrifluoroethane	7.32	151	20131	2.183	ng		96
26) Vinyl Acetate	8.39	86	2943	1.159	ng	#	64
27) 2-Butanone (MEK)	8.66	72	28471	2.840	ng	#	61
28) cis-1,2-Dichloroethene	9.11	61	11741	0.544	ng		90
30) Ethyl Acetate	9.36	61	8937	1.573	ng		92
31) n-Hexane	9.35	57	44228	1.563	ng		97
34) Tetrahydrofuran (THF)	9.81	72	40154	4.037	ng	#	72
41) Benzene	10.88	78	49239	0.783	ng		99
47) Trichloroethene	11.94	130	26818	1.972	ng		97
51) n-Heptane	12.25	71	9978	0.655	ng		94
58) Toluene	13.78	91	189322	3.017	ng		99
67) m- & p-Xylenes	16.21	91	73427	1.359	ng		96
70) o-Xylene	16.71	91	26219	0.478	ng		92
91) d-Limonene	19.09	68	50817	1.917	ng		95

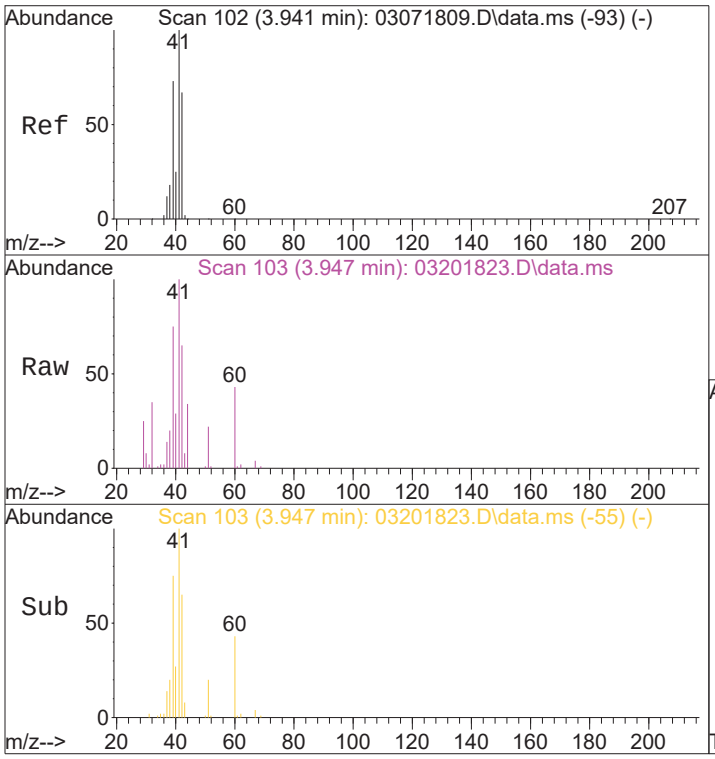
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 21 14:04:17 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

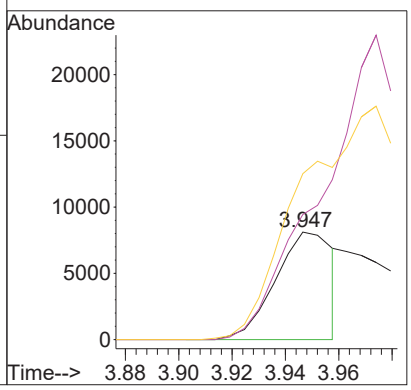


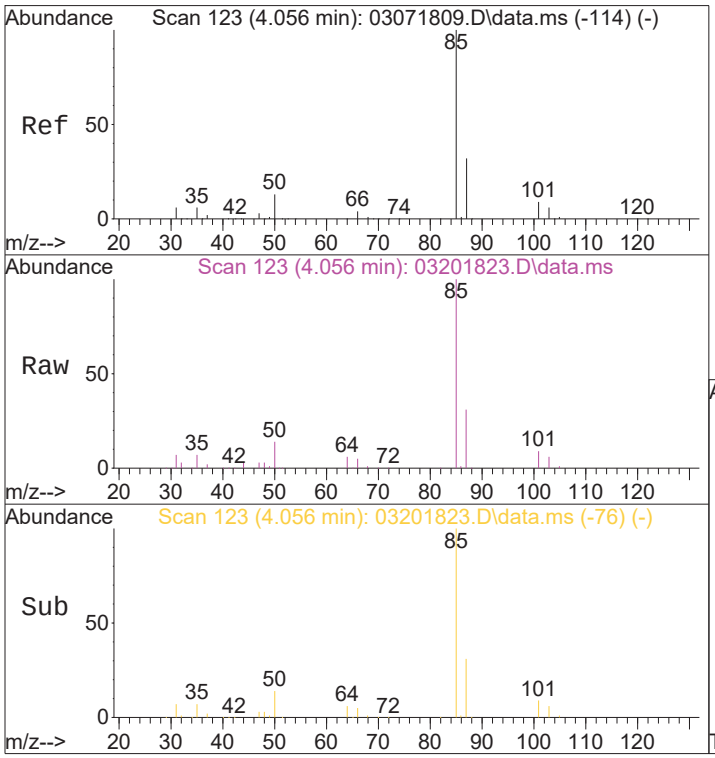


#2
Propene
Concen: 0.60 ng m
RT: 3.95 min Scan# 103
Delta R.T. 0.011 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 42 Resp: 12127

Ion	Ratio	Lower	Upper
42	100		
39	403.0	84.2	124.2#
41	384.1	131.0	171.0#

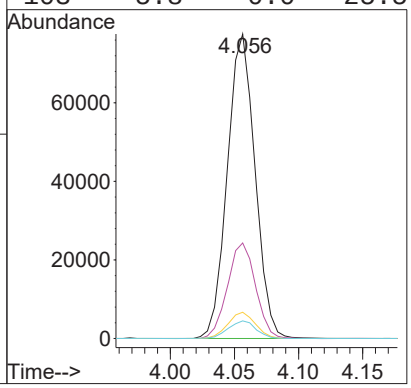


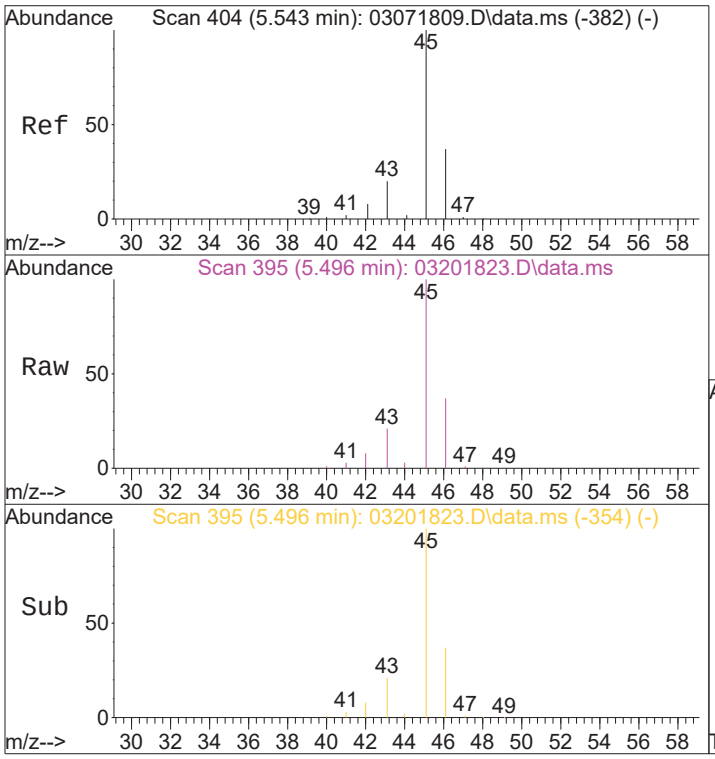


#3
Dichlorodifluoromethane (CFC 12)
Concen: 3.93 ng
RT: 4.06 min Scan# 123
Delta R.T. 0.005 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 85 Resp: 116709

Ion	Ratio	Lower	Upper
85	100		
87	31.7	12.4	52.4
101	8.5	0.0	28.6
103	5.8	0.0	25.5

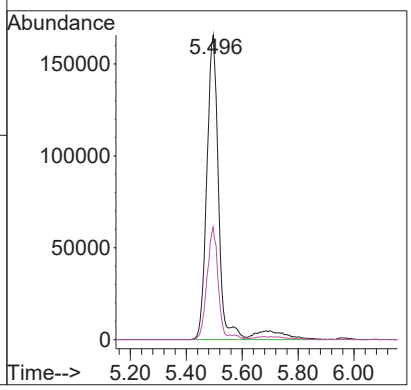


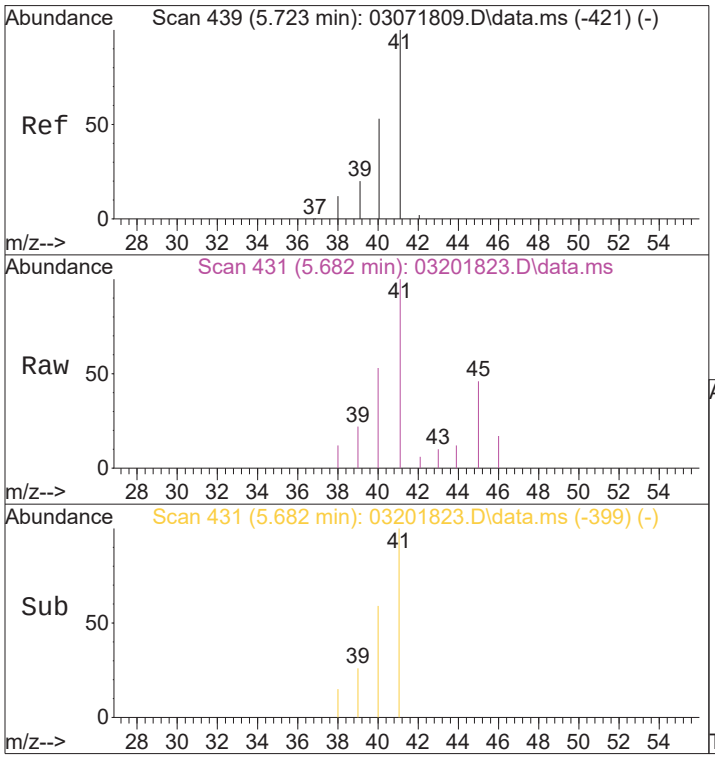


#10
Ethanol
Concen: 38.09 ng m
RT: 5.50 min Scan# 395
Delta R.T. -0.041 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 45 Resp: 506364

Ion	Ratio	Lower	Upper
45	100		
46	32.2	17.5	57.5

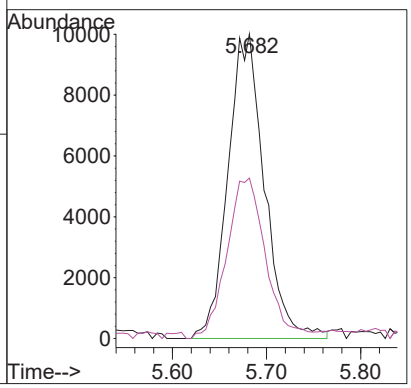


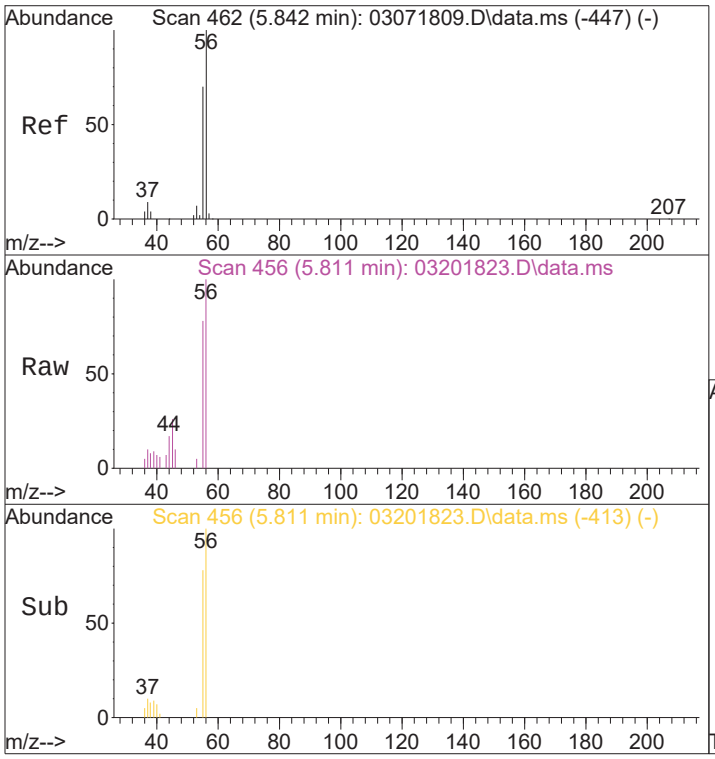


#11
Acetonitrile
Concen: 0.77 ng
RT: 5.68 min Scan# 431
Delta R.T. -0.036 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 41 Resp: 26874

Ion	Ratio	Lower	Upper
41	100		
40	56.1	32.1	72.1

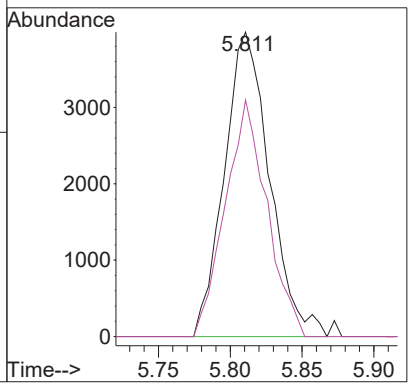


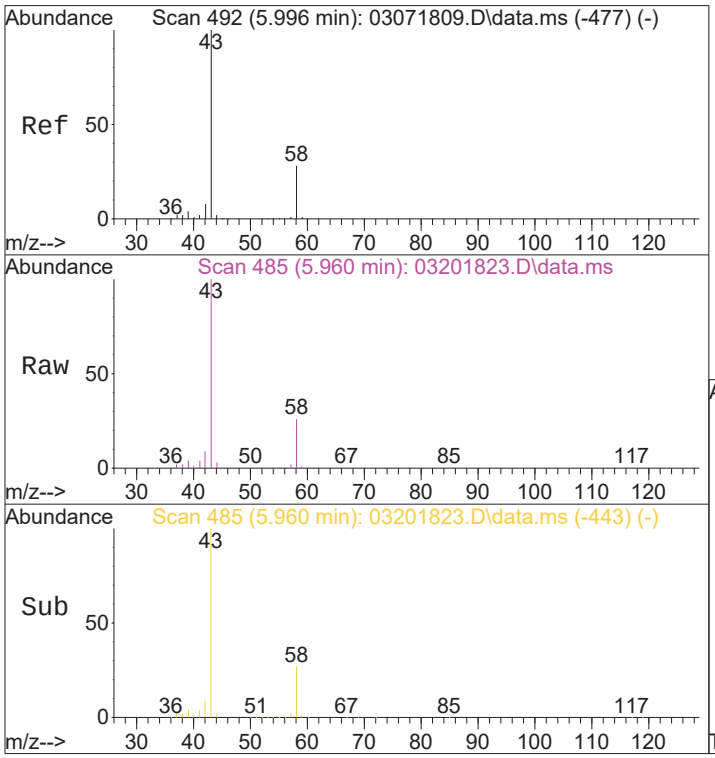


#12
Acrolein
Concen: 0.86 ng
RT: 5.81 min Scan# 456
Delta R.T. -0.026 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 56 Resp: 8732

Ion	Ratio	Lower	Upper
56	100		
55	71.6	49.6	89.6

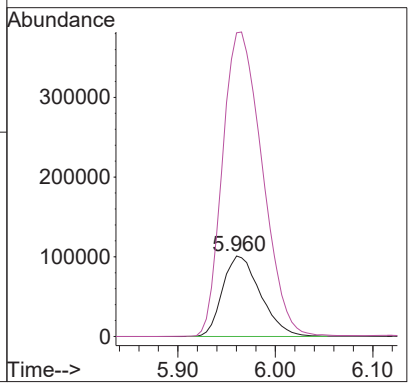


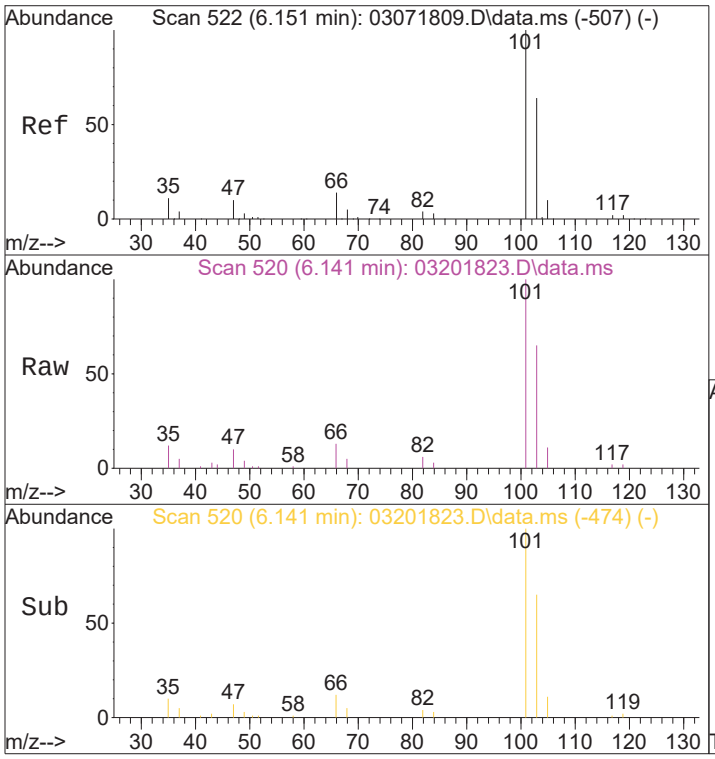


#13
Acetone
Concen: 23.21 ng
RT: 5.96 min Scan# 485
Delta R.T. -0.031 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 58 Resp: 273244

Ion	Ratio	Lower	Upper
58	100		
43	398.0	279.1	339.1#

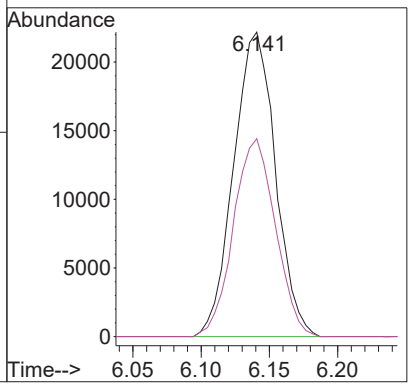


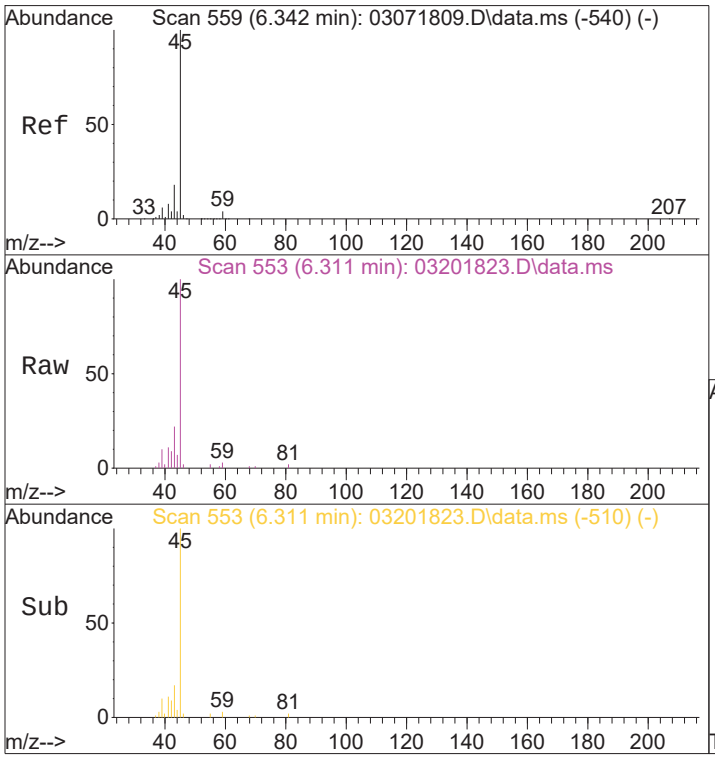


#14
Trichlorofluoromethane
Concen: 2.01 ng
RT: 6.14 min Scan# 520
Delta R.T. -0.010 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion:101 Resp: 47335

Ion	Ratio	Lower	Upper
101	100		
103	65.2	44.8	84.8

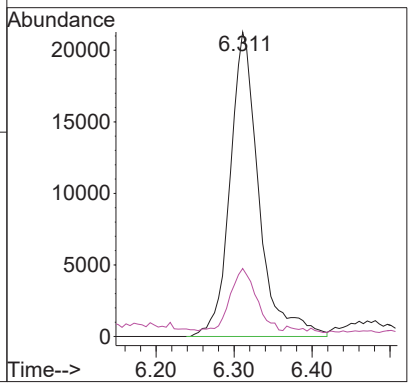


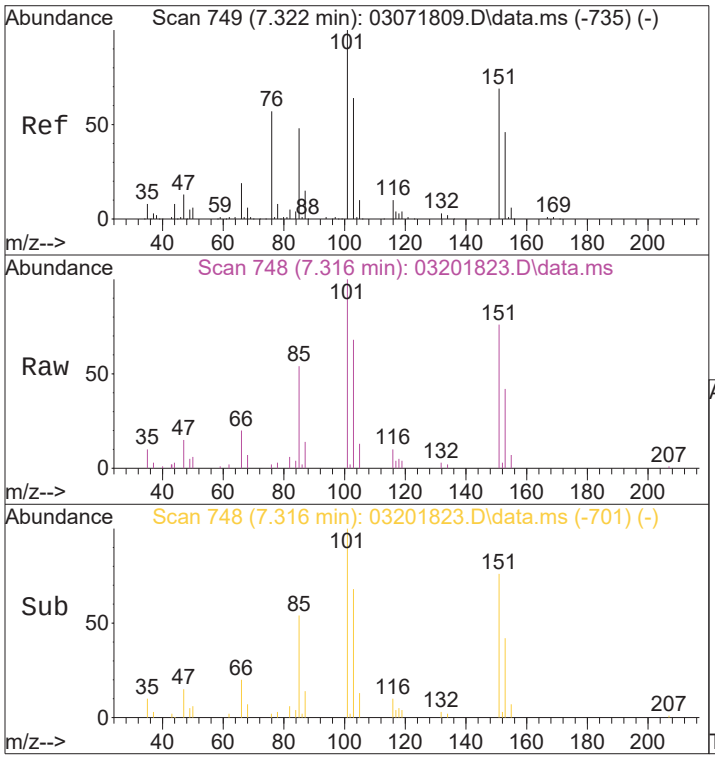


#15
2-Propanol (Isopropanol)
Concen: 1.16 ng
RT: 6.31 min Scan# 553
Delta R.T. -0.026 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 45 Resp: 54557

Ion	Ratio	Lower	Upper
45	100		
43	18.3	0.0	37.2

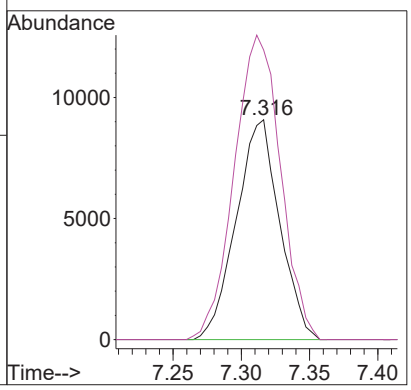


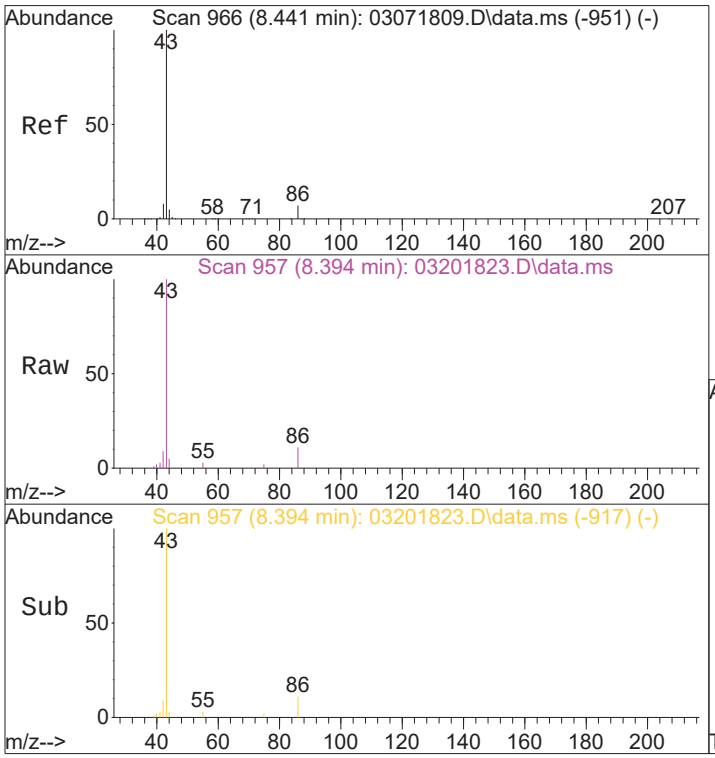


#21
Trichlorotrifluoroethane
Concen: 2.18 ng
RT: 7.32 min Scan# 748
Delta R.T. -0.005 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion:151 Resp: 20131

Ion	Ratio	Lower	Upper
151	100		
101	147.7	122.5	162.5

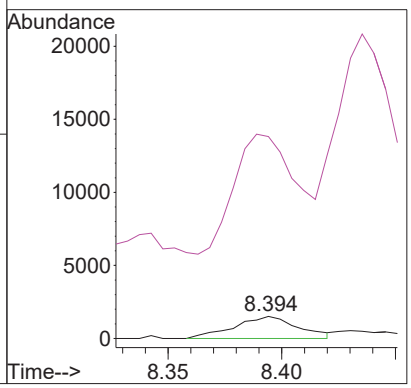


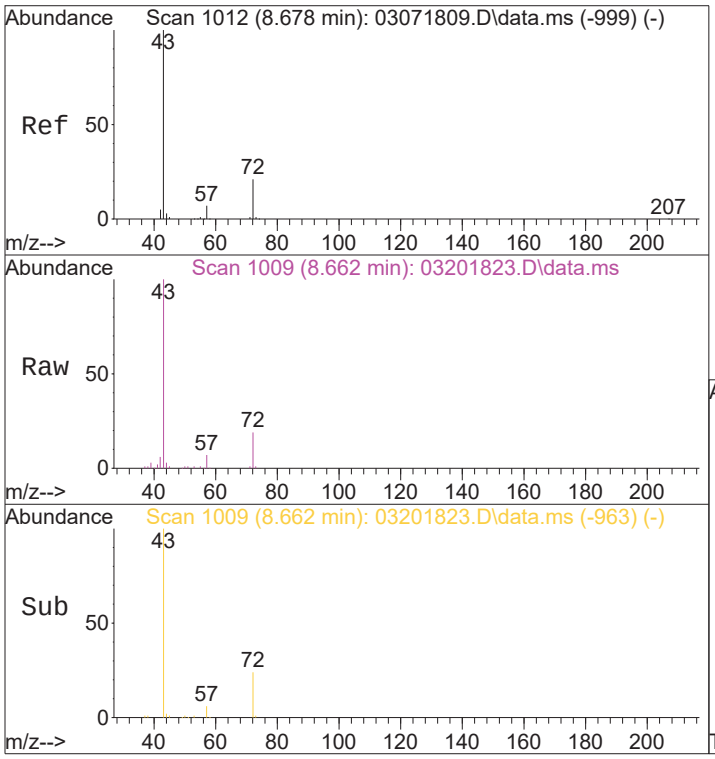


#26
Vinyl Acetate
Concen: 1.16 ng
RT: 8.39 min Scan# 957
Delta R.T. -0.041 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 86 Resp: 2943

Ion	Ratio	Lower	Upper
86	100		
43	1142.5	1322.8	1362.8#

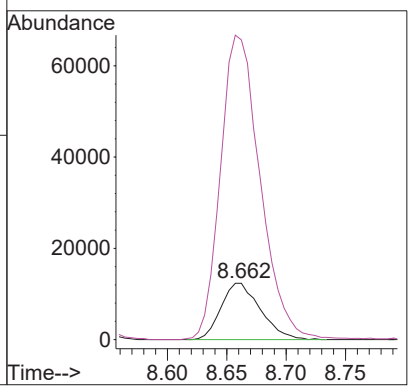


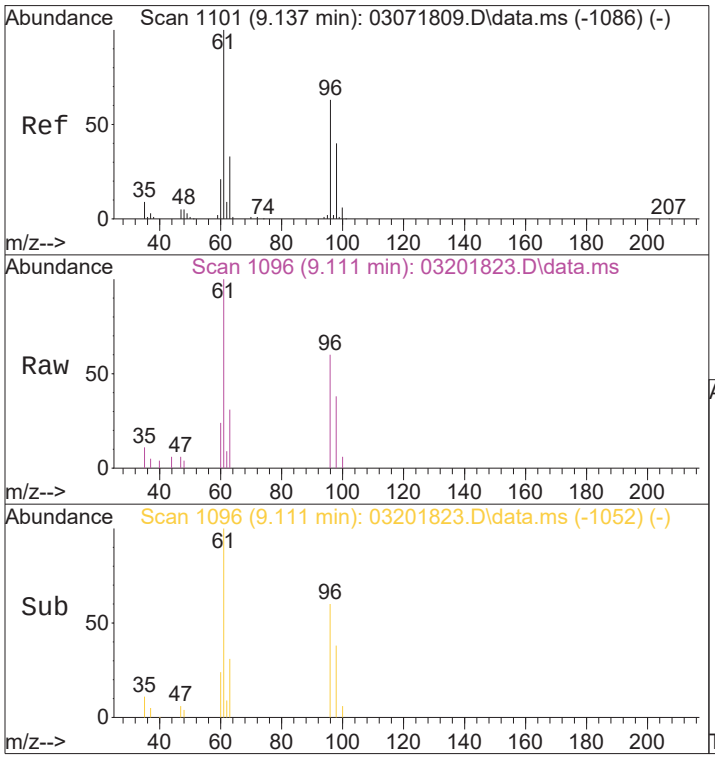


#27
2-Butanone (MEK)
Concen: 2.84 ng
RT: 8.66 min Scan# 1009
Delta R.T. -0.010 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 72 Resp: 28471

Ion	Ratio	Lower	Upper
72	100		
43	547.0	427.4	467.4#

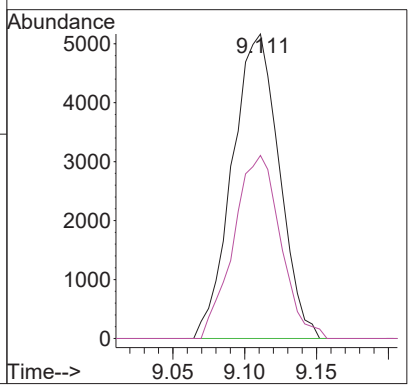


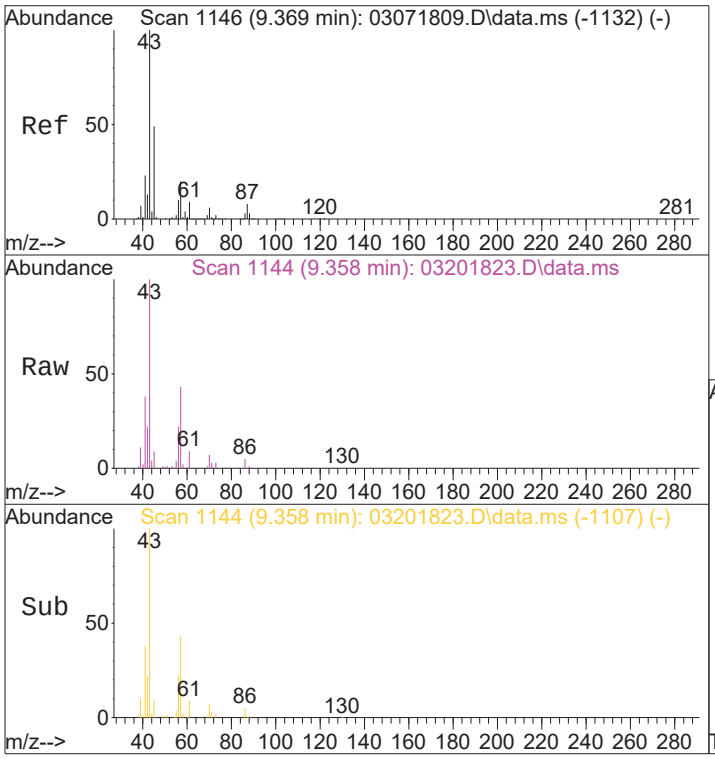


#28
cis-1,2-Dichloroethene
Concen: 0.54 ng
RT: 9.11 min Scan# 1096
Delta R.T. -0.021 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 61 Resp: 11741

Ion	Ratio	Lower	Upper
61	100		
96	60.1	48.4	88.4

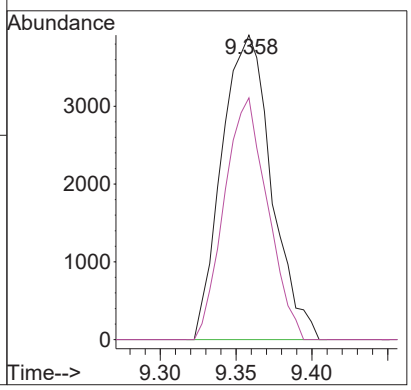


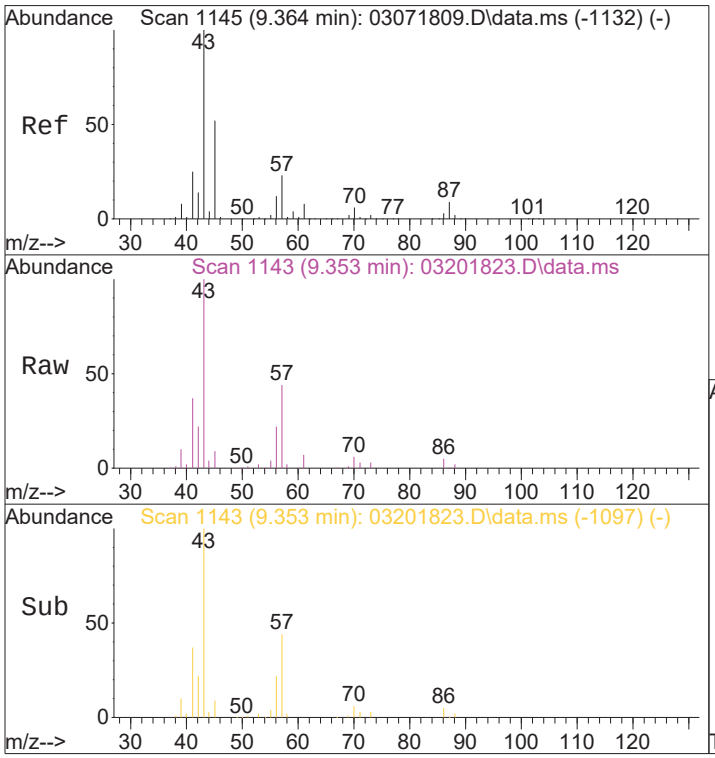


#30
Ethyl Acetate
Concen: 1.57 ng
RT: 9.36 min Scan# 1144
Delta R.T. -0.010 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 61 Resp: 8937

Ion	Ratio	Lower	Upper
61	100		
70	69.0	55.8	95.8

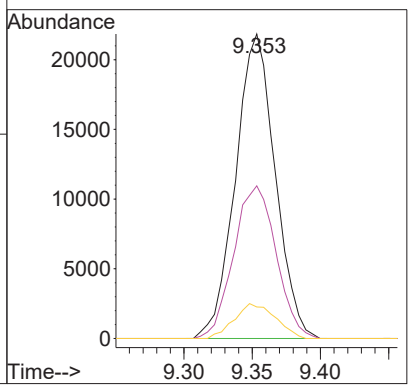


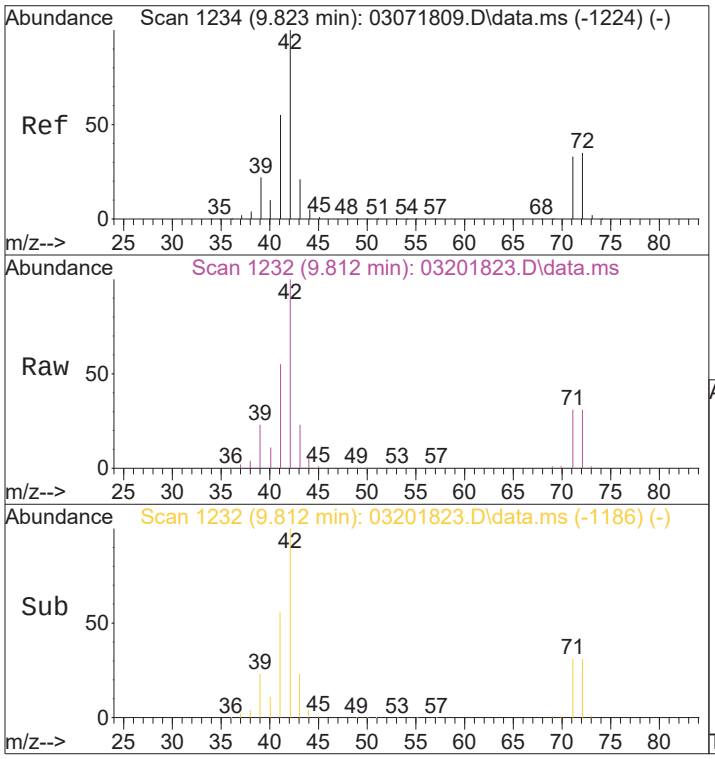


#31
n-Hexane
Concen: 1.56 ng
RT: 9.35 min Scan# 1143
Delta R.T. -0.010 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 57 Resp: 44228

Ion	Ratio	Lower	Upper
57	100		
56	53.5	40.9	61.3
86	11.9	10.6	16.0

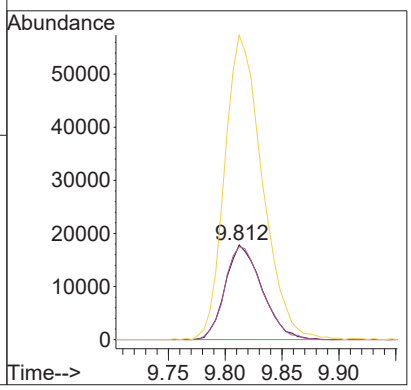


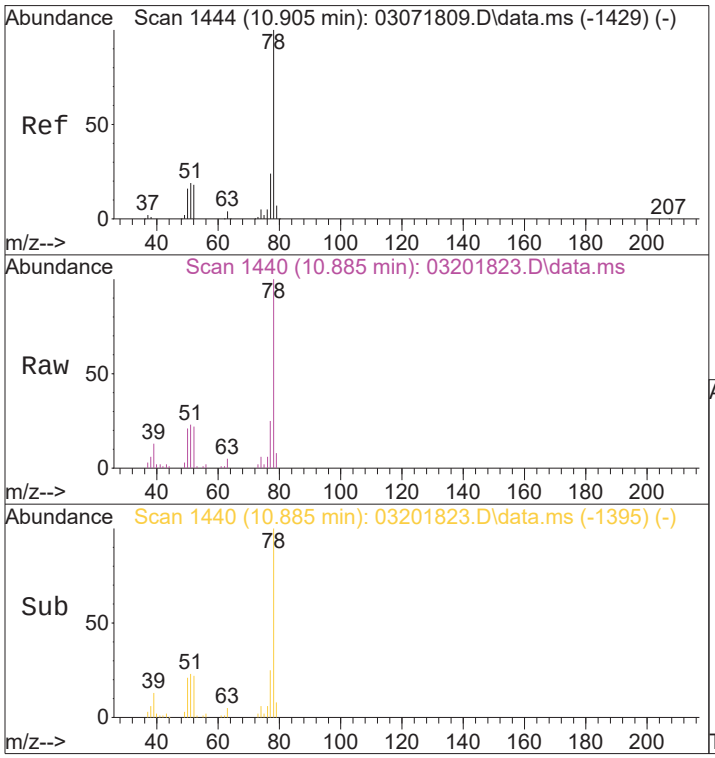


#34
Tetrahydrofuran (THF)
Concen: 4.04 ng
RT: 9.81 min Scan# 1232
Delta R.T. -0.010 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 72 Resp: 40154

Ion	Ratio	Lower	Upper
72	100		
71	100.2	75.8	115.8
42	329.9	243.1	283.1#

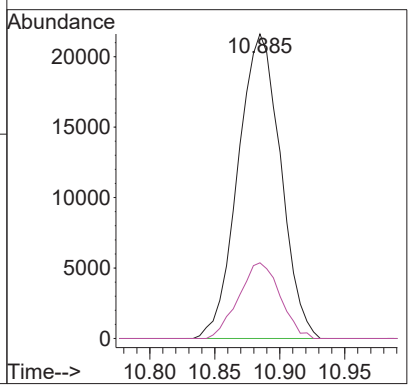


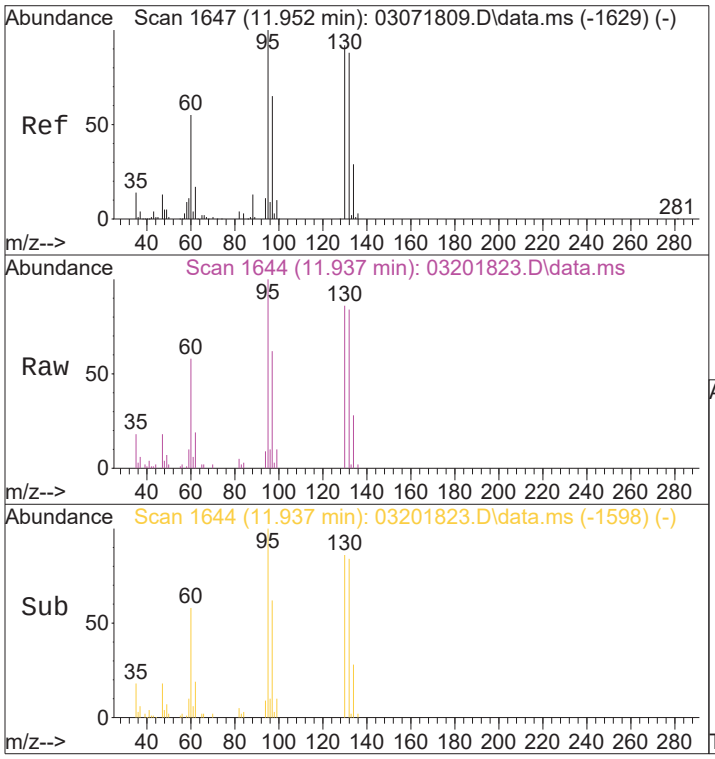


#41
Benzene
Concen: 0.78 ng
RT: 10.88 min Scan# 1440
Delta R.T. -0.016 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 78 Resp: 49239

Ion	Ratio	Lower	Upper
78	100		
77	24.2	3.8	43.8

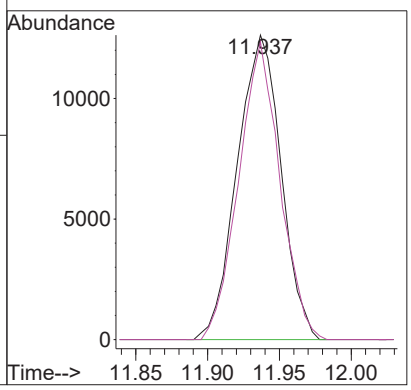


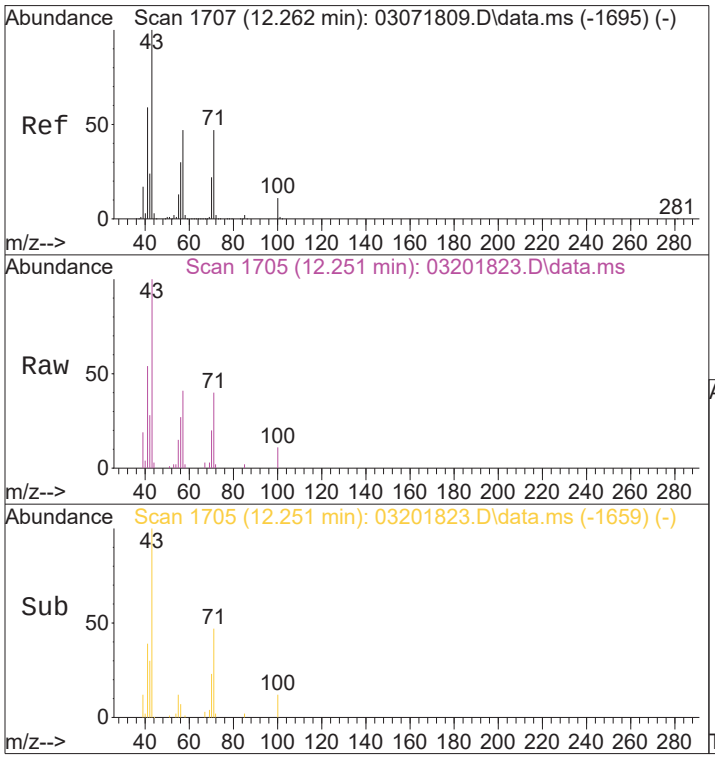


#47
Trichloroethene
Concen: 1.97 ng
RT: 11.94 min Scan# 1644
Delta R.T. -0.010 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion:130 Resp: 26818

Ion	Ratio	Lower	Upper
130	100		
132	91.8	74.9	114.9

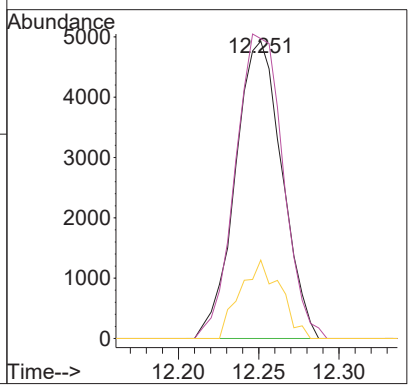


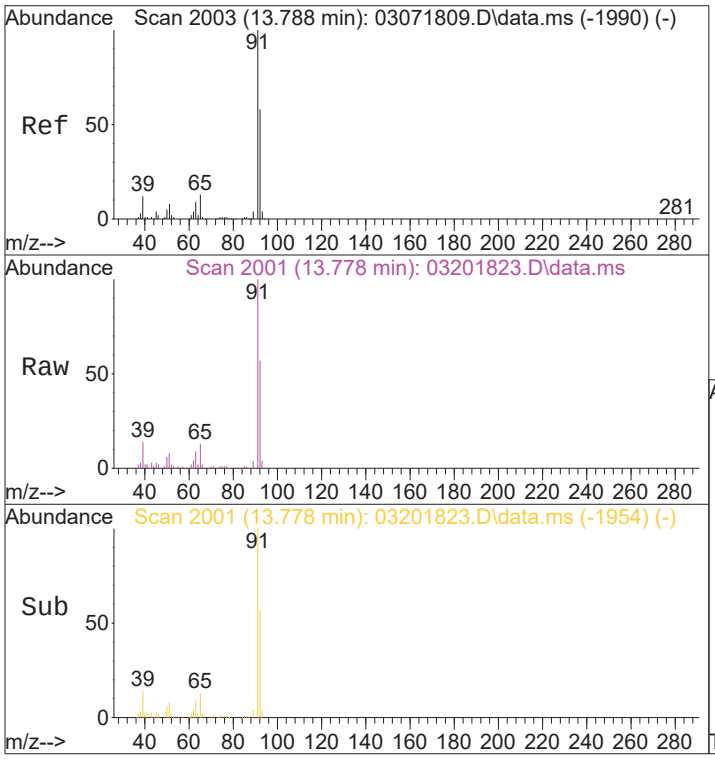


#51
n-Heptane
Concen: 0.65 ng
RT: 12.25 min Scan# 1705
Delta R.T. -0.010 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 71 Resp: 9978

Ion	Ratio	Lower	Upper
71	100		
57	104.0	77.6	117.6
100	22.7	4.4	44.4

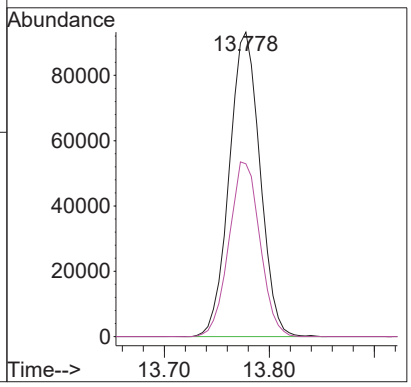


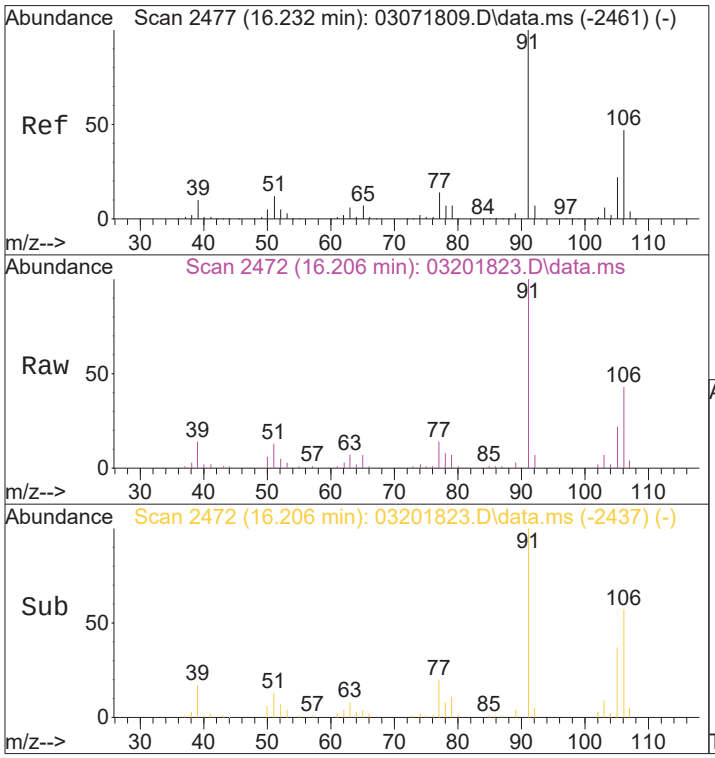


#58
Toluene
Concen: 3.02 ng
RT: 13.78 min Scan# 2001
Delta R.T. -0.005 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 91 Resp: 189322

Ion	Ratio	Lower	Upper
91	100		
92	57.9	39.0	79.0

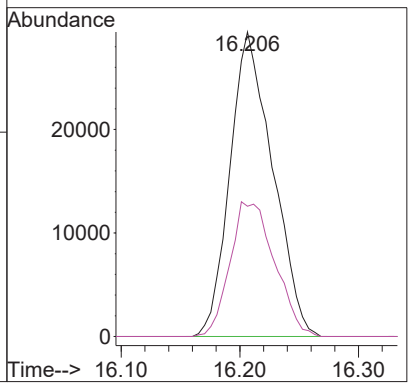


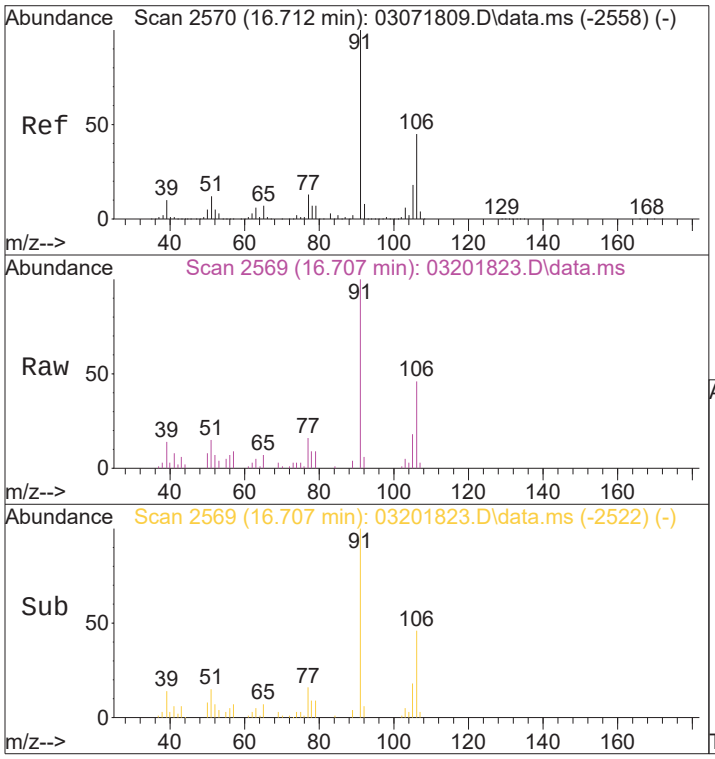


#67
m- & p-Xylenes
Concen: 1.36 ng
RT: 16.21 min Scan# 2472
Delta R.T. -0.021 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 91 Resp: 73427

Ion	Ratio	Lower	Upper
91	100		
106	46.2	28.9	68.9

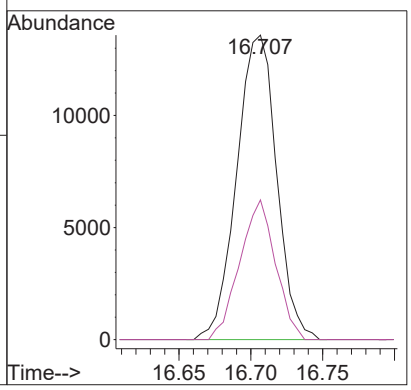


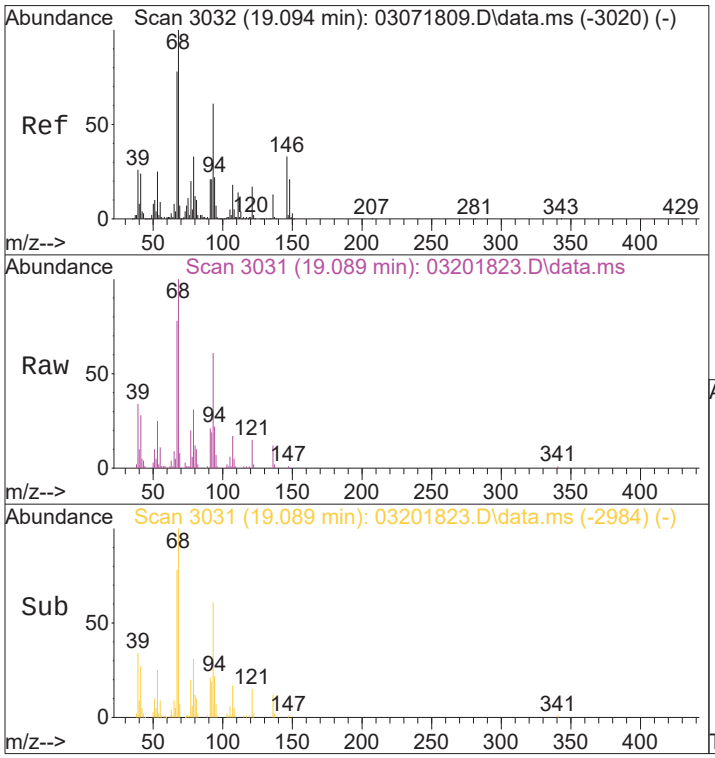


#70
o-Xylene
Concen: 0.48 ng
RT: 16.71 min Scan# 2569
Delta R.T. -0.005 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

Tgt Ion: 91 Resp: 26219

Ion	Ratio	Lower	Upper
91	100		
106	41.2	26.7	66.7

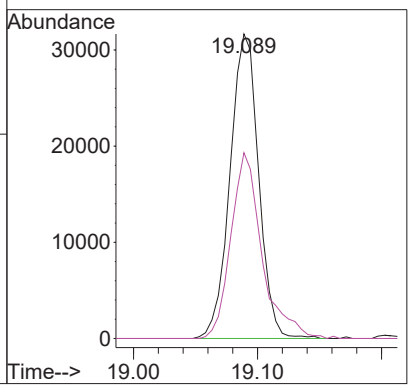




#91
d-Limonene
Concen: 1.92 ng
RT: 19.09 min Scan# 3031
Delta R.T. -0.005 min
Lab File: 03201823.D
Acq: 20 Mar 2018 16:17

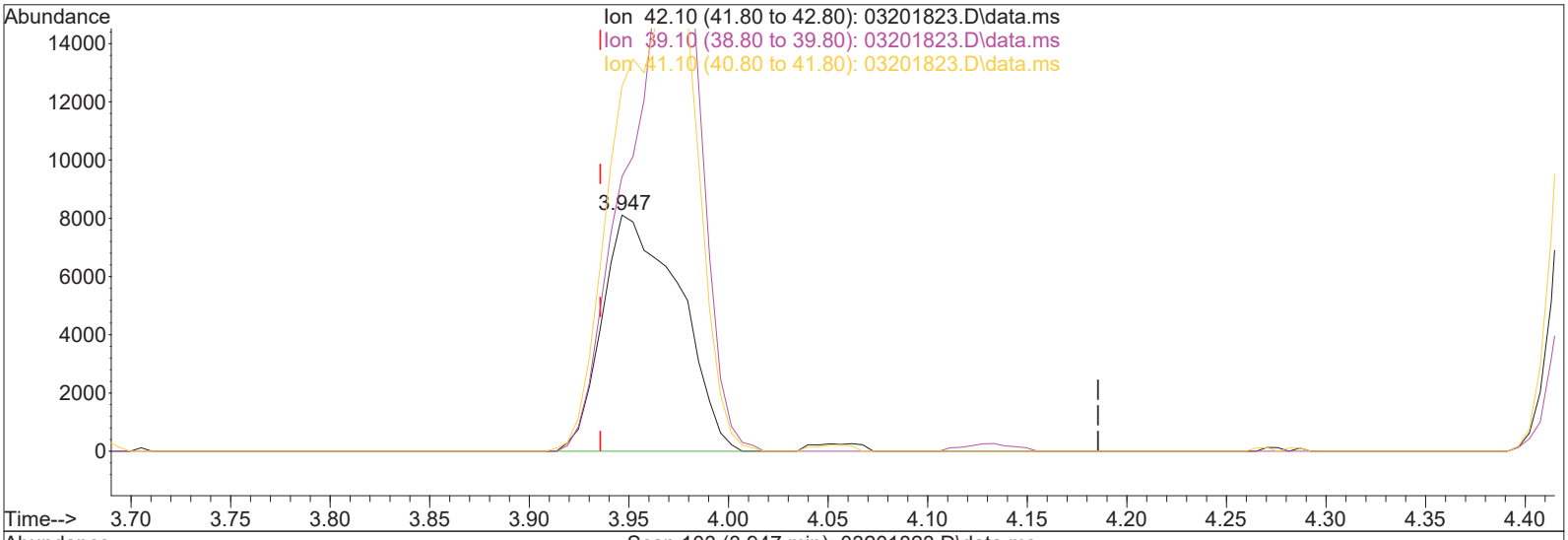
Tgt Ion: 68 Resp: 50817

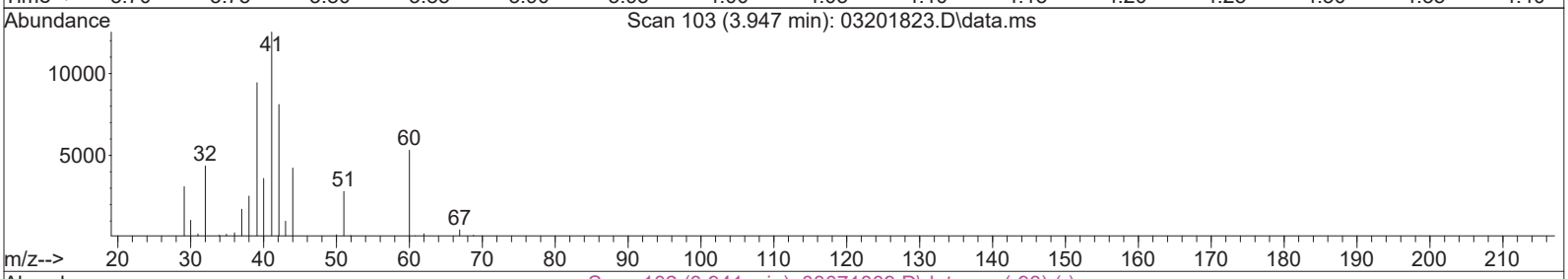
Ion	Ratio	Lower	Upper
68	100		
93	66.4	42.6	82.6

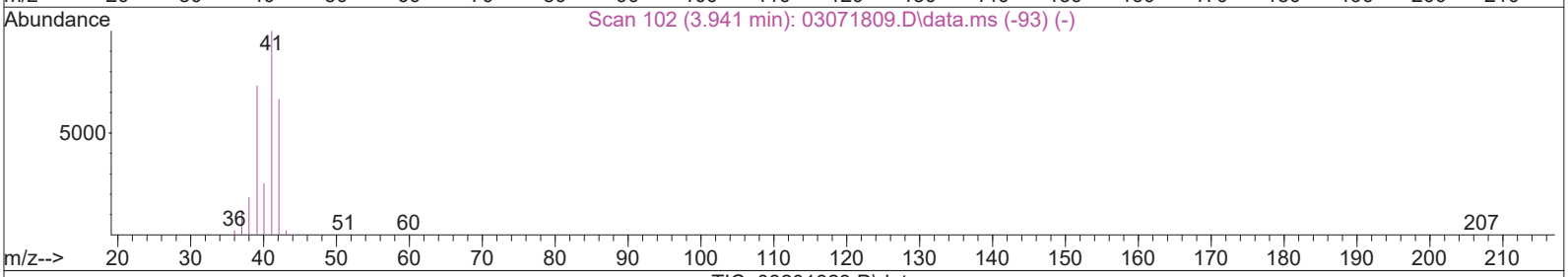


Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 20 17:39:27 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201823.D\data.ms

(2) Propene (T)

3.947min (+0.011) 1.07ng

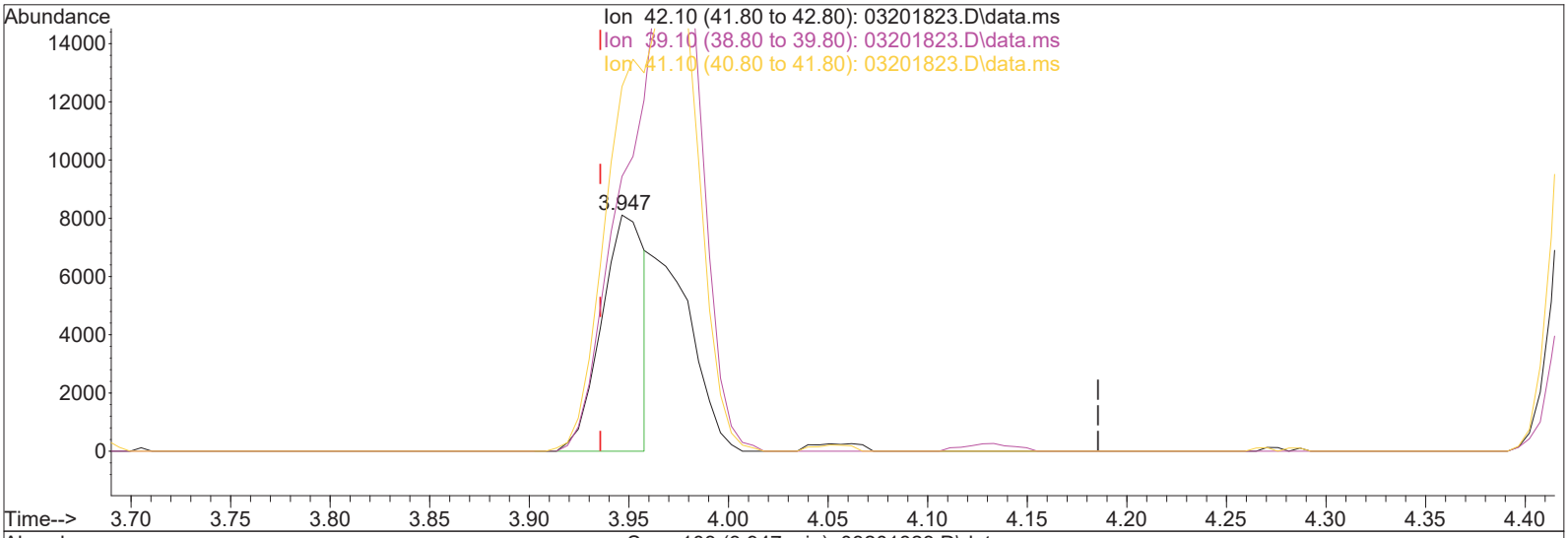
response 21888

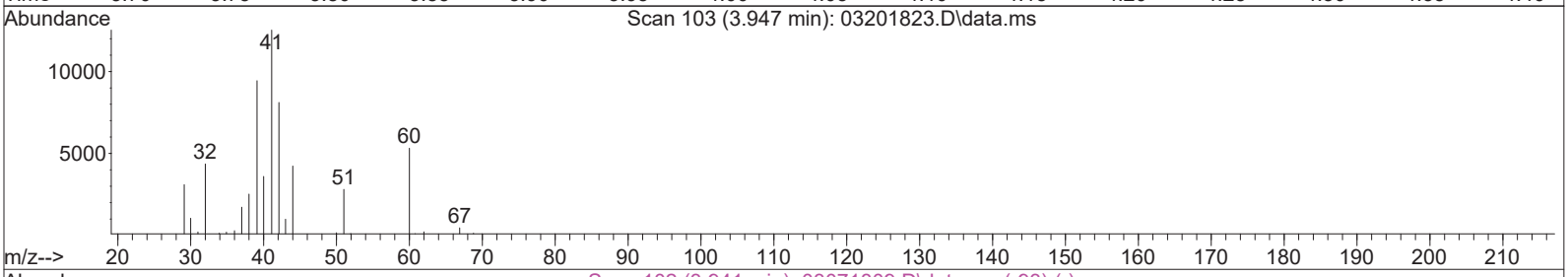
Ion	Exp%	Act%
42.10	100	100
39.10	104.20	223.26#
41.10	151.00	212.79#
0.00	0.00	0.00

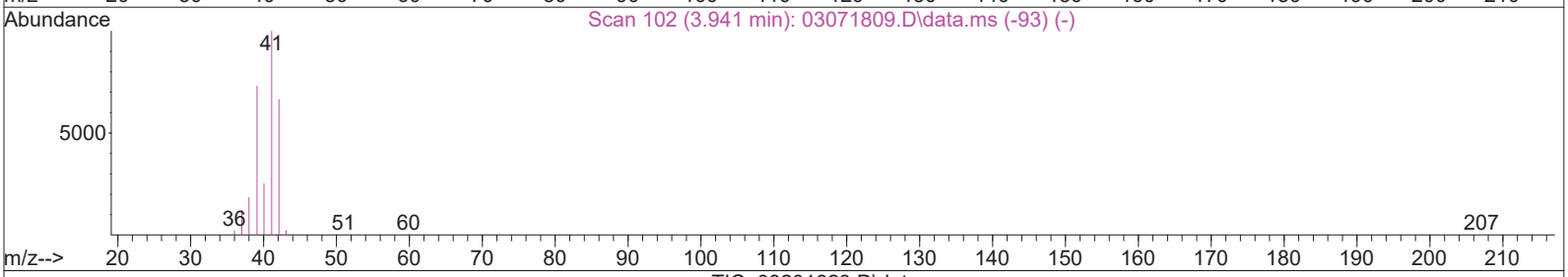
00884294

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 20 17:39:27 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201823.D\data.ms

(2) Propene (T)

3.947min (+0.011) 0.60ng m

response 12127

Ion	Exp%	Act%
42.10	100	100
39.10	104.20	402.96#
41.10	151.00	384.06#
0.00	0.00	0.00

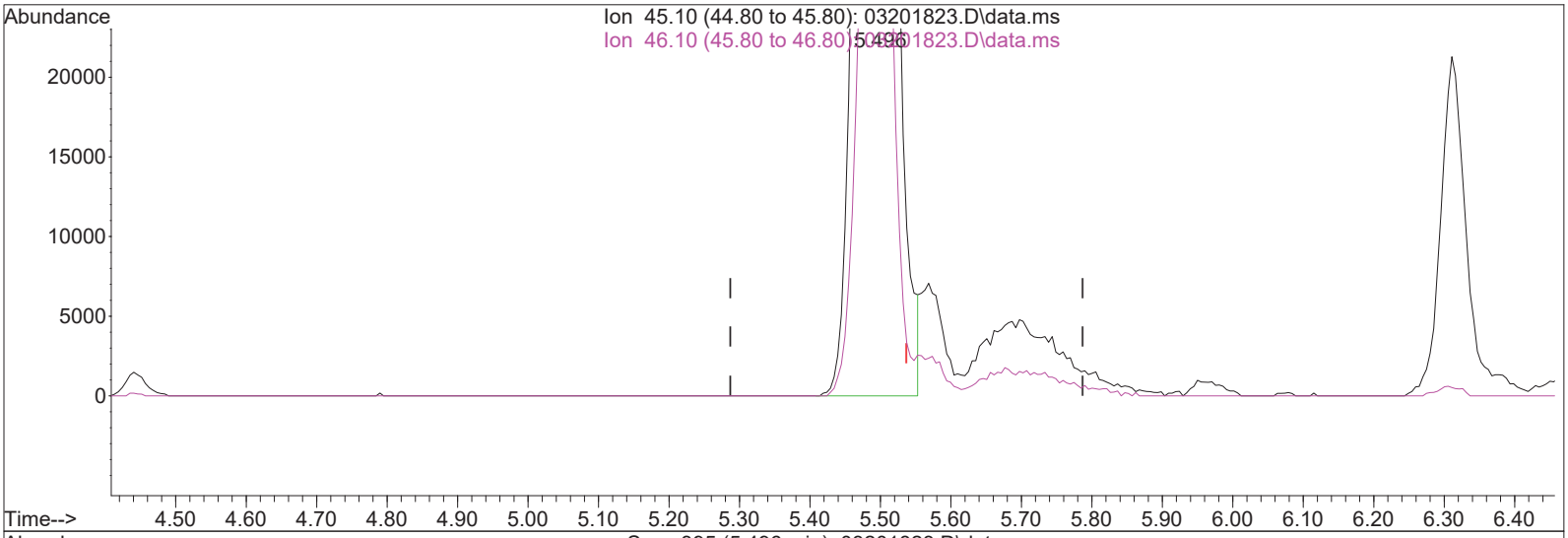
IPC

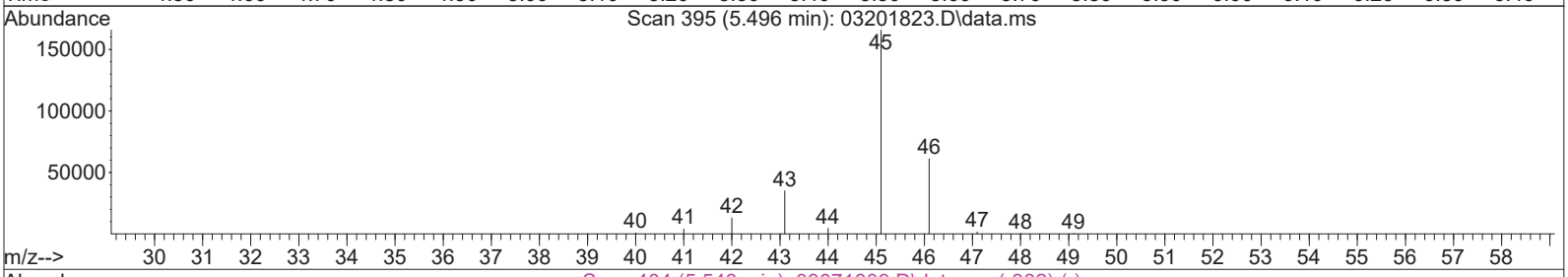
LH 3/21/18

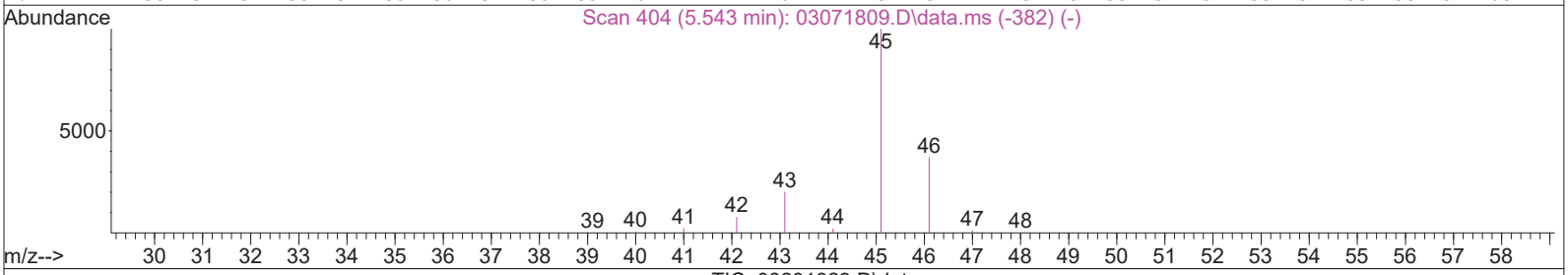
3/21/18

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 20 17:39:27 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201823.D\data.ms

(10) Ethanol (T)

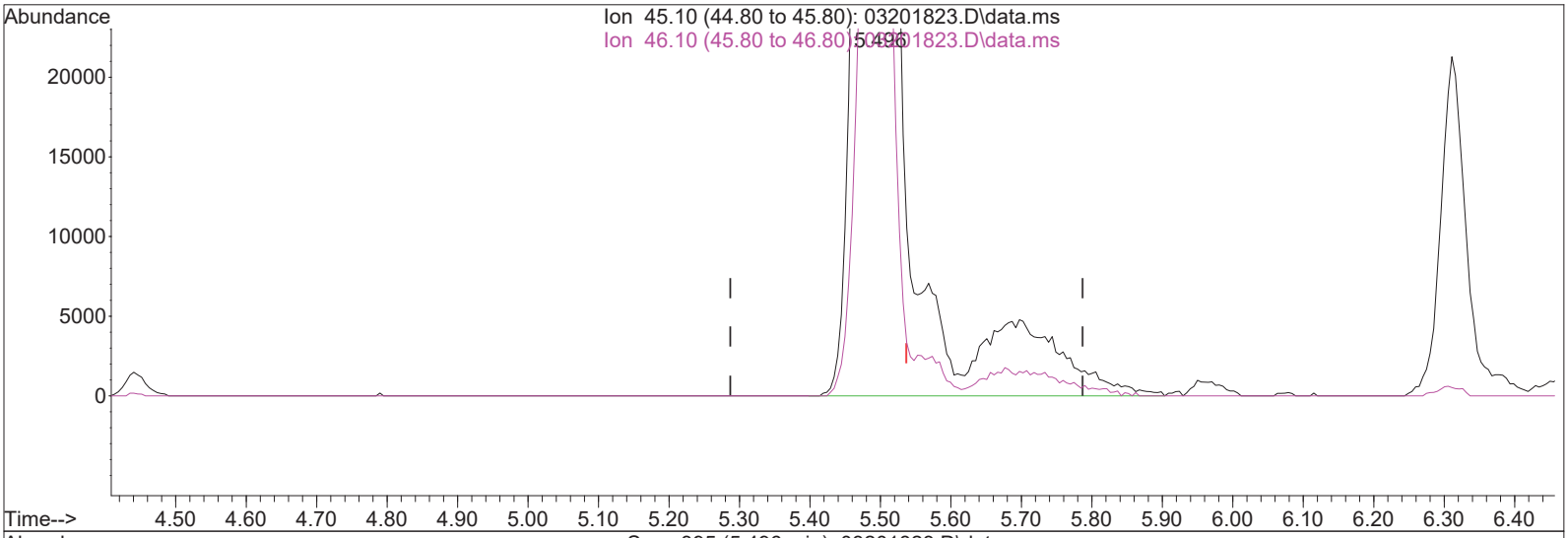
5.496min (-0.041) 34.04ng

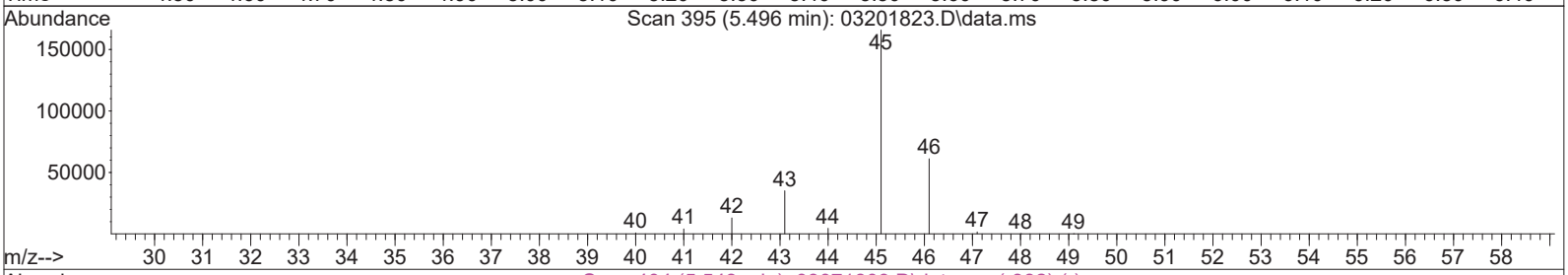
response 452550

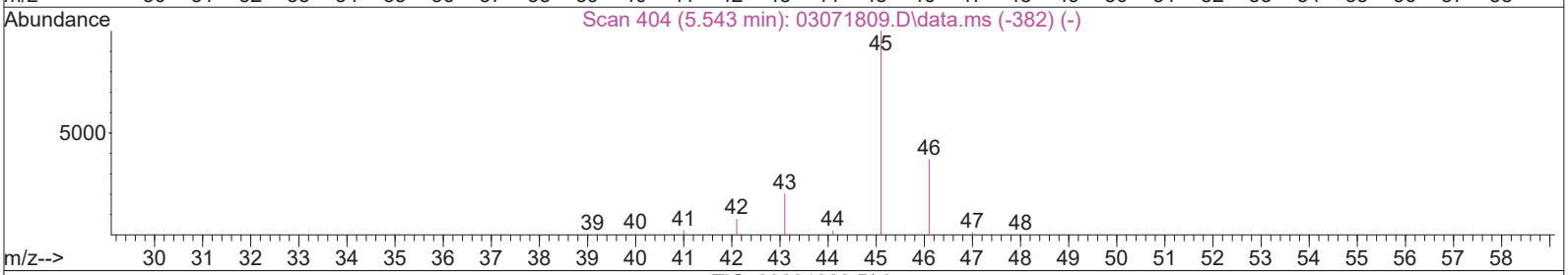
Ion	Exp%	Act%
45.10	100	100
46.10	37.50	36.08
0.00	0.00	0.00
0.00	0.00	0.00

Data File: I:\MS09\Data\2018_03\20\03201823.D
Acq On : 20 Mar 2018 16:17 Operator: LH
Sample : P1801150-003 (1000mL)
Misc : S31-03061806
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Mar 20 17:39:27 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201823.D\data.ms

(10) Ethanol (T)

5.496min (-0.041) 38.09ng m

response 506364

Ion	Exp%	Act%
45.10	100	100
46.10	37.50	32.25
0.00	0.00	0.00
0.00	0.00	0.00

SP

LH 3/21/18

3/21/18

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 21 14:06:38 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018 LH 3/21/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	110801	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	606722	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	312990	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	289465	14.319	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 114.56%				
57) Toluene-d8 (SS2)	13.67	98	706811	12.014	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.08%				
73) Bromofluorobenzene (SS3)	17.17	174	164212	11.739	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.92%				
Target Compounds							Qvalue
2) Propene	3.96	42	9138m	0.462	ng		
3) Dichlorodifluoromethan...	4.06	85	60273	2.087	ng		100
4) Chloromethane	4.26	50	11316	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	4.45	135	1105	N.D.			
6) Vinyl Chloride	0.00	62	0	N.D.			
7) 1,3-Butadiene	0.00	54	0	N.D.			
8) Bromomethane	5.04	94	619	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.47	45	74343m	5.751	ng		
11) Acetonitrile	5.68	41	7128	N.D.			
12) Acrolein	5.82	56	2840	N.D.			
13) Acetone	5.97	58	55350	4.836	ng	#	58
14) Trichlorofluoromethane	6.14	101	24191	1.055	ng		98
15) 2-Propanol (Isopropanol)	6.30	45	37827m	0.831	ng		
16) Acrylonitrile	6.56	53	493	N.D.			
17) 1,1-Dichloroethene	0.00	96	0	N.D.			
18) 2-Methyl-2-Propanol (t...	6.98	59	4413	N.D.			
19) Methylene Chloride	6.98	84	4486	N.D.			
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.			
21) Trichlorotrifluoroethane	7.31	151	122277	13.633	ng		91
22) Carbon Disulfide	7.28	76	4115	N.D.			
23) trans-1,2-Dichloroethene	0.00	61	0	N.D.			
24) 1,1-Dichloroethane	0.00	63	0	N.D.			
25) Methyl tert-Butyl Ether	8.28	73	271	N.D.			
26) Vinyl Acetate	8.40	86	2392	0.969	ng	#	76
27) 2-Butanone (MEK)	8.67	72	7425	0.762	ng	#	75
28) cis-1,2-Dichloroethene	9.10	61	1482	N.D.			
29) Diisopropyl Ether	9.35	87	744	N.D.			
30) Ethyl Acetate	9.35	61	56995	10.314	ng		88
31) n-Hexane	9.35	57	10886	N.D.			
32) Chloroform	9.41	83	1720	N.D.			
34) Tetrahydrofuran (THF)	9.83	72	1227	N.D.			
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	10.16	62	1137	N.D.			
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.			
39) Isopropyl Acetate	0.00	61	0	N.D.			
40) 1-Butanol	0.00	56	0	N.D.	d		
41) Benzene	10.88	78	21678	N.D.			
42) Carbon Tetrachloride	11.03	117	6410	N.D.			
43) Cyclohexane	11.16	84	2463	N.D.			
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.			
46) Bromodichloromethane	0.00	83	0	N.D.			
47) Trichloroethene	11.94	130	2874	N.D.			
48) 1,4-Dioxane	0.00	88	0	N.D.			
49) 2,2,4-Trimethylpentane...	12.00	57	2101	N.D.			

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

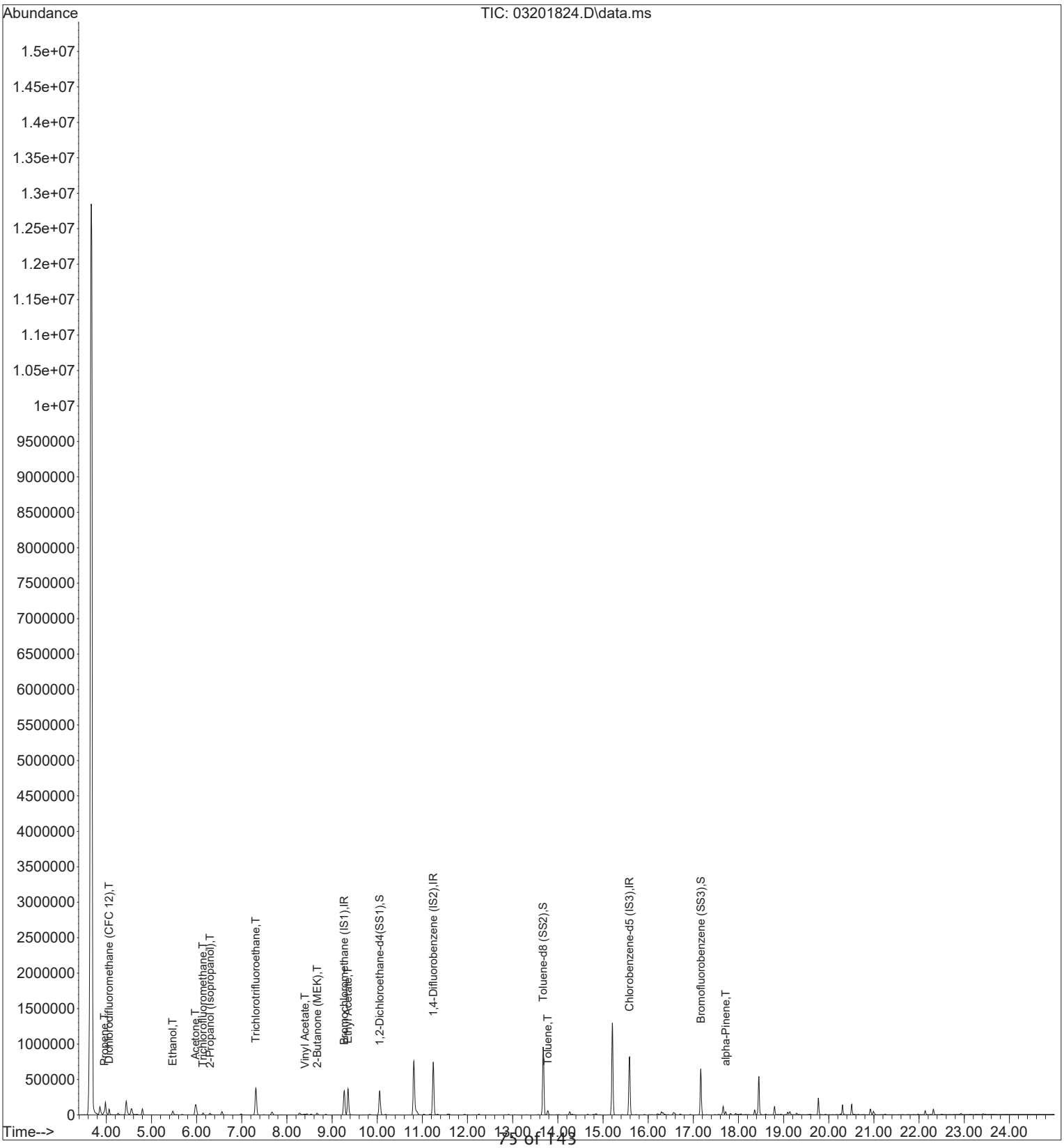
Quant Time: Mar 21 14:06:38 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.	
51) n-Heptane	12.25	71	2382	N.D.	
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.	
53) 4-Methyl-2-pentanone	12.83	58	573	N.D.	
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.	
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.	
58) Toluene	13.78	91	46375	0.759 ng	98
59) 2-Hexanone	14.03	43	4147	N.D.	
60) Dibromochloromethane	0.00	129	0	N.D.	
61) 1,2-Dibromoethane	0.00	107	0	N.D.	
62) n-Butyl Acetate	14.66	43	9080	N.D.	
63) n-Octane	14.79	57	1286	N.D.	
64) Tetrachloroethene	14.93	166	909	N.D.	
65) Chlorobenzene	0.00	112	0	N.D.	
66) Ethylbenzene	16.03	91	4950	N.D.	
67) m- & p-Xylenes	16.21	91	13364	N.D.	
68) Bromoform	0.00	173	0	N.D.	
69) Styrene	16.59	104	11673	N.D.	
70) o-Xylene	16.70	91	4407	N.D.	
71) n-Nonane	16.93	43	3372	N.D.	
72) 1,1,2,2-Tetrachloroethane	16.72	83	252	N.D.	
74) Cumene	17.32	105	588	N.D.	
75) alpha-Pinene	17.72	93	17864	0.529 ng	92
76) n-Propylbenzene	17.83	91	1948	N.D.	
77) 3-Ethyltoluene	17.94	105	3857	N.D.	
78) 4-Ethyltoluene	17.99	105	2044	N.D.	
79) 1,3,5-Trimethylbenzene	18.07	105	1101	N.D.	
80) alpha-Methylstyrene	18.22	118	1709	N.D.	
81) 2-Ethyltoluene	18.26	105	1014	N.D.	
82) 1,2,4-Trimethylbenzene	18.49	105	5007	N.D.	
83) n-Decane	18.60	57	4323	N.D.	
84) Benzyl Chloride	18.62	91	201	N.D.	
85) 1,3-Dichlorobenzene	18.71	146	726	N.D.	
86) 1,4-Dichlorobenzene	18.71	146	726	N.D.	
87) sec-Butylbenzene	0.00	105	0	N.D.	
88) 4-Isopropyltoluene (p-...	18.93	119	3566	N.D.	
89) 1,2,3-Trimethylbenzene	18.93	105	1500	N.D.	
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.	
91) d-Limonene	19.09	68	9869	N.D.	
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.	
93) n-Undecane	19.93	57	3084	N.D.	
94) 1,2,4-Trichlorobenzene	20.87	180	111	N.D.	
95) Naphthalene	20.99	128	29582	N.D.	
96) n-Dodecane	21.01	57	5137	N.D.	
97) Hexachlorobutadiene	0.00	225	0	N.D.	
98) Cyclohexanone	16.38	55	4925	N.D.	
99) tert-Butylbenzene	18.45	119	6351	N.D.	
100) n-Butylbenzene	19.36	91	2349	N.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 21 14:06:38 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 21 14:06:38 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 3/21/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	110801	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	606722	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	312990	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	289465	14.319	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 114.56%				
57) Toluene-d8 (SS2)	13.67	98	706811	12.014	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.08%				
73) Bromofluorobenzene (SS3)	17.17	174	164212	11.739	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.92%				
Target Compounds							Qvalue
2) Propene	3.96	42	9138m	0.462	ng		
3) Dichlorodifluoromethan...	4.06	85	60273	2.087	ng		100
10) Ethanol	5.47	45	74343m	5.751	ng		
13) Acetone	5.97	58	55350	4.836	ng	#	58
14) Trichlorofluoromethane	6.14	101	24191	1.055	ng		98
15) 2-Propanol (Isopropanol)	6.30	45	37827m	0.831	ng		
21) Trichlorotrifluoroethane	7.31	151	122277	13.633	ng		91
26) Vinyl Acetate	8.40	86	2392	0.969	ng	#	76
27) 2-Butanone (MEK)	8.67	72	7425	0.762	ng	#	75
30) Ethyl Acetate	9.35	61	56995	10.314	ng		88
58) Toluene	13.78	91	46375	0.759	ng		98
75) alpha-Pinene	17.72	93	17864	0.529	ng		92

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 21 14:06:38 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
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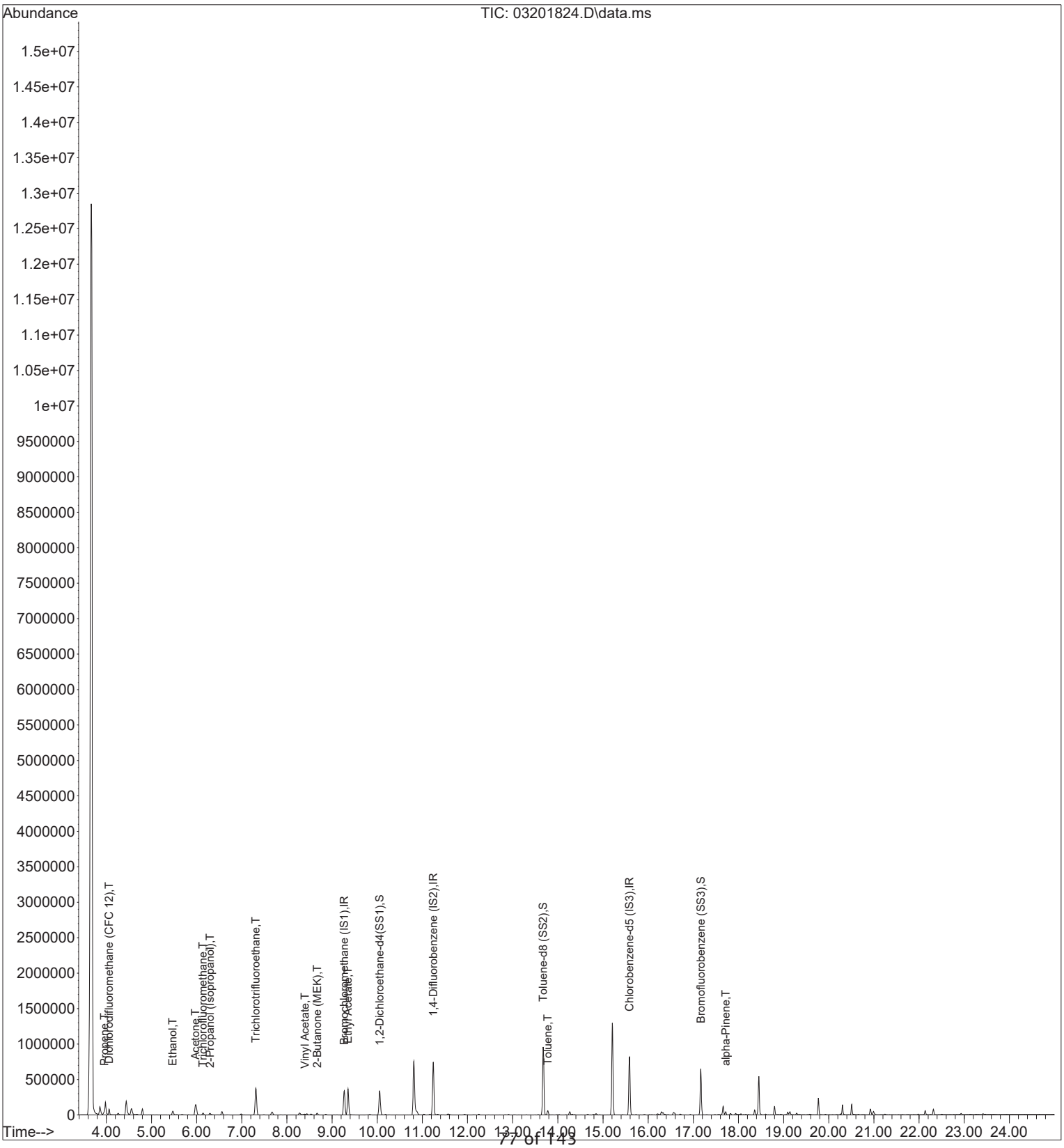
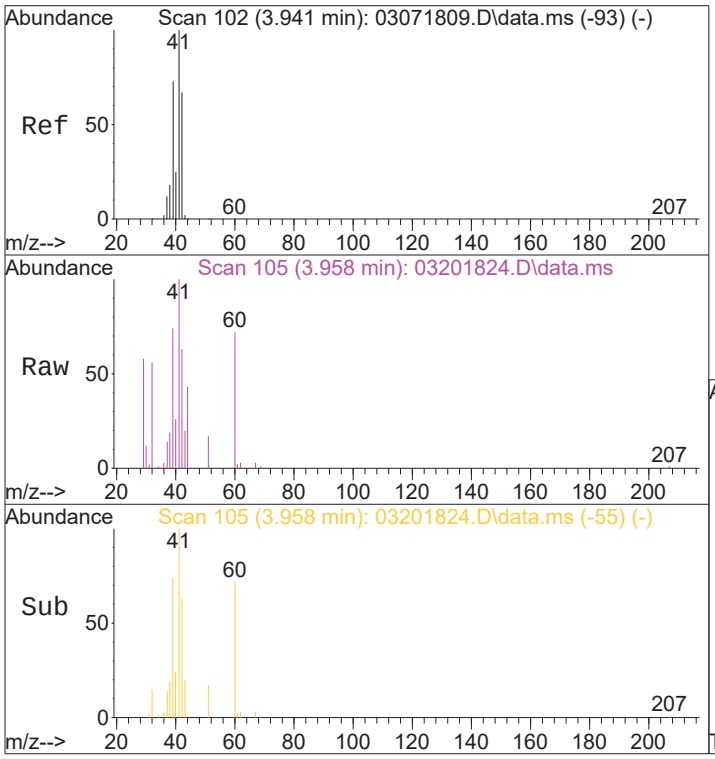
DataAcq Meth:TO15.M

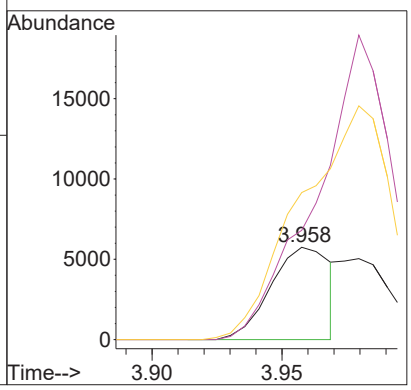


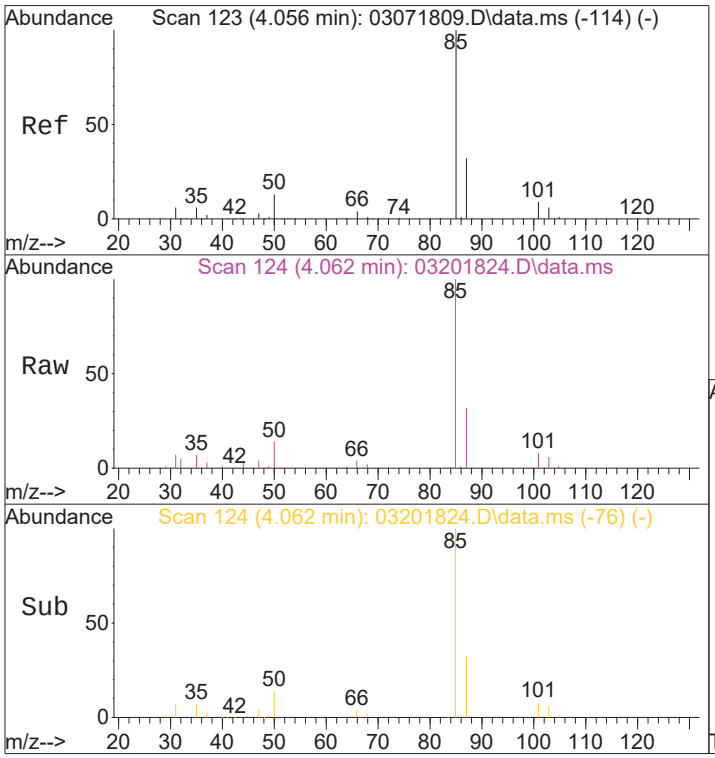


#2
Propene
Concen: 0.46 ng m
RT: 3.96 min Scan# 105
Delta R.T. 0.022 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 42 Resp: 9138

Ion	Ratio	Lower	Upper
42	100		
39	411.6	84.2	124.2#
41	384.4	131.0	171.0#

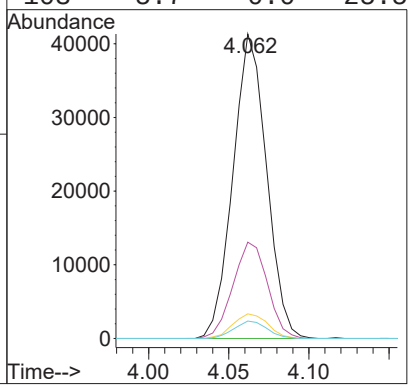


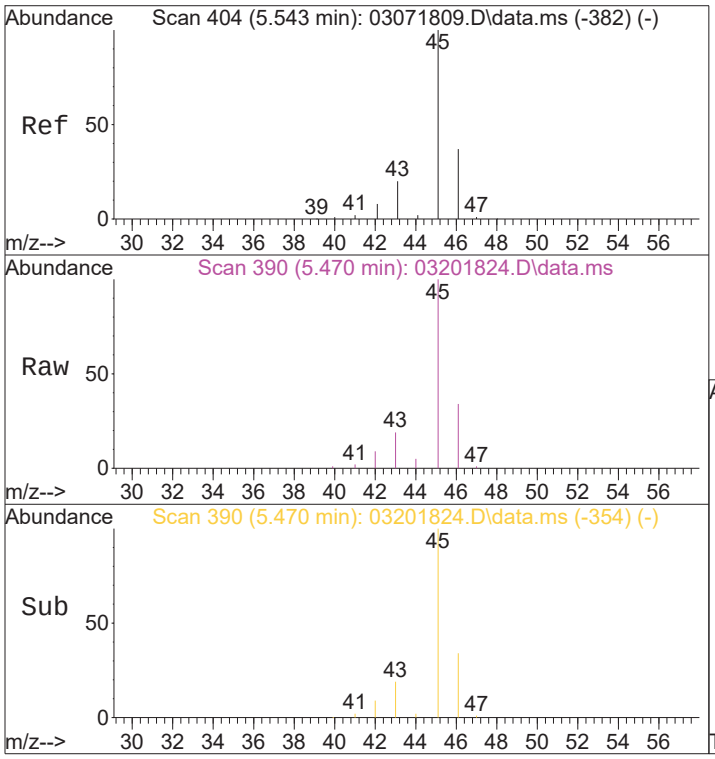


#3
Dichlorodifluoromethane (CFC 12)
Concen: 2.09 ng
RT: 4.06 min Scan# 124
Delta R.T. 0.011 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 85 Resp: 60273

Ion	Ratio	Lower	Upper
85	100		
87	32.5	12.4	52.4
101	8.4	0.0	28.6
103	5.7	0.0	25.5

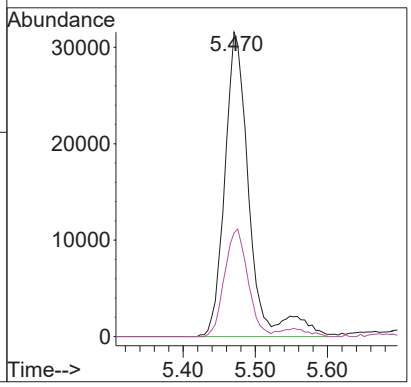


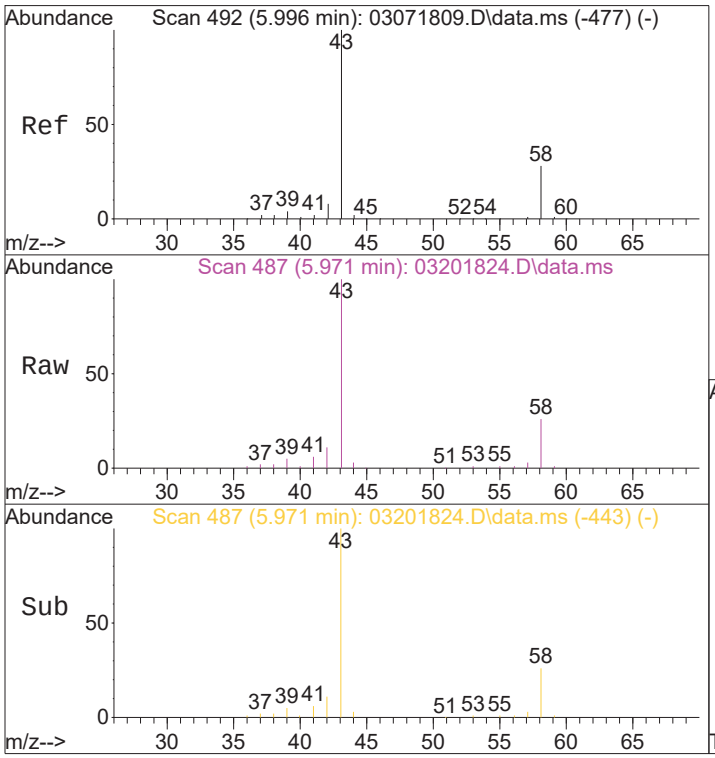


#10
Ethanol
Concen: 5.75 ng m
RT: 5.47 min Scan# 390
Delta R.T. -0.067 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 45 Resp: 74343

Ion	Ratio	Lower	Upper
45	100		
46	33.6	17.5	57.5

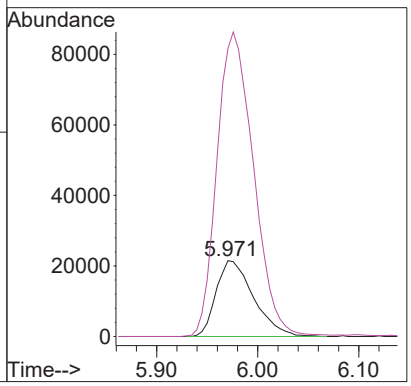


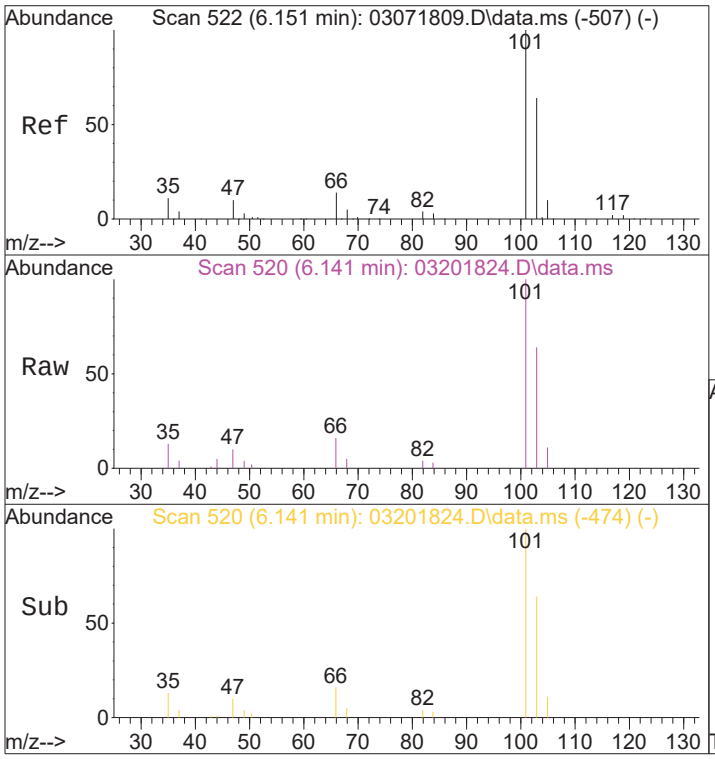


#13
Acetone
Concen: 4.84 ng
RT: 5.97 min Scan# 487
Delta R.T. -0.021 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 58 Resp: 55350

Ion	Ratio	Lower	Upper
58	100		
43	392.8	279.1	339.1#

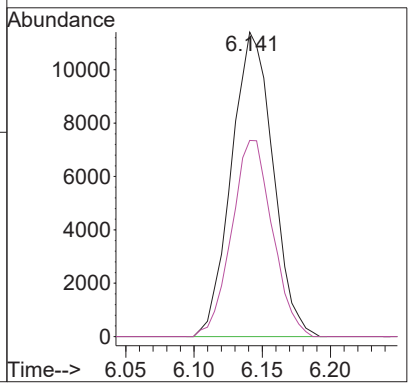


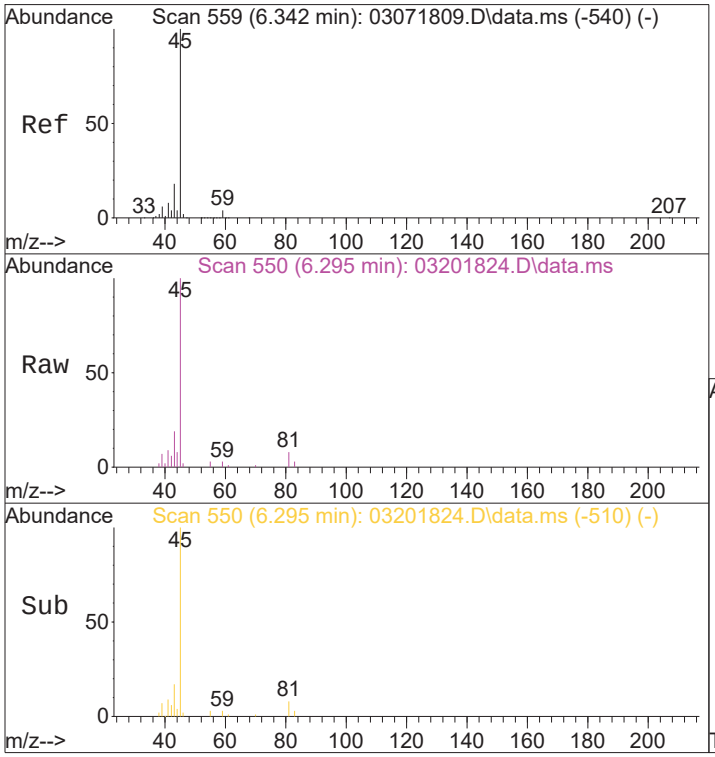


#14
Trichlorofluoromethane
Concen: 1.05 ng
RT: 6.14 min Scan# 520
Delta R.T. -0.010 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion:101 Resp: 24191

Ion	Ratio	Lower	Upper
101	100		
103	63.2	44.8	84.8

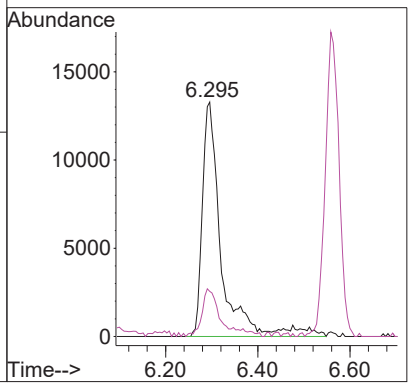


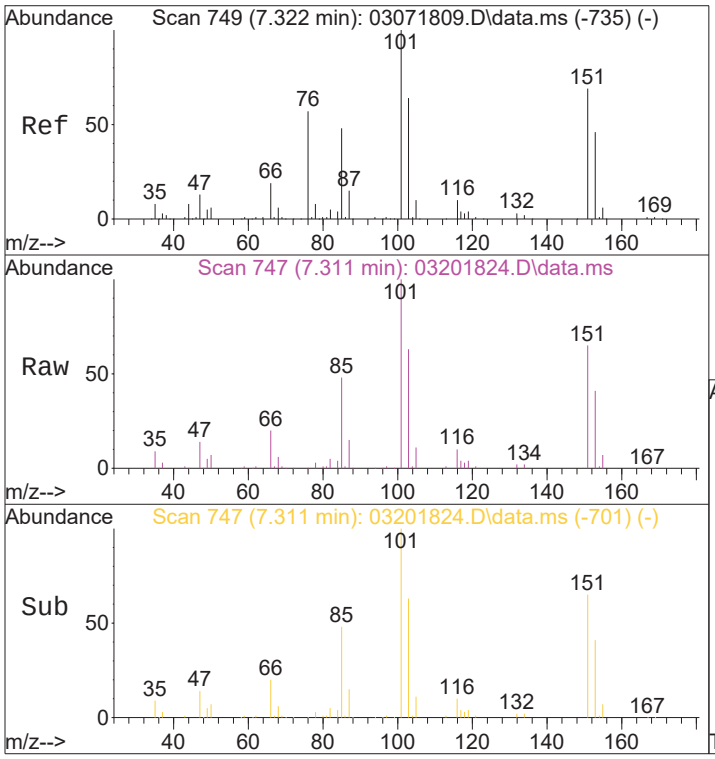


#15
2-Propanol (Isopropanol)
Concen: 0.83 ng m
RT: 6.30 min Scan# 550
Delta R.T. -0.041 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 45 Resp: 37827

Ion	Ratio	Lower	Upper
45	100		
43	20.5	0.0	37.2

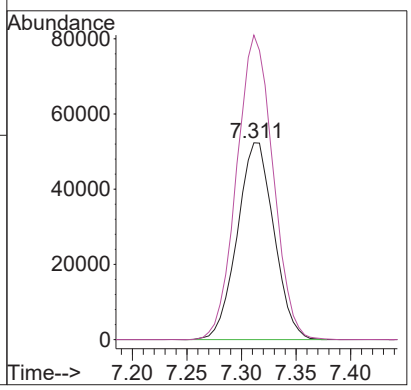


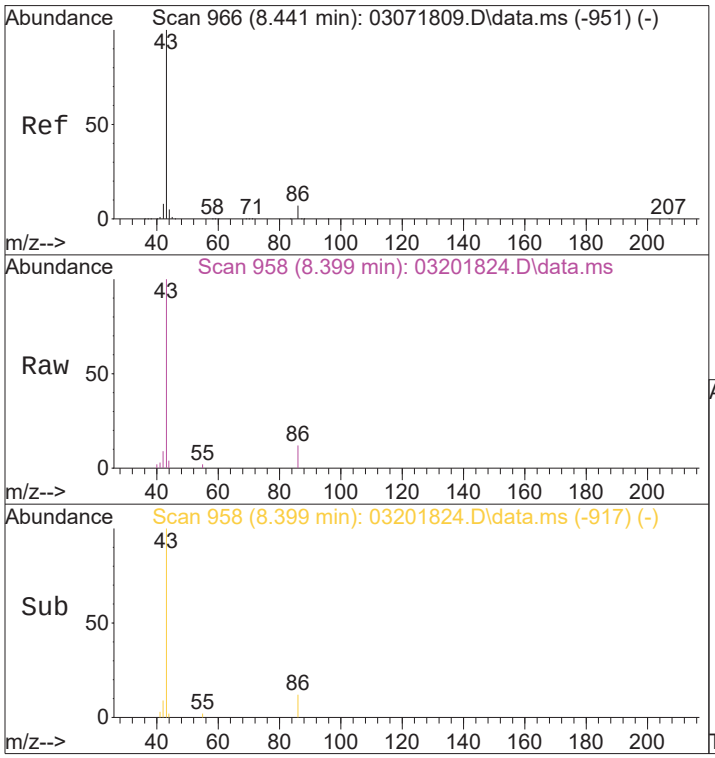


#21
Trichlorotrifluoroethane
Concen: 13.63 ng
RT: 7.31 min Scan# 747
Delta R.T. -0.010 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion:151 Resp: 122277

Ion	Ratio	Lower	Upper
151	100		
101	153.5	122.5	162.5

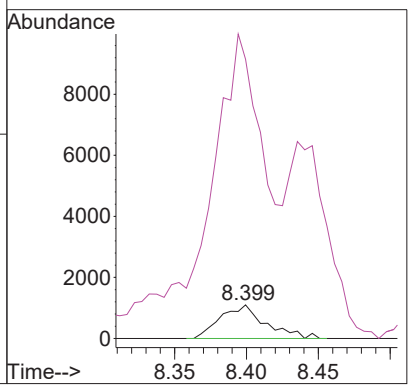


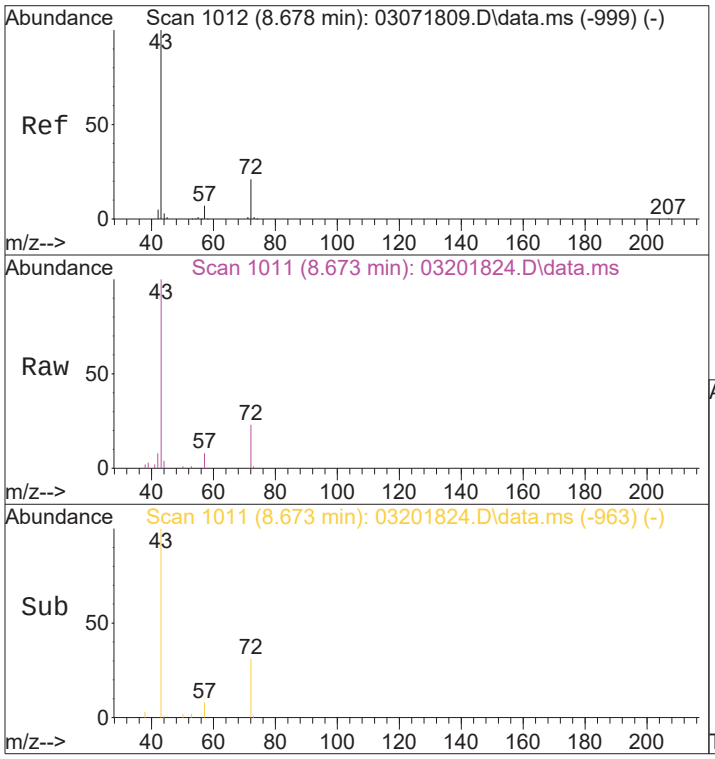


#26
Vinyl Acetate
Concen: 0.97 ng
RT: 8.40 min Scan# 958
Delta R.T. -0.036 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 86 Resp: 2392

Ion	Ratio	Lower	Upper
86	100		
43	1208.4	1322.8	1362.8#

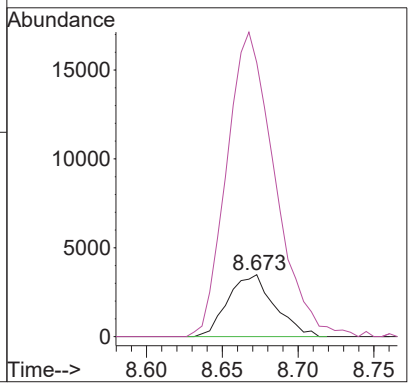


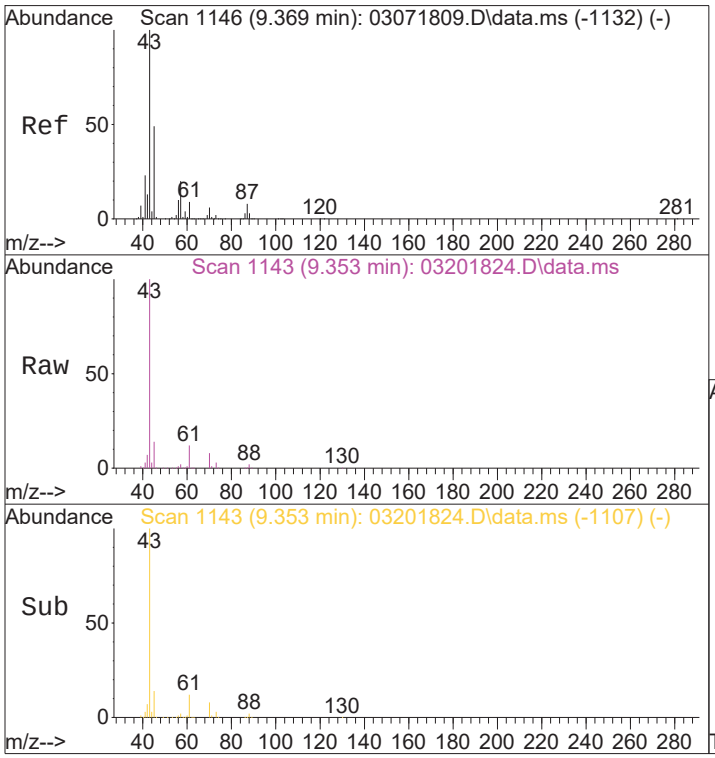


#27
2-Butanone (MEK)
Concen: 0.76 ng
RT: 8.67 min Scan# 1011
Delta R.T. 0.000 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 72 Resp: 7425

Ion	Ratio	Lower	Upper
72	100		
43	510.9	427.4	467.4#

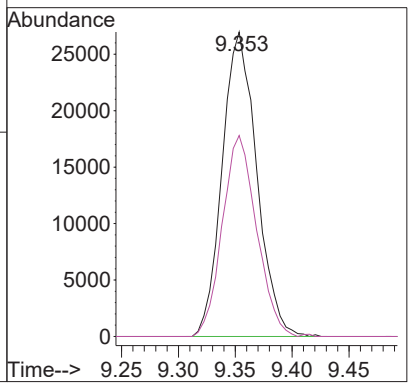


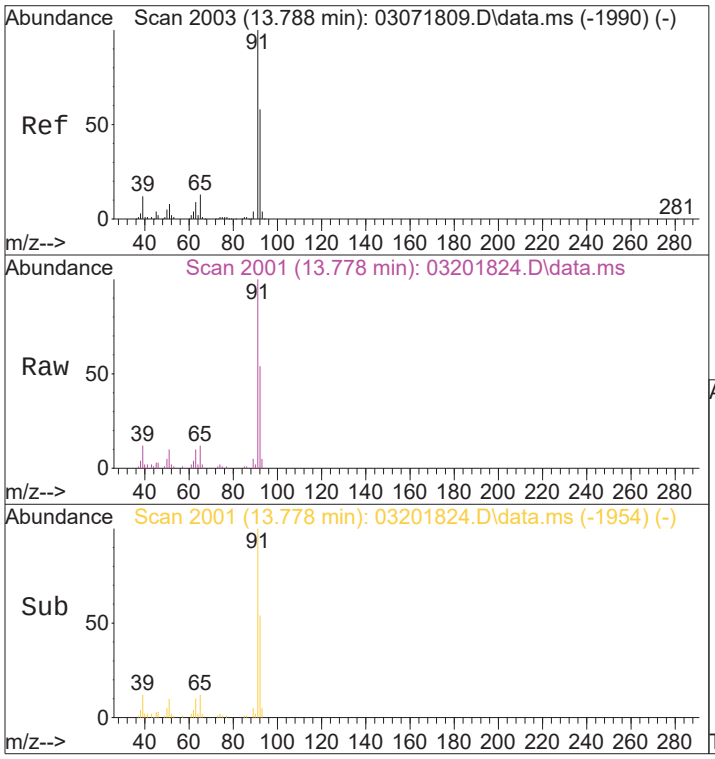


#30
Ethyl Acetate
Concen: 10.31 ng
RT: 9.35 min Scan# 1143
Delta R.T. -0.015 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 61 Resp: 56995

Ion	Ratio	Lower	Upper
61	100		
70	65.3	55.8	95.8

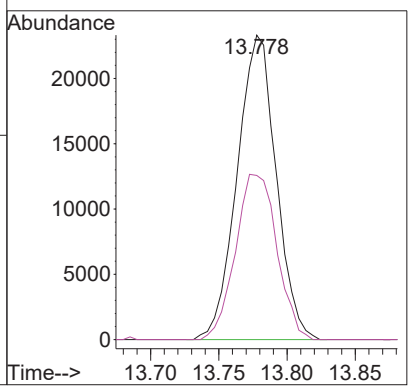


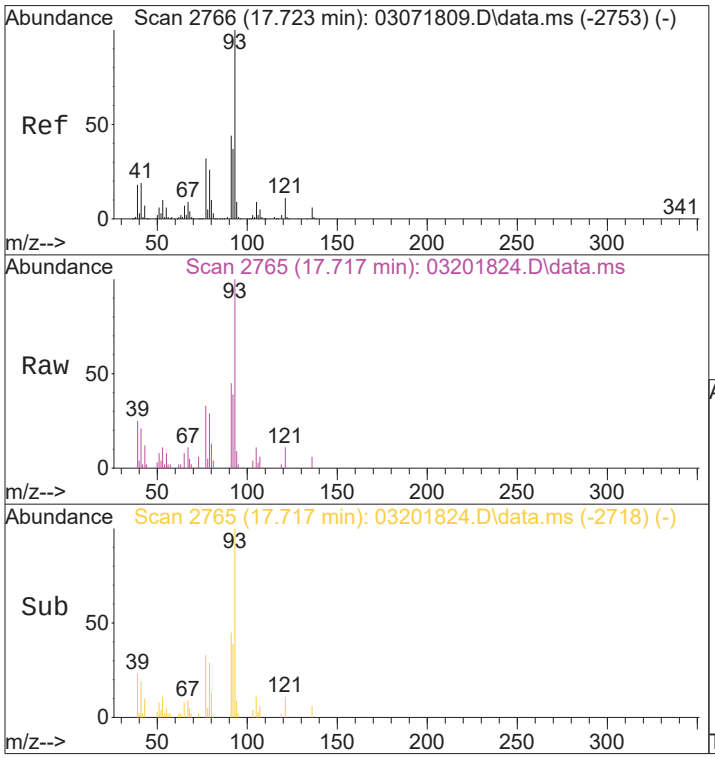


#58
Toluene
Concen: 0.76 ng
RT: 13.78 min Scan# 2001
Delta R.T. -0.005 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

Tgt Ion: 91 Resp: 46375

Ion	Ratio	Lower	Upper
91	100		
92	57.7	39.0	79.0

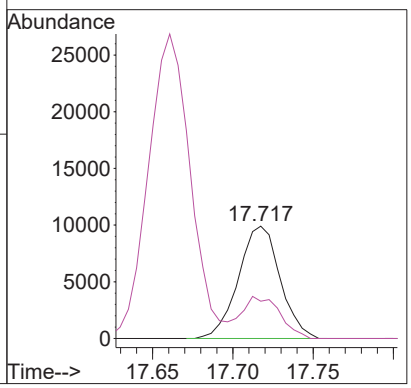




#75
alpha-Pinene
Concen: 0.53 ng
RT: 17.72 min Scan# 2765
Delta R.T. -0.005 min
Lab File: 03201824.D
Acq: 20 Mar 2018 16:51

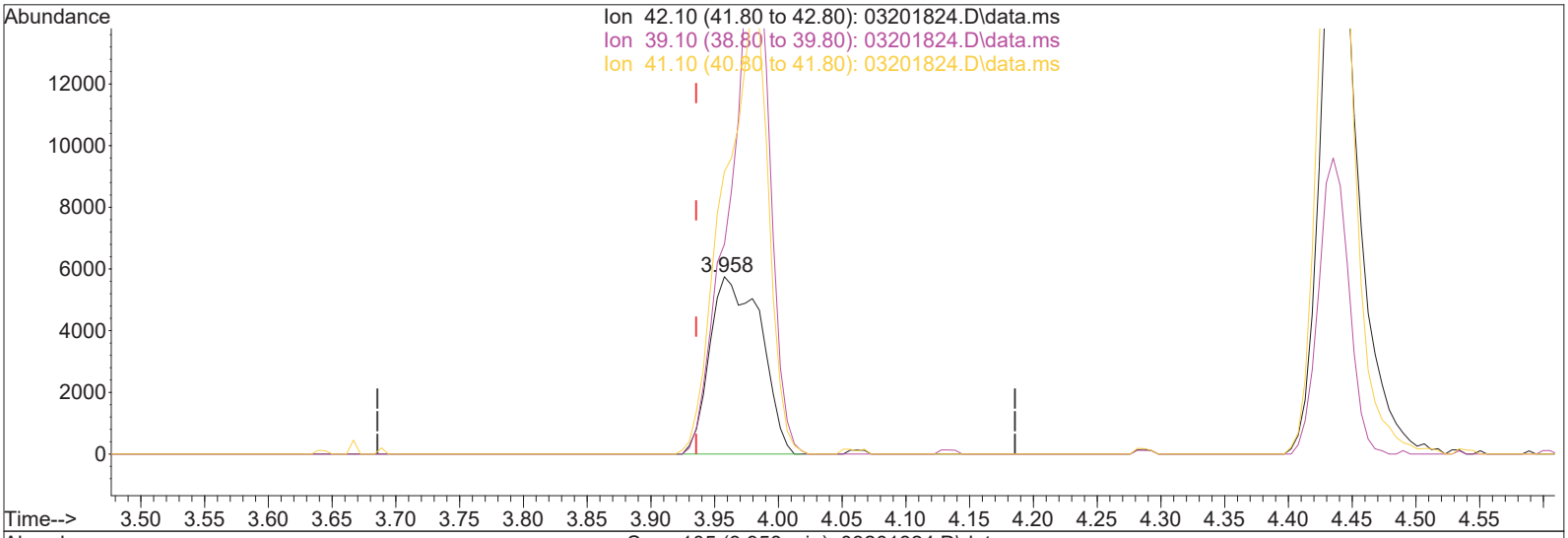
Tgt Ion: 93 Resp: 17864

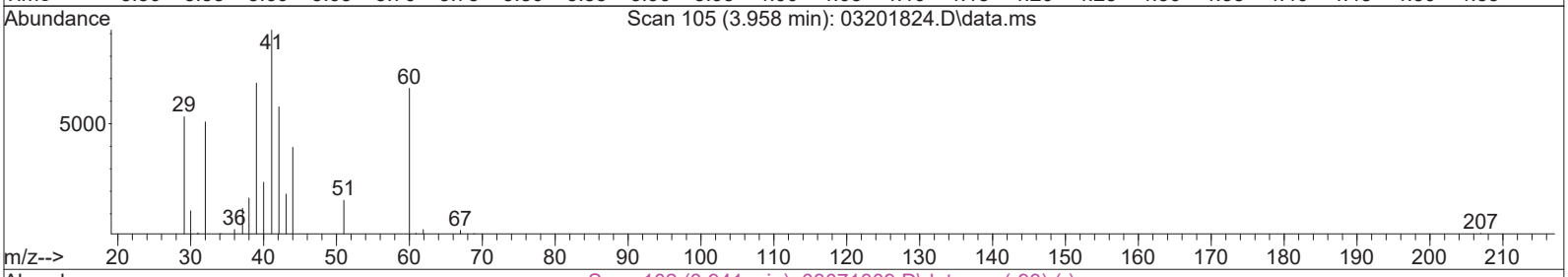
Ion	Ratio	Lower	Upper
93	100		
77	34.4	10.1	50.1

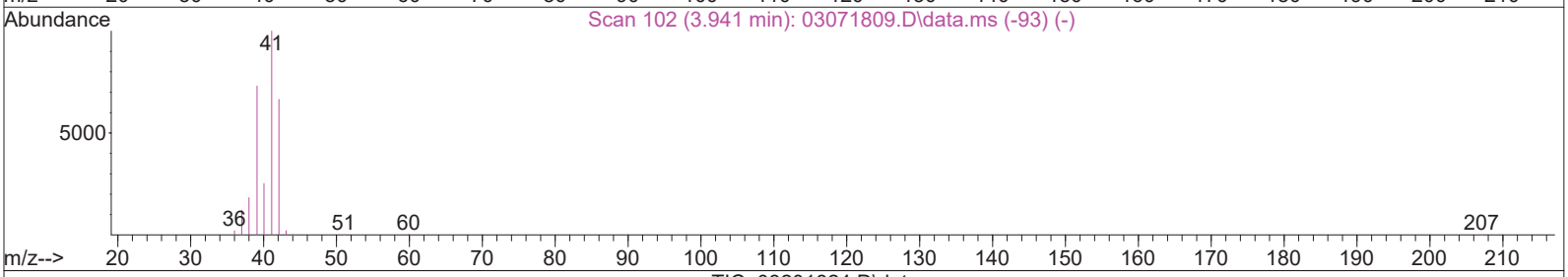


Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 20 17:39:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201824.D\data.ms

(2) Propene (T)

3.958min (+0.022) 0.81ng

response 16026

Ion	Exp%	Act%
42.10	100	100
39.10	104.20	234.68#
41.10	151.00	219.21#
0.00	0.00	0.00

00884309

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
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Quant Time: Mar 20 17:39:34 2018
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Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
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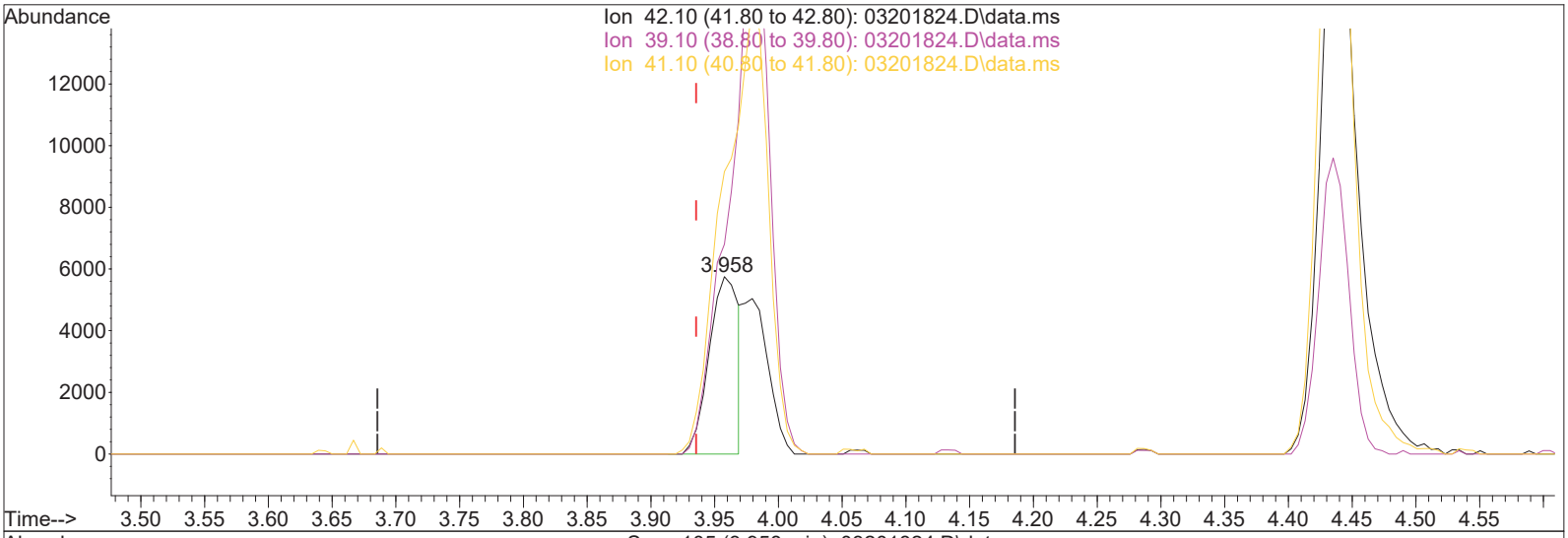

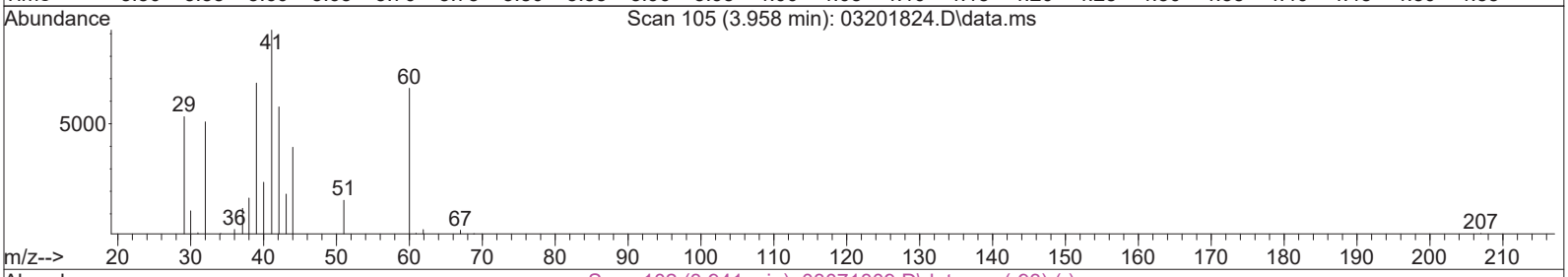

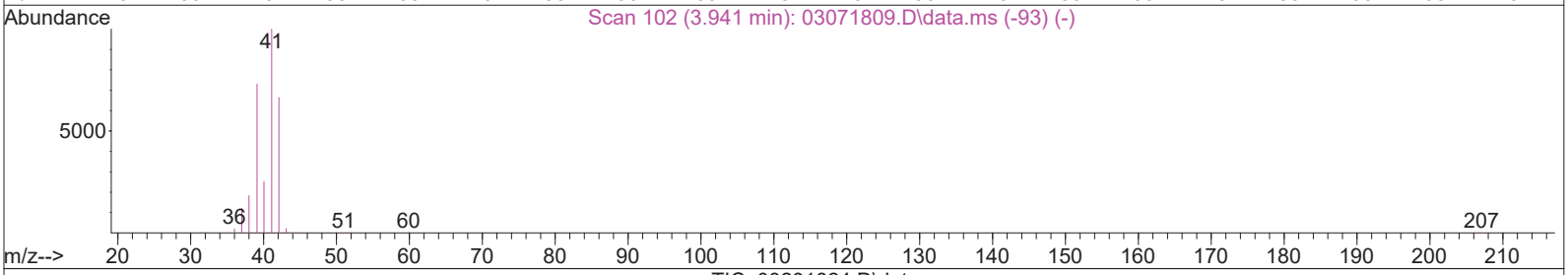

TIC: 03201824.D\data.ms

(2) Propene (T)

3.958min (+0.022) 0.46ng m

response 9138

Ion	Exp%	Act%
42.10	100	100
39.10	104.20	411.58#
41.10	151.00	384.45#
0.00	0.00	0.00

IPC

LH 3/21/18

3/21/18

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 20 17:39:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
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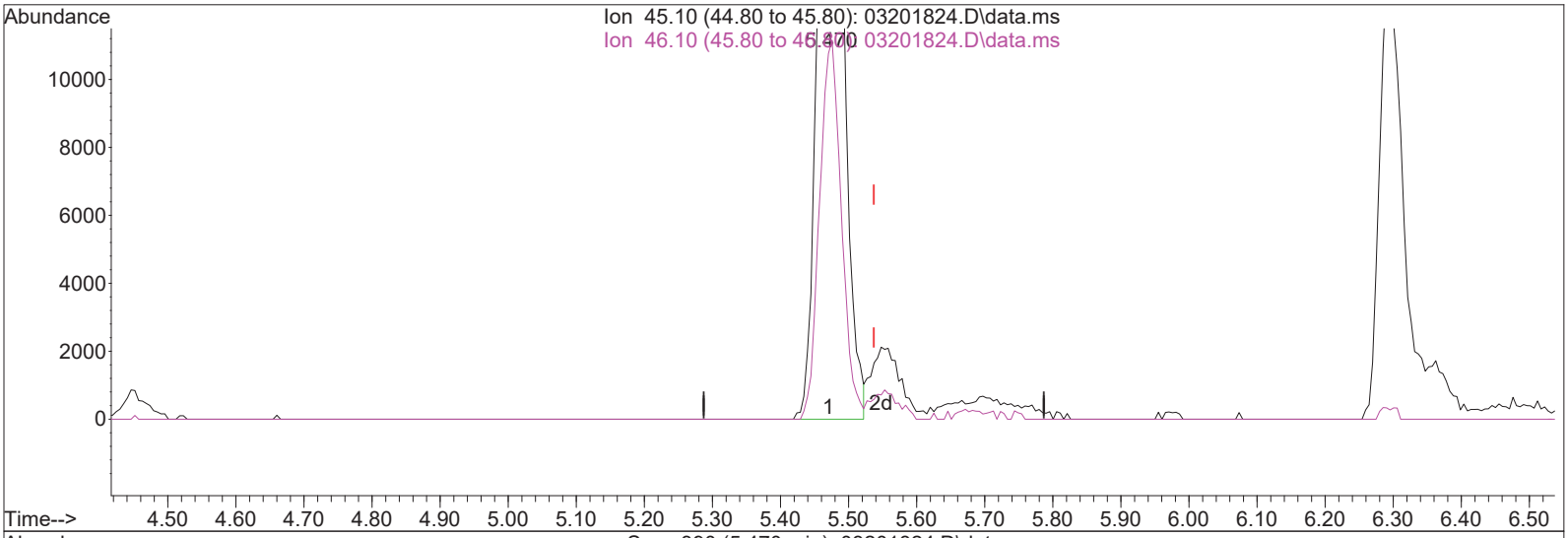
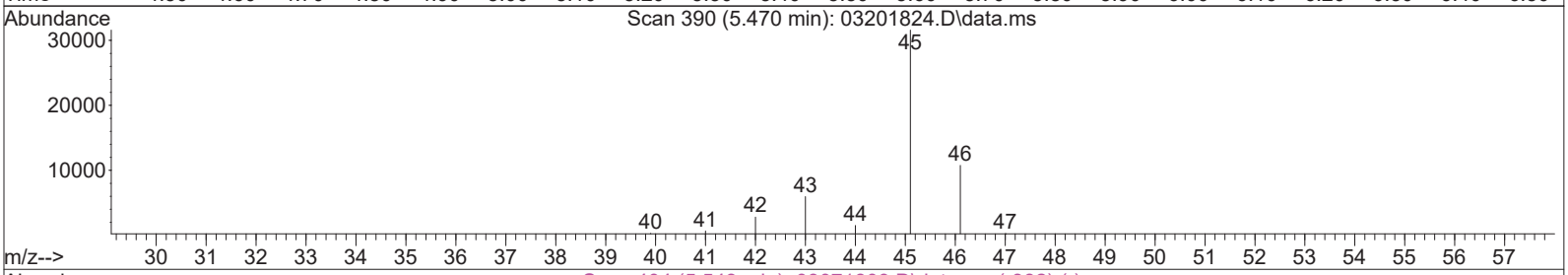
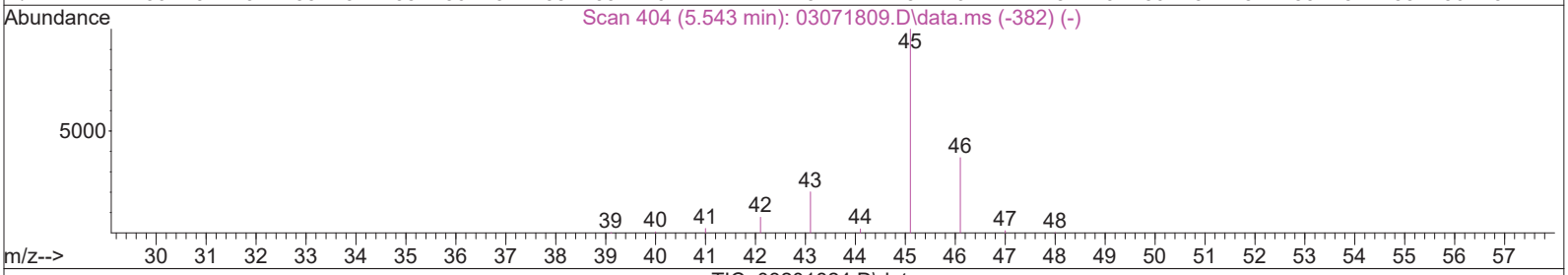
DataAcq Meth:TO15.M







TIC: 03201824.D\data.ms

(10) Ethanol (T)

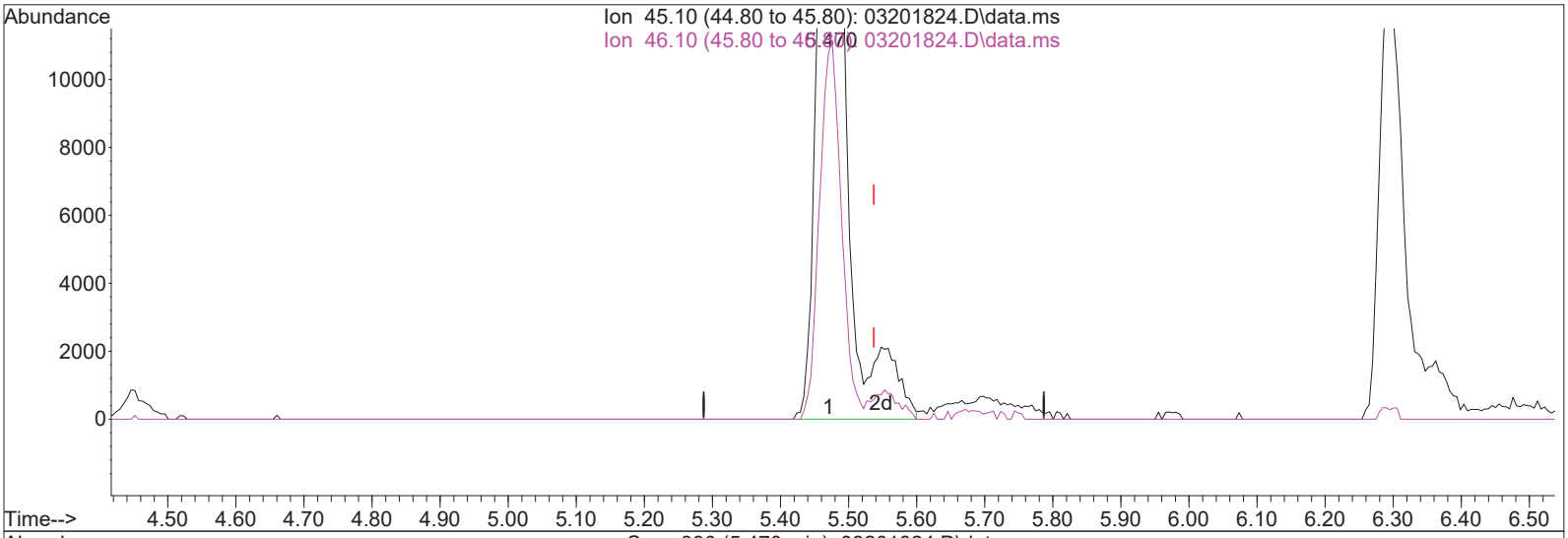
5.470min (-0.067) 5.28ng

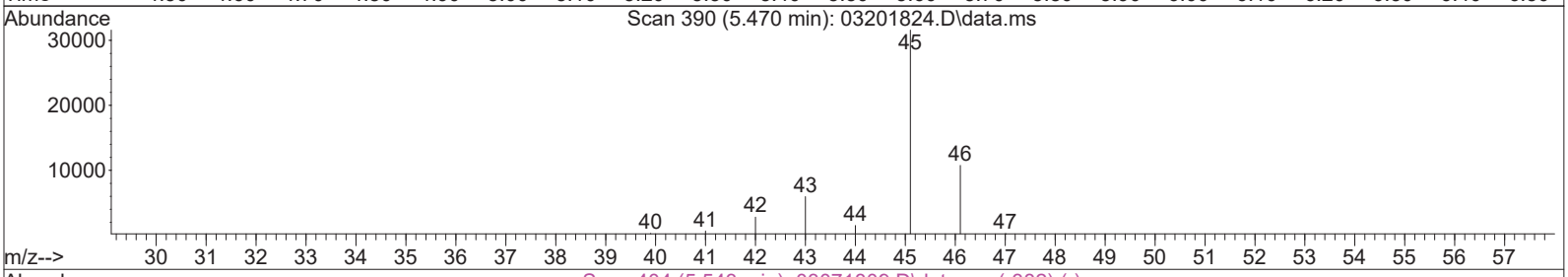
response 68199

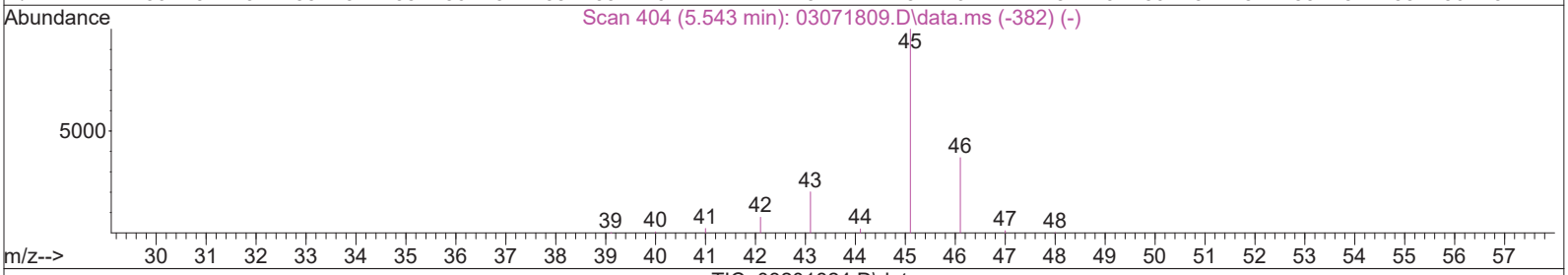
Ion	Exp%	Act%
45.10	100	100
46.10	37.50	36.59
0.00	0.00	0.00
0.00	0.00	0.00

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 20 17:39:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201824.D\data.ms

(10) Ethanol (T)

5.470min (-0.067) 5.75ng m

response 74343

Ion	Exp%	Act%
45.10	100	100
46.10	37.50	33.57
0.00	0.00	0.00
0.00	0.00	0.00

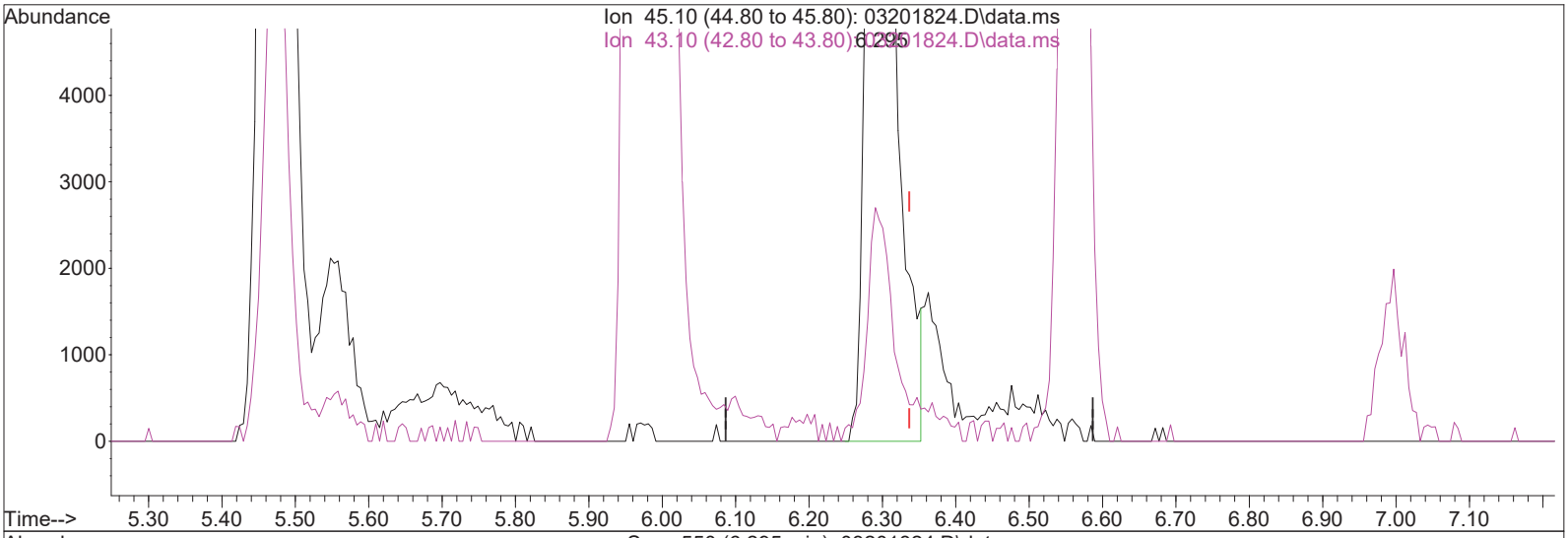
SP

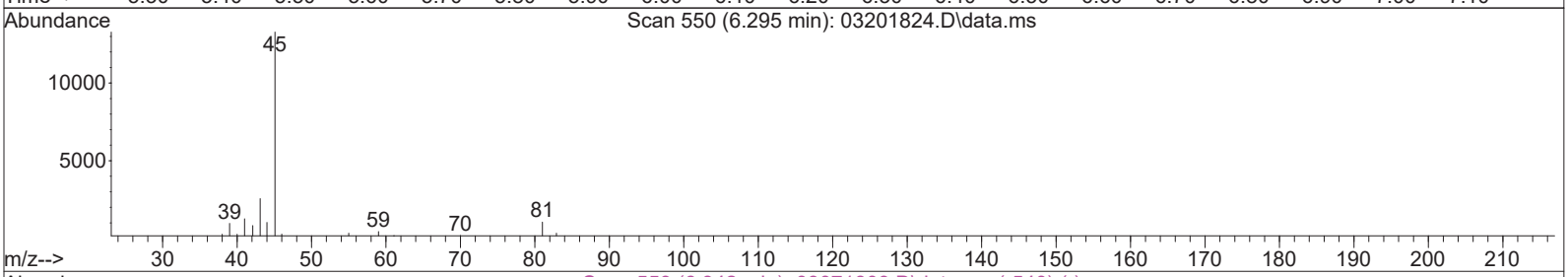
LH 3/21/18

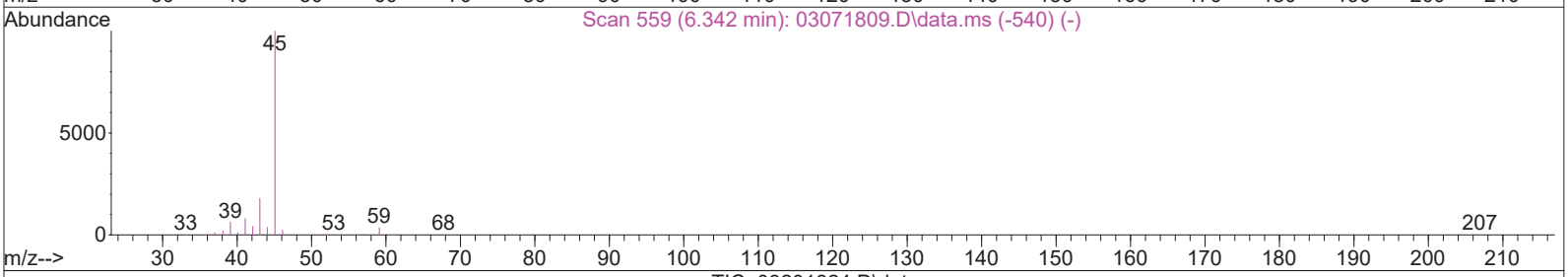
3/21/18

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 20 17:39:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201824.D\data.ms

(15) 2-Propanol (Isopropanol) (T)

6.295min (-0.041) 0.70ng

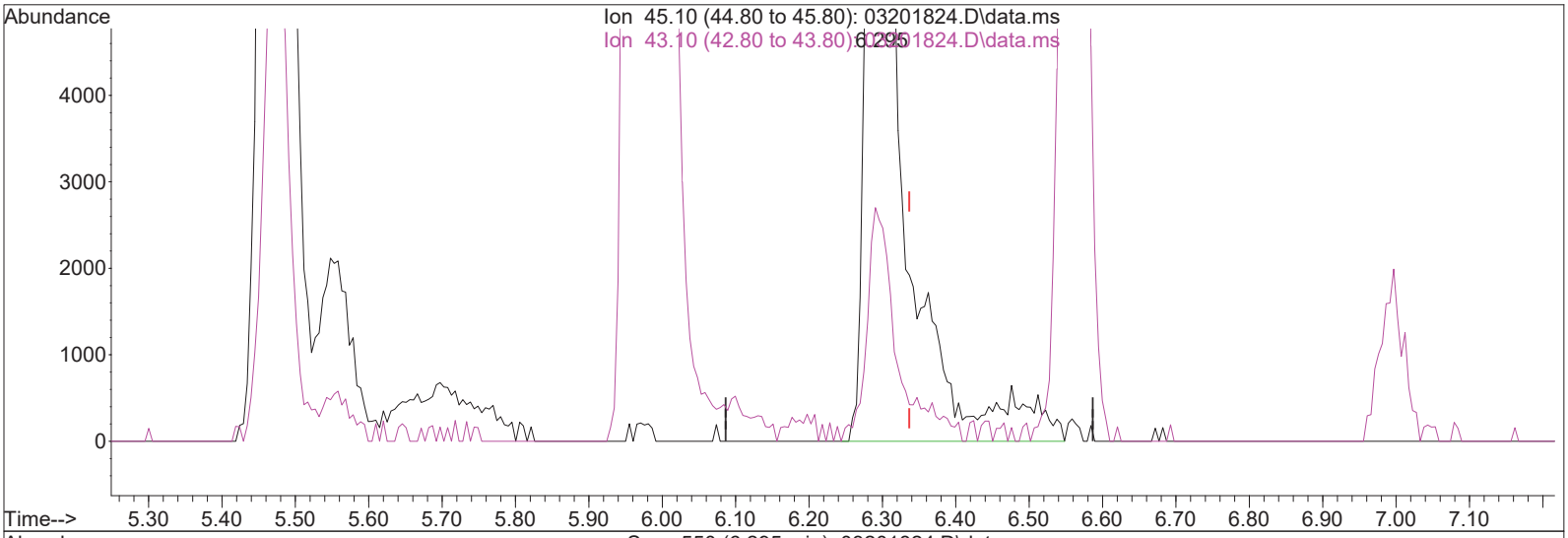
response 31870

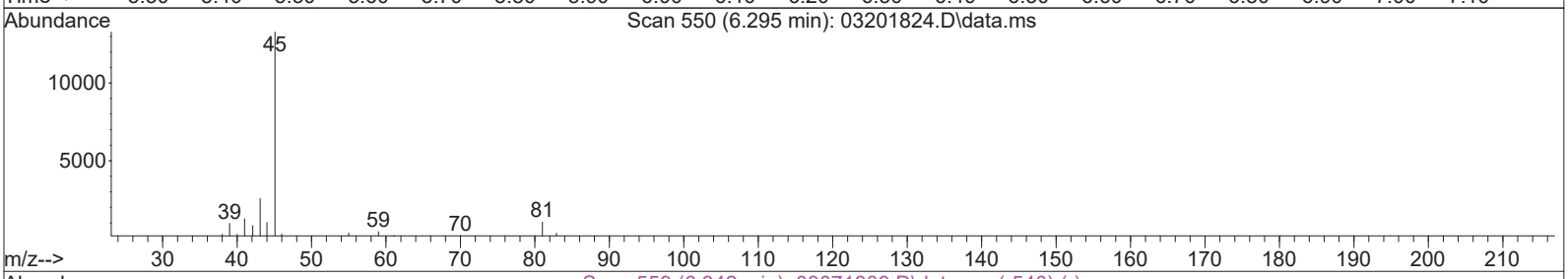
Ion	Exp%	Act%
45.10	100	100
43.10	17.20	24.35
0.00	0.00	0.00
0.00	0.00	0.00

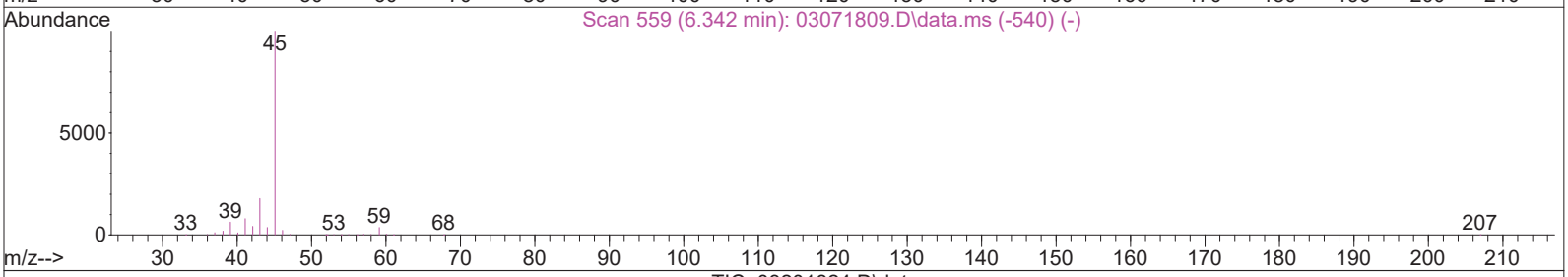
00884313

Data File: I:\MS09\Data\2018_03\20\03201824.D
Acq On : 20 Mar 2018 16:51 Operator: LH
Sample : P1801150-004 (1000mL)
Misc : S31-03061806
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 20 17:39:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 03201824.D\data.ms

(15) 2-Propanol (Isopropanol) (T)

6.295min (-0.041) 0.83ng m

response 37827

Ion	Exp%	Act%
45.10	100	100
43.10	17.20	20.52
0.00	0.00	0.00
0.00	0.00	0.00

SP

LH 3/21/18

3/21/18

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201803.D
Acq On : 20 Mar 2018 2:48 Operator: LH
Sample : MB R032018_1000mL
Misc : S31-03061806/AC00463
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Mar 20 08:59:57 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018 LH 3/20/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	141667	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	766244	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.58	82	368517	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	334637	12.947	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.60%				
57) Toluene-d8 (SS2)	13.67	98	872123	12.590	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.72%				
73) Bromofluorobenzene (SS3)	17.17	174	190564	11.571	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 92.56%				
Target Compounds							Qvalue
2) Propene	3.97	42	1215	N.D.			
3) Dichlorodifluoromethan...	4.00	85	150	N.D.			
4) Chloromethane	0.00	50	0	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.			
6) Vinyl Chloride	0.00	62	0	N.D.			
7) 1,3-Butadiene	0.00	54	0	N.D.			
8) Bromomethane	0.00	94	0	N.D.			
9) Chloroethane	0.00	64	0	N.D.			
10) Ethanol	5.46	45	11625	0.703	ng		94
11) Acetonitrile	5.68	41	2673	N.D.			
12) Acrolein	5.83	56	1100	N.D.			
13) Acetone	5.99	58	9411	0.643	ng		98
14) Trichlorofluoromethane	0.00	101	0	N.D.			
15) 2-Propanol (Isopropanol)	6.36	45	2023	N.D.			
16) Acrylonitrile	6.50	53	490	N.D.			
17) 1,1-Dichloroethene	0.00	96	0	N.D.			
18) 2-Methyl-2-Propanol (t...	7.01	59	108	N.D.			
19) Methylene Chloride	6.98	84	2228	0.125	ng	#	71
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.			
21) Trichlorotrifluoroethane	0.00	151	0	N.D.			
22) Carbon Disulfide	7.29	76	3343	N.D.			
23) trans-1,2-Dichloroethene	0.00	61	0	N.D.			
24) 1,1-Dichloroethane	0.00	63	0	N.D.			
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.			
26) Vinyl Acetate	8.39	86	999	0.316	ng		98
27) 2-Butanone (MEK)	8.68	72	828	N.D.			
28) cis-1,2-Dichloroethene	0.00	61	0	N.D.			
29) Diisopropyl Ether	0.00	87	0	N.D.			
30) Ethyl Acetate	0.00	61	0	N.D.			
31) n-Hexane	9.36	57	101	N.D.			
32) Chloroform	0.00	83	0	N.D.			
34) Tetrahydrofuran (THF)	0.00	72	0	N.D.			
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.			
36) 1,2-Dichloroethane	0.00	62	0	N.D.			
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.			
39) Isopropyl Acetate	0.00	61	0	N.D.			
40) 1-Butanol	10.82	56	8521	0.375	ng	#	79
41) Benzene	10.89	78	1682	N.D.			
42) Carbon Tetrachloride	0.00	117	0	N.D.			
43) Cyclohexane	11.22	84	828	N.D.			
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.			
45) 1,2-Dichloropropane	0.00	63	0	N.D.			
46) Bromodichloromethane	0.00	83	0	N.D.			
47) Trichloroethene	0.00	130	0	N.D.			
48) 1,4-Dioxane	11.95	88	132	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.			

Data File: I:\MS09\Data\2018_03\20\03201803.D
Acq On : 20 Mar 2018 2:48 Operator: LH
Sample : MB R032018_1000mL
Misc : S31-03061806/AC00463
ALS Vial : 2 Sample Multiplier: 1

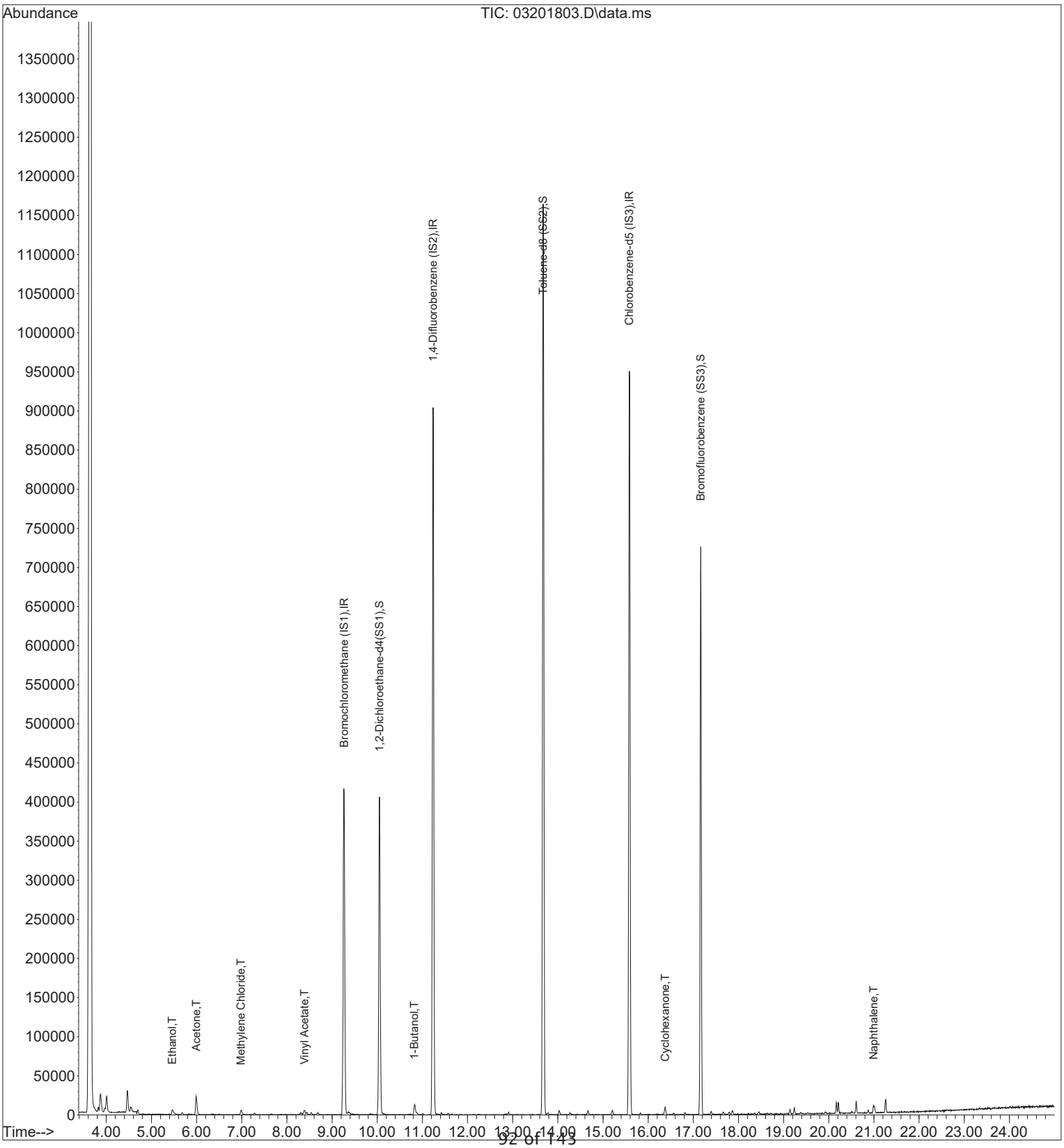
Quant Time: Mar 20 08:59:57 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D.		
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	12.84	58	201	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	13.78	91	984	N.D.		
59) 2-Hexanone	14.04	43	4584	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	14.66	43	4546	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	0.00	166	0	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	16.02	91	448	N.D.		
67) m- & p-Xylenes	16.21	91	1253	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	16.59	104	422	N.D.		
70) o-Xylene	16.72	91	444	N.D.		
71) n-Nonane	0.00	43	0	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	0.00	105	0	N.D.		
75) alpha-Pinene	0.00	93	0	N.D.		
76) n-Propylbenzene	17.79	91	2747	N.D.		
77) 3-Ethyltoluene	17.94	105	183	N.D.		
78) 4-Ethyltoluene	17.98	105	301	N.D.		
79) 1,3,5-Trimethylbenzene	0.00	105	0	N.D.		
80) alpha-Methylstyrene	18.22	118	270	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D.		
82) 1,2,4-Trimethylbenzene	18.48	105	322	N.D.		
83) n-Decane	0.00	57	0	N.D.		
84) Benzyl Chloride	18.63	91	707	N.D.		
85) 1,3-Dichlorobenzene	18.65	146	406	N.D.		
86) 1,4-Dichlorobenzene	18.72	146	538	N.D.		
87) sec-Butylbenzene	18.77	105	119	N.D.		
88) 4-Isopropyltoluene (p-...	18.93	119	481	N.D.		
89) 1,2,3-Trimethylbenzene	18.93	105	131	N.D.		
90) 1,2-Dichlorobenzene	19.07	146	273	N.D.		
91) d-Limonene	0.00	68	0	N.D.		
92) 1,2-Dibromo-3-Chloropr...	19.53	157	209	N.D.		
93) n-Undecane	19.93	57	763	N.D.		
94) 1,2,4-Trichlorobenzene	20.87	180	1402	N.D.		
95) Naphthalene	20.99	128	7430	0.090	ng	96
96) n-Dodecane	21.01	57	2347	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	16.38	55	4953	0.168	ng	90
99) tert-Butylbenzene	0.00	119	0	N.D.		
100) n-Butylbenzene	19.38	91	1111	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201803.D
Acq On : 20 Mar 2018 2:48 Operator: LH
Sample : MB R032018_1000mL
Misc : S31-03061806/AC00463
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Mar 20 08:59:57 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201804.D
Acq On : 20 Mar 2018 3:21 Operator: LH
Sample : LCS R9032018_25ng
Misc : S31-03061806/S31-03021804 (3/31)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Mar 20 09:00:00 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018 LH 3/20/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.30	130	143140	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	11.26	114	750432	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	15.59	82	376287	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.08	65	338488	12.961	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.68%				
57) Toluene-d8 (SS2)	13.68	98	875747	12.382	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.04%				
73) Bromofluorobenzene (SS3)	17.17	174	202533	12.043	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.32%				
Target Compounds							Qvalue
2) Propene	3.94	42	737454	28.830	ng		98
3) Dichlorodifluoromethan...	4.05	85	966177	25.895	ng		99
4) Chloromethane	4.26	50	991179	27.380	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.43	135	370918	25.152	ng		100
6) Vinyl Chloride	4.55	62	822678	27.851	ng		99
7) 1,3-Butadiene	4.73	54	680232	30.167	ng		92
8) Bromomethane	5.04	94	369030	24.703	ng		99
9) Chloroethane	5.26	64	381540	27.490	ng		100
10) Ethanol	5.54	45	2369876	141.901	ng		100
11) Acetonitrile	5.72	41	1223513	27.953	ng		99
12) Acrolein	5.84	56	342405	26.790	ng		100
13) Acetone	6.00	58	2079400	140.627	ng	#	77
14) Trichlorofluoromethane	6.15	101	768952	25.955	ng		100
15) 2-Propanol (Isopropanol)	6.34	45	3335023	56.686	ng		99
16) Acrylonitrile	6.53	53	771405	28.796	ng		99
17) 1,1-Dichloroethene	6.86	96	405559	26.501	ng	#	77
18) 2-Methyl-2-Propanol (t...	6.99	59	2904218	54.965	ng		97
19) Methylene Chloride	7.03	84	455281	25.333	ng		82
20) 3-Chloro-1-propene (Al...	7.15	41	1031507	28.994	ng		93
21) Trichlorotrifluoroethane	7.32	151	295450	25.499	ng		91
22) Carbon Disulfide	7.29	76	1782534	27.843	ng		100
23) trans-1,2-Dichloroethene	8.04	61	785340	28.675	ng		90
24) 1,1-Dichloroethane	8.27	63	958367	26.466	ng		100
25) Methyl tert-Butyl Ether	8.32	73	1498911	27.320	ng		99
26) Vinyl Acetate	8.44	86	526604	165.117	ng	#	47
27) 2-Butanone (MEK)	8.68	72	348120	27.646	ng	#	75
28) cis-1,2-Dichloroethene	9.13	61	757964	27.940	ng		90
29) Diisopropyl Ether	9.36	87	383924	25.612	ng	#	54
30) Ethyl Acetate	9.37	61	419756	58.800	ng		93
31) n-Hexane	9.36	57	994267	27.976	ng		99
32) Chloroform	9.44	83	822117	25.986	ng		100
34) Tetrahydrofuran (THF)	9.82	72	342031	27.376	ng	#	84
35) Ethyl tert-Butyl Ether	9.91	87	568301	28.858	ng	#	88
36) 1,2-Dichloroethane	10.18	62	746203	26.416	ng		100
38) 1,1,1-Trichloroethane	10.45	97	731506	26.659	ng		97
39) Isopropyl Acetate	10.81	61	694468	57.598	ng	#	71
40) 1-Butanol	10.82	56	1257733	56.475	ng		88
41) Benzene	10.90	78	1904493	25.024	ng		99
42) Carbon Tetrachloride	11.05	117	618897	26.807	ng		100
43) Cyclohexane	11.18	84	1453848	54.596	ng		92
44) tert-Amyl Methyl Ether	11.49	73	1498576	27.872	ng		95
45) 1,2-Dichloropropane	11.72	63	543295	27.426	ng		100
46) Bromodichloromethane	11.90	83	683233	28.553	ng		100
47) Trichloroethene	11.95	130	408296	24.802	ng		100
48) 1,4-Dioxane	11.92	88	384350	27.644	ng		91
49) 2,2,4-Trimethylpentane...	12.01	57	2428394	27.928	ng		93

Data File: I:\MS09\Data\2018_03\20\03201804.D
Acq On : 20 Mar 2018 3:21 Operator: LH
Sample : LCS R9032018_25ng
Misc : S31-03061806/S31-03021804 (3/31)
ALS Vial : 2 Sample Multiplier: 1

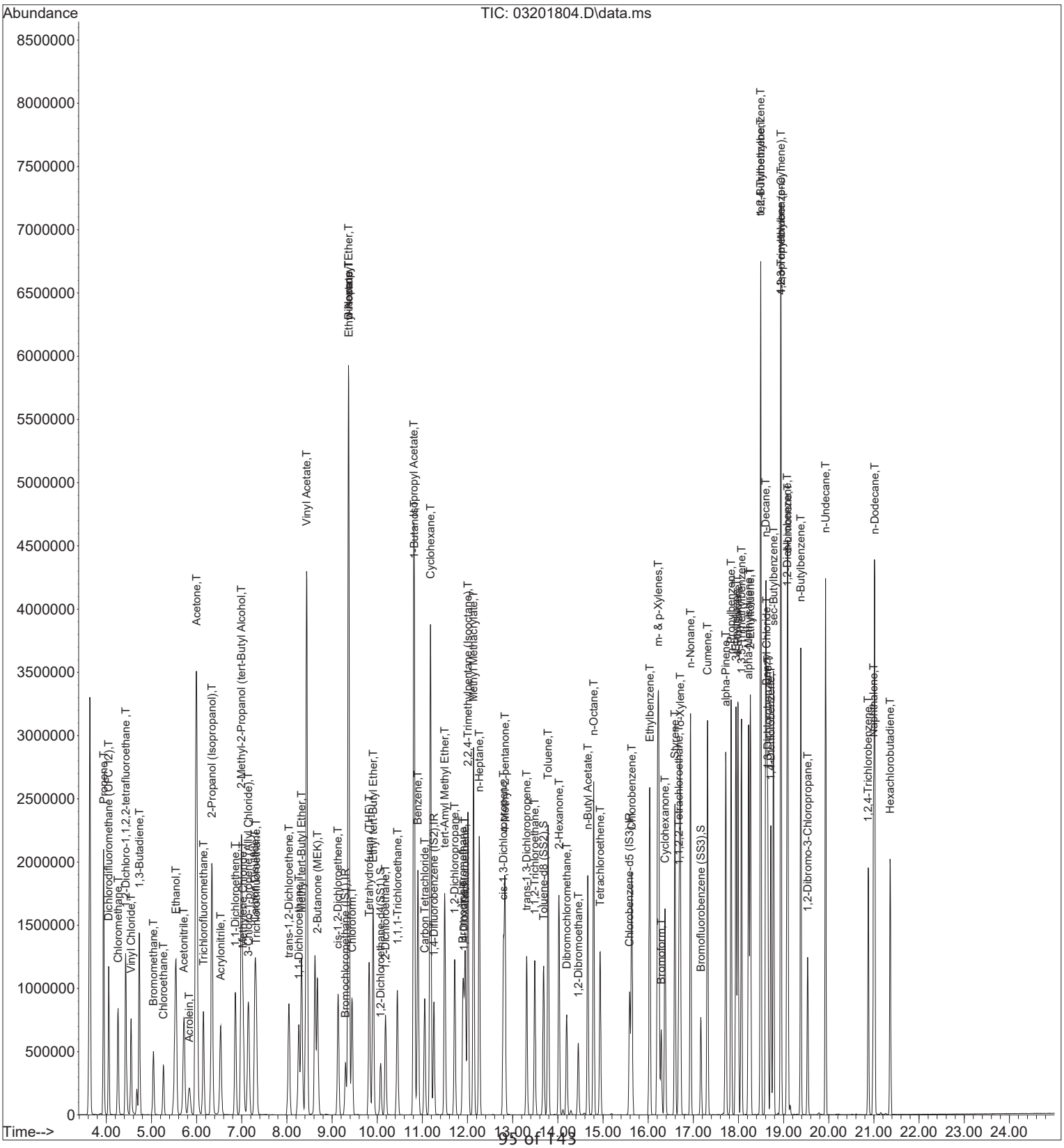
Quant Time: Mar 20 09:00:00 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.13	100	355332	58.089	ng	#	82
51) n-Heptane	12.26	71	524076	28.421	ng		95
52) cis-1,3-Dichloropropene	12.79	75	849009	28.492	ng		99
53) 4-Methyl-2-pentanone	12.83	58	557392	30.374	ng		88
54) trans-1,3-Dichloropropene	13.31	75	797725	28.699	ng		100
55) 1,1,2-Trichloroethane	13.49	97	430821	27.238	ng		98
58) Toluene	13.78	91	1870732	25.456	ng		99
59) 2-Hexanone	14.03	43	1482760	28.166	ng		93
60) Dibromochloromethane	14.20	129	476810	27.714	ng		99
61) 1,2-Dibromoethane	14.45	107	463785	26.114	ng		100
62) n-Butyl Acetate	14.66	43	1711842	29.390	ng		95
63) n-Octane	14.79	57	513824	27.774	ng		93
64) Tetrachloroethene	14.94	166	396066	26.123	ng		100
65) Chlorobenzene	15.64	112	1131585	25.161	ng		100
66) Ethylbenzene	16.04	91	2190499	26.645	ng		97
67) m- & p-Xylenes	16.22	91	3439711	54.353	ng		97
68) Bromoform	16.29	173	349997	27.127	ng		100
69) Styrene	16.59	104	1267084	27.208	ng		97
70) o-Xylene	16.71	91	1762922	27.448	ng		96
71) n-Nonane	16.94	43	1414036	28.696	ng		92
72) 1,1,2,2-Tetrachloroethane	16.68	83	854667	29.245	ng		99
74) Cumene	17.32	105	2141597	27.139	ng		98
75) alpha-Pinene	17.72	93	1175831	28.959	ng		95
76) n-Propylbenzene	17.84	91	2762093	27.909	ng		97
77) 3-Ethyltoluene	17.94	105	2077611	26.625	ng		99
78) 4-Ethyltoluene	17.99	105	2135025	28.762	ng		98
79) 1,3,5-Trimethylbenzene	18.07	105	1771280	27.561	ng		97
80) alpha-Methylstyrene	18.22	118	916233	28.510	ng		99
81) 2-Ethyltoluene	18.26	105	2121780	27.650	ng		98
82) 1,2,4-Trimethylbenzene	18.49	105	1907375	28.082	ng		98
83) n-Decane	18.60	57	1342401	28.885	ng		97
84) Benzyl Chloride	18.62	91	1724057	29.133	ng		96
85) 1,3-Dichlorobenzene	18.65	146	874883	25.568	ng		100
86) 1,4-Dichlorobenzene	18.72	146	864393	25.121	ng		99
87) sec-Butylbenzene	18.77	105	2434797	27.471	ng		98
88) 4-Isopropyltoluene (p-...	18.94	119	2286191	27.648	ng		96
89) 1,2,3-Trimethylbenzene	18.94	105	1985139	28.779	ng		97
90) 1,2-Dichlorobenzene	19.08	146	862170	26.618	ng		99
91) d-Limonene	19.09	68	948820	30.562	ng		96
92) 1,2-Dibromo-3-Chloropr...	19.53	157	291487	27.574	ng	#	75
93) n-Undecane	19.93	57	1413372	29.353	ng		97
94) 1,2,4-Trichlorobenzene	20.87	180	526517	24.454	ng		99
95) Naphthalene	20.99	128	1756788	20.935	ng		100
96) n-Dodecane	21.02	57	1359714	28.625	ng		96
97) Hexachlorobutadiene	21.36	225	347193	26.156	ng		99
98) Cyclohexanone	16.37	55	819529	27.166	ng		92
99) tert-Butylbenzene	18.49	119	1764711	28.134	ng		99
100) n-Butylbenzene	19.38	91	2131664	27.863	ng		98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\20\03201804.D
Acq On : 20 Mar 2018 3:21 Operator: LH
Sample : LCS R9032018_25ng
Misc : S31-03061806/S31-03021804 (3/31)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Mar 20 09:00:00 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Response Factor Report MS09

Method Path : I:\MS09\Methods\
Method File : R9030718.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Thu Mar 08 08:49:25 2018
Response Via : Initial Calibration

3/8/18

Calibration Files
0.08=03071803.D 0.10=03071804.D 0.20=03071805.D 0.40=03071806.D 1.0 =03071807.D 5.0 =03071808.D 25 =03071809.D
50 =03071810.D 100 =03071811.D

		Compound	0.08	0.10	0.20	0.40	1.0	5.0	25	50	100	Avg	%RSD
1)	IR	Bromochloromethane...	----------	ISTD	----------								
2)	T	Propene				2.248	2.334	2.045	2.338	2.100	2.338	2.234	5.86
3)	T	Dichlorodifluo...	3.799	3.549	3.390	3.247	3.331	3.100	3.285	2.889	2.735	3.258	9.92
4)	T	Chloromethane	3.843	3.567	3.209	3.120	3.231	2.891	3.248	2.858	2.486	3.161	12.59
5)	T	1,2-Dichloro-1...	1.362	1.439	1.181	1.224	1.314	1.218	1.358	1.260	1.235	1.288	6.60
6)	T	Vinyl Chloride	2.902	2.808	2.449	2.490	2.591	2.407	2.661	2.477	2.430	2.580	6.87
7)	T	1,3-Butadiene	2.213	2.003	1.882	1.862	1.850	1.770	2.167	2.013	1.962	1.969	7.50
8)	T	Bromomethane	1.473	1.684	1.201	1.292	1.263	1.120	1.283	1.229	1.197	1.305	13.18
9)	T	Chloroethane	1.338	1.289	1.221	1.263	1.209	1.080	1.242	1.176	1.092	1.212	7.07
10)	T	Ethanol	1.863	1.688	1.461	1.406	1.470	1.296	1.402	1.290	1.250	1.458	13.73
11)	T	Acetonitrile	4.564	4.547	3.871	3.751	3.611	3.489	3.681	3.482	3.405	3.822	11.51
12)	T	Acrolein	1.352	1.261	1.141	1.041	1.082	1.028	1.095	1.031	1.014	1.116	10.51
13)	T	Acetone				1.444	1.358	1.251	1.307	1.214	1.174	1.291	7.70
14)	T	Trichlorofluor...	3.017	2.892	2.627	2.514	2.669	2.480	2.569	2.317	2.199	2.587	9.92
15)	T	2-Propanol (Is...	6.376	5.612	5.234	5.046	5.240	4.903	5.194	4.739	3.896	5.138	12.96
16)	T	Acrylonitrile	2.551	2.495	2.253	2.215	2.330	2.198	2.425	2.312	2.276	2.339	5.34
17)	T	1,1-Dichloroet...	1.415	1.484	1.294	1.351	1.322	1.219	1.347	1.305	1.291	1.336	5.76
18)	T	2-Methyl-2-Pro...	5.265	5.212	4.677	4.546	4.513	4.276	4.615	4.287	4.136	4.614	8.57
19)	T	Methylene Chlo...				1.962	1.656	1.413	1.499	1.446	1.441	1.569	13.45
20)	T	3-Chloro-1-pro...	3.563	3.315	3.066	3.118	3.044	2.962	3.150	2.918	2.825	3.107	7.15
21)	T	Trichlorotrifl...	1.052	1.028	0.984	1.010	1.039	0.942	1.037	1.003	1.011	1.012	3.31
22)	T	Carbon Disulfide				5.990	5.685	5.111	5.755	5.502	5.502	5.591	5.31
23)	T	trans-1,2-Dich...	2.440	2.567	2.382	2.361	2.348	2.300	2.489	2.346	2.292	2.392	3.79
24)	T	1,1-Dichloroet...	3.880	3.481	3.177	3.119	3.174	2.857	3.088	2.884	2.800	3.162	10.77
25)	T	Methyl tert-Bu...	5.614	5.090	4.938	4.642	4.524	4.431	4.879	4.552	4.450	4.791	8.06
26)	T	Vinyl Acetate				0.215	0.228	0.243	0.329	0.325	0.332	0.279	19.91
27)	T	2-Butanone (MEK)	1.272	1.064	1.074	1.055	1.103	1.041	1.144	1.080	1.064	1.100	6.48
28)	T	cis-1,2-Dichlo...	2.713	2.447	2.304	2.321	2.382	2.230	2.448	2.268	2.209	2.369	6.55
29)	T	Diisopropyl Ether	1.435	1.513	1.370	1.346	1.256	1.128	1.269	1.226	1.239	1.309	9.03
30)	T	Ethyl Acetate	0.663	0.572	0.595	0.634	0.630	0.589	0.665	0.635	0.627	0.623	5.14
31)	T	n-Hexane	3.362	3.380	3.045	3.150	3.156	2.867	3.138	2.967	2.868	3.104	6.06
32)	T	Chloroform	3.413	3.024	2.741	2.644	2.769	2.515	2.759	2.538	2.462	2.763	10.77
33)	S	1,2-Dichloroet...	2.360	2.376	2.369	2.371	2.383	2.362	2.215	2.090	2.000	2.281	6.35
34)	T	Tetrahydrofura...	1.173	1.123	1.106	1.155	1.062	0.992	1.119	1.050	1.040	1.091	5.40
35)	T	Ethyl tert-But...	1.723	1.859	1.612	1.744	1.546	1.598	1.900	1.765	1.731	1.720	6.87
36)	T	1,2-Dichloroet...	2.894	2.767	2.524	2.584	2.445	2.291	2.458	2.178	2.059	2.467	10.83
37)	IR	1,4-Difluorobenzen...	----------	ISTD	----------								
38)	T	1,1,1-Trichlor...	0.509	0.509	0.438	0.457	0.454	0.427	0.471	0.432	0.415	0.457	7.44
39)	T	Isopropyl Acetate	0.214	0.204	0.183	0.192	0.204	0.189	0.216	0.205	0.201	0.201	5.58
40)	T	1-Butanol	0.441	0.420	0.356	0.344	0.346	0.343	0.377	0.360	0.351	0.371	9.65
41)	T	Benzene	1.649	1.459	1.336	1.214	1.182	1.089	1.210	1.144	1.125	1.268	14.44
42)	T	Carbon Tetrach...	0.437	0.396	0.368	0.374	0.385	0.364	0.408	0.373	0.356	0.385	6.59

00884320

Method Path : I:\MS09\Methods\
Method File : R9030718.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)

43)	T	Cyclohexane	0.448	0.475	0.444	0.424	0.427	0.414	0.467	0.448	0.446	0.444	4.47
44)	T	tert-Amyl Meth...	1.150	1.001	0.841	0.839	0.746	0.783	0.952	0.886	0.863	0.896	13.77
45)	T	1,2-Dichloropr...	0.370	0.359	0.329	0.311	0.331	0.301	0.339	0.317	0.311	0.330	7.01
46)	T	Bromodichlorom...	0.416	0.378	0.395	0.386	0.407	0.380	0.435	0.399	0.391	0.399	4.62
47)	T	Trichloroethene	0.281	0.302	0.285	0.270	0.268	0.246	0.279	0.267	0.269	0.274	5.60
48)	T	1,4-Dioxane	0.242	0.230	0.236	0.210	0.224	0.214	0.248	0.238	0.242	0.232	5.64
49)	T	2,2,4-Trimethy...	1.652	1.561	1.382	1.375	1.439	1.347	1.513	1.407	1.359	1.448	7.26
50)	T	Methyl Methacr...	0.089	0.100	0.088	0.097	0.099	0.099	0.118	0.113	0.114	0.102	10.59
51)	T	n-Heptane	0.338	0.305	0.269	0.306	0.306	0.292	0.330	0.311	0.306	0.307	6.51
52)	T	cis-1,3-Dichlo...	0.504	0.487	0.480	0.461	0.495	0.475	0.550	0.513	0.502	0.496	5.20
53)	T	4-Methyl-2-pen...	0.294	0.300	0.286	0.285	0.308	0.297	0.345	0.321	0.314	0.306	6.28
54)	T	trans-1,3-Dich...	0.511	0.443	0.433	0.429	0.443	0.448	0.520	0.477	0.464	0.463	7.17
55)	T	1,1,2-Trichlor...	0.301	0.270	0.253	0.239	0.262	0.240	0.280	0.264	0.263	0.263	7.32
56)	IR	Chlorobenzene-d5 (...	----------	ISTD	----------								
57)	S	Toluene-d8 (SS2)	2.387	2.360	2.360	2.354	2.344	2.323	2.311	2.345	2.362	2.350	0.96
58)	T	Toluene	2.903	2.683	2.397	2.285	2.302	2.167	2.483	2.376	2.375	2.441	9.19
59)	T	2-Hexanone	2.005	1.818	1.697	1.648	1.701	1.668	1.839	1.707	1.656	1.749	6.73
60)	T	Dibromochlorom...	0.550	0.529	0.556	0.526	0.570	0.545	0.640	0.613	0.615	0.572	7.22
61)	T	1,2-Dibromoethane	0.612	0.661	0.535	0.575	0.582	0.534	0.619	0.593	0.599	0.590	6.81
62)	T	n-Butyl Acetate	2.105	1.984	1.801	1.868	1.921	1.861	2.076	1.931	1.866	1.935	5.29
63)	T	n-Octane	0.656	0.629	0.643	0.579	0.609	0.554	0.645	0.609	0.608	0.615	5.38
64)	T	Tetrachloroethene	0.492	0.509	0.477	0.480	0.482	0.460	0.548	0.533	0.551	0.504	6.63
65)	T	Chlorobenzene	1.828	1.624	1.432	1.409	1.379	1.312	1.528	1.458	1.475	1.494	10.28
66)	T	Ethylbenzene	3.034	2.778	2.647	2.530	2.667	2.519	2.890	2.765	2.749	2.731	6.04
67)	T	m- & p-Xylenes	2.399	2.107	1.923	1.916	2.021	1.942	2.267	2.163	2.183	2.102	7.97
68)	T	Bromoform	0.416	0.387	0.380	0.398	0.418	0.404	0.491	0.474	0.491	0.429	10.34
69)	T	Styrene	1.552	1.556	1.376	1.378	1.486	1.475	1.742	1.670	1.688	1.547	8.54
70)	T	o-Xylene	2.369	2.157	2.007	1.933	2.008	2.010	2.317	2.187	2.213	2.134	7.14
71)	T	n-Nonane	1.934	1.656	1.572	1.543	1.620	1.571	1.743	1.578	1.515	1.637	7.96
72)	T	1,1,2,2-Tetrac...	0.979	0.874	0.876	0.882	0.945	0.927	1.103	1.058	1.094	0.971	9.59
73)	S	Bromofluoroben...	0.538	0.538	0.538	0.545	0.558	0.582	0.584	0.569	0.576	0.559	3.54
74)	T	Cumene	2.777	2.748	2.454	2.403	2.538	2.483	2.855	2.676	2.660	2.621	6.04
75)	T	alpha-Pinene	1.484	1.402	1.278	1.261	1.044	1.206	1.550	1.449	1.465	1.349	12.05
76)	T	n-Propylbenzene	3.458	3.328	3.052	3.034	3.256	3.195	3.609	3.368	3.287	3.288	5.58
77)	T	3-Ethyltoluene	2.640	2.589	2.408	2.351	2.458	2.492	2.967	2.710	2.715	2.592	7.37
78)	T	4-Ethyltoluene	2.562	2.372	2.242	2.253	2.449	2.417	2.701	2.607	2.589	2.466	6.51
79)	T	1,3,5-Trimethy...	2.246	2.018	1.951	1.950	2.051	2.080	2.403	2.251	2.265	2.135	7.52
80)	T	alpha-Methylst...	0.977	1.013	0.892	0.880	1.009	1.087	1.290	1.219	1.243	1.068	14.21
81)	T	2-Ethyltoluene	2.616	2.558	2.347	2.302	2.506	2.463	2.840	2.658	2.651	2.549	6.54
82)	T	1,2,4-Trimethy...	2.392	2.210	1.923	1.961	2.120	2.175	2.577	2.474	2.473	2.256	10.40
83)	T	n-Decane	1.624	1.582	1.485	1.469	1.485	1.503	1.680	1.554	1.512	1.544	4.67
84)	T	Benzyl Chloride	1.723	1.676	1.664	1.719	1.756	2.017	2.451	2.332	2.355	1.966	16.70
85)	T	1,3-Dichlorobe...	1.165	1.203	1.001	1.008	1.061	1.080	1.257	1.206	1.248	1.137	8.84
86)	T	1,4-Dichlorobe...	1.197	1.140	1.011	1.029	1.091	1.106	1.267	1.211	1.235	1.143	7.94
87)	T	sec-Butylbenzene	3.096	2.971	2.651	2.659	2.892	2.904	3.276	3.049	3.001	2.944	6.79
88)	T	4-Isopropyltol...	2.941	2.638	2.401	2.403	2.651	2.679	3.144	2.986	2.880	2.747	9.41
89)	T	1,2,3-Trimethy...	2.247	2.237	2.056	2.048	2.164	2.211	2.623	2.522	2.514	2.291	9.18
90)	T	1,2-Dichlorobe...	1.141	0.980	0.974	0.981	1.033	1.040	1.199	1.151	1.185	1.076	8.62
91)	T	d-Limonene	0.874	0.894	0.860	0.923	0.979	1.070	1.268	1.207	1.207	1.031	15.59
92)	T	1,2-Dibromo-3-...				0.251	0.306	0.338	0.417	0.394	0.400	0.351	18.34
93)	T	n-Undecane	1.566	1.566	1.417	1.436	1.604	1.657	1.840	1.690	1.618	1.600	8.02
94)	T	1,2,4-Trichlor...	0.633	0.679	0.600	0.632	0.666	0.716	0.854	0.818	0.840	0.715	13.64

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00884321

Method Path : I:\MS09\Methods\
Method File : R9030718.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)

95)	T	Naphthalene	2.837	2.742	2.389	2.287	2.500	2.784	3.310	3.140	3.101	2.788	12.63
96)	T	n-Dodecane	1.599	1.439	1.403	1.315	1.526	1.626	1.875	1.740	1.679	1.578	11.17
97)	T	Hexachlorobuta...	0.405	0.411	0.385	0.363	0.429	0.438	0.522	0.497	0.520	0.441	13.30
98)	T	Cyclohexanone	1.079	1.088	0.907	0.939	0.958	0.948	1.080	1.015	1.006	1.002	6.82
99)	T	tert-Butylbenzene	2.111	2.062	1.829	1.855	1.984	2.025	2.376	2.272	2.239	2.084	8.93
100)	T	n-Butylbenzene	2.574	2.528	2.264	2.228	2.552	2.579	2.888	2.671	2.588	2.541	7.83

(#) = Out of Range

Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID:
4ng/L Std. ID: S31-03071803
20ng/L Std. ID: S31-03071802
200ng/L Std. ID: S31-03071801

3/8/18

Dilution Factors:		5	50	250	1000	Working STD Conc.(ng/L):	4	4	4	4	20	20	200	200	200
	Source Std.	Primary Working Standards				Injection (L):	0.020	0.025	0.050	0.100	0.050	0.25	0.125	0.25	0.50
Compounds	mg/m³	200ng/L	20ng/L	4ng/L	1ng/L	ICAL Points:	0.08ng	0.1ng	0.2ng	0.4ng	1ng	5ng	25ng	50ng	100ng
Propene	1.037	207.4	20.74	4.148	1.037		0.08296	0.1037	0.2074	0.4148	1.037	5.185	25.925	51.85	103.7
Dichlorodifluoromethane	1.048	209.6	20.96	4.192	1.048		0.08384	0.1048	0.2096	0.4192	1.048	5.240	26.200	52.40	104.8
Chloromethane	1.006	201.2	20.12	4.024	1.006		0.08048	0.1006	0.2012	0.4024	1.006	5.030	25.150	50.30	100.6
Freon-114	1.021	204.2	20.42	4.084	1.021		0.08168	0.1021	0.2042	0.4084	1.021	5.105	25.525	51.05	102.1
Vinyl Chloride	1.032	206.4	20.64	4.128	1.032		0.08256	0.1032	0.2064	0.4128	1.032	5.160	25.800	51.60	103.2
1,3-Butadiene	1.059	211.8	21.18	4.236	1.059		0.08472	0.1059	0.2118	0.4236	1.059	5.295	26.475	52.95	105.9
Bromomethane	0.993	198.6	19.86	3.972	0.993		0.07944	0.0993	0.1986	0.3972	0.993	4.965	24.825	49.65	99.3
Chloroethane	1.012	202.4	20.24	4.048	1.012		0.08096	0.1012	0.2024	0.4048	1.012	5.060	25.300	50.60	101.2
Ethanol	5.271	1054.2	105.42	21.084	5.271		0.42168	0.5271	1.0542	2.1084	5.271	26.355	131.775	263.55	527.1
Acetonitrile	1.059	211.8	21.18	4.236	1.059		0.08472	0.1059	0.2118	0.4236	1.059	5.295	26.475	52.95	105.9
Acrolein	1.054	210.8	21.08	4.216	1.054		0.08432	0.1054	0.2108	0.4216	1.054	5.270	26.350	52.70	105.4
Acetone	5.322	1064.4	106.44	21.288	5.322		0.42576	0.5322	1.0644	2.1288	5.322	26.610	133.050	266.10	532.2
Trichlorofluoromethane	1.051	210.2	21.02	4.204	1.051		0.08408	0.1051	0.2102	0.4204	1.051	5.255	26.275	52.55	105.1
Isopropanol	2.107	421.4	42.14	8.428	2.107		0.16856	0.2107	0.4214	0.8428	2.107	10.535	52.675	105.35	210.7
Acrylonitrile	1.056	211.2	21.12	4.224	1.056		0.08448	0.1056	0.2112	0.4224	1.056	5.280	26.400	52.80	105.6
1,1-Dichloroethene	1.061	212.2	21.22	4.244	1.061		0.08488	0.1061	0.2122	0.4244	1.061	5.305	26.525	53.05	106.1
tert-Butanol	2.120	424.0	42.40	8.480	2.120		0.16960	0.2120	0.4240	0.8480	2.120	10.600	53.000	106.00	212.0
Methylene Chloride	1.058	211.6	21.16	4.232	1.058		0.08464	0.1058	0.2116	0.4232	1.058	5.290	26.450	52.90	105.8
Allyl Chloride	1.054	210.8	21.08	4.216	1.054		0.08432	0.1054	0.2108	0.4216	1.054	5.270	26.350	52.70	105.4
Trichlorotrifluoroethane	1.053	210.6	21.06	4.212	1.053		0.08424	0.1053	0.2106	0.4212	1.053	5.265	26.325	52.65	105.3
Carbon Disulfide	1.063	212.6	21.26	4.252	1.063		0.08504	0.1063	0.2126	0.4252	1.063	5.315	26.575	53.15	106.3
trans-1,2-Dichloroethene	1.081	216.2	21.62	4.324	1.081		0.08648	0.1081	0.2162	0.4324	1.081	5.405	27.025	54.05	108.1
1,1-Dichloroethane	1.022	204.4	20.44	4.088	1.022		0.08176	0.1022	0.2044	0.4088	1.022	5.110	25.550	51.10	102.2
Methyl tert-Butyl Ether	1.070	214.0	21.40	4.280	1.070		0.08560	0.1070	0.2140	0.4280	1.070	5.350	26.750	53.50	107.0
Vinyl Acetate	5.281	1056.2	105.62	21.124	5.281		0.42248	0.5281	1.0562	2.1124	5.281	26.405	132.025	264.05	528.1
2-Butanone	1.052	210.4	21.04	4.208	1.052		0.08416	0.1052	0.2104	0.4208	1.052	5.260	26.300	52.60	105.2
cis-1,2-Dichloroethene	1.067	213.4	21.34	4.268	1.067		0.08536	0.1067	0.2134	0.4268	1.067	5.335	26.675	53.35	106.7
Diisopropyl Ether	1.065	213.0	21.30	4.260	1.065		0.08520	0.1065	0.2130	0.4260	1.065	5.325	26.625	53.25	106.5
Ethyl Acetate	2.136	427.2	42.72	8.544	2.136		0.17088	0.2136	0.4272	0.8544	2.136	10.680	53.400	106.80	213.6
n-Hexane	1.066	213.2	21.32	4.264	1.066		0.08528	0.1066	0.2132	0.4264	1.066	5.330	26.650	53.30	106.6
Chloroform	1.061	212.2	21.22	4.244	1.061		0.08488	0.1061	0.2122	0.4244	1.061	5.305	26.525	53.05	106.1
Tetrahydrofuran	1.064	212.8	21.28	4.256	1.064		0.08512	0.1064	0.2128	0.4256	1.064	5.320	26.600	53.20	106.4
Ethyl tert-Butyl Ether	1.059	211.8	21.18	4.236	1.059		0.08472	0.1059	0.2118	0.4236	1.059	5.295	26.475	52.95	105.9
1,2-Dichloroethane	1.055	211.0	21.10	4.220	1.055		0.08440	0.1055	0.2110	0.4220	1.055	5.275	26.375	52.75	105.5
1,1,1-Trichloroethane	1.077	215.4	21.54	4.308	1.077		0.08616	0.1077	0.2154	0.4308	1.077	5.385	26.925	53.85	107.7
Isopropyl Acetate	2.113	422.6	42.26	8.452	2.113		0.16904	0.2113	0.4226	0.8452	2.113	10.565	52.825	105.65	211.3
1-Butanol	2.114	422.8	42.28	8.456	2.114		0.16912	0.2114	0.4228	0.8456	2.114	10.570	52.850	105.70	211.4
Benzene	1.057	211.4	21.14	4.228	1.057		0.08456	0.1057	0.2114	0.4228	1.057	5.285	26.425	52.85	105.7
Carbon Tetrachloride	1.060	212.0	21.20	4.240	1.060		0.08480	0.1060	0.2120	0.4240	1.060	5.300	26.500	53.00	106.0
Cyclohexane	2.135	427.0	42.70	8.540	2.135		0.17080	0.2135	0.4270	0.8540	2.135	10.675	53.375	106.75	213.5
tert-Amyl Methyl Ether	1.057	211.4	21.14	4.228	1.057		0.08456	0.1057	0.2114	0.4228	1.057	5.285	26.425	52.85	105.7
1,2-Dichloropropane	1.066	213.2	21.32	4.264	1.066		0.08528	0.1066	0.2132	0.4264	1.066	5.330	26.650	53.30	106.6
Bromodichloromethane	1.067	213.4	21.34	4.268	1.067		0.08536	0.1067	0.2134	0.4268	1.067	5.335	26.675	53.35	106.7
Trichloroethene	1.061	212.2	21.22	4.244	1.061		0.08488	0.1061	0.2122	0.4244	1.061	5.305	26.525	53.05	106.1
1,4-Dioxane	1.063	212.6	21.26	4.252	1.063		0.08504	0.1063	0.2126	0.4252	1.063	5.315	26.575	53.15	106.3
Isooctane	1.060	212.0	21.20	4.240	1.060		0.08480	0.1060	0.2120	0.4240	1.060	5.300	26.500	53.00	106.0
Methyl Methacrylate	2.112	422.4	42.24	8.448	2.112		0.16896	0.2112	0.4224	0.8448	2.112	10.560	52.800	105.60	211.2

00884323

Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID:
4ng/L Std. ID: S31-03071803
20ng/L Std. ID: S31-03071802
200ng/L Std. ID: S31-03071801

Dilution Factors:		5	50	250	1000	Working STD Conc.(ng/L):	4	4	4	4	20	20	200	200	200
	Source Std.	Primary Working Standards				Injection (L):	0.020	0.025	0.050	0.100	0.050	0.25	0.125	0.25	0.50
Compounds	mg/m^3	200ng/L	20ng/L	4ng/L	1ng/L	ICAL Points:	0.08ng	0.1ng	0.2ng	0.4ng	1ng	5ng	25ng	50ng	100ng
n-Heptane	1.065	213.0	21.30	4.260	1.065		0.08520	0.1065	0.2130	0.4260	1.065	5.325	26.625	53.25	106.5
cis-1,3-Dichloropropene	1.120	224.0	22.40	4.480	1.120		0.08960	0.1120	0.2240	0.4480	1.120	5.600	28.000	56.00	112.0

Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID:
4ng/L Std. ID: S31-03071803
20ng/L Std. ID: S31-03071802
200ng/L Std. ID: S31-03071801

Dilution Factors:		5	50	250	1000	Working STD Conc.(ng/L):	4	4	4	4	20	20	200	200	200
	Source Std.	Primary Working Standards				Injection (L):	0.020	0.025	0.050	0.100	0.050	0.25	0.125	0.25	0.50
Compounds	mg/m^3	200ng/L	20ng/L	4ng/L	1ng/L	ICAL Points:	0.08ng	0.1ng	0.2ng	0.4ng	1ng	5ng	25ng	50ng	100ng
4-Methyl-2-pentanone	1.059	211.8	21.18	4.236	1.059		0.08472	0.1059	0.2118	0.4236	1.059	5.295	26.475	52.95	105.9
trans-1,3-Dichloropropene	1.067	213.4	21.34	4.268	1.067		0.08536	0.1067	0.2134	0.4268	1.067	5.335	26.675	53.35	106.7
1,1,2-Trichloroethane	1.064	212.8	21.28	4.256	1.064		0.08512	0.1064	0.2128	0.4256	1.064	5.320	26.600	53.20	106.4
Toluene	1.054	210.8	21.08	4.216	1.054		0.08432	0.1054	0.2108	0.4216	1.054	5.270	26.350	52.70	105.4
2-Hexanone	1.060	212.0	21.20	4.240	1.060		0.08480	0.1060	0.2120	0.4240	1.060	5.300	26.500	53.00	106.0
Dibromochloromethane	1.061	212.2	21.22	4.244	1.061		0.08488	0.1061	0.2122	0.4244	1.061	5.305	26.525	53.05	106.1
1,2-Dibromoethane	1.064	212.8	21.28	4.256	1.064		0.08512	0.1064	0.2128	0.4256	1.064	5.320	26.600	53.20	106.4
n-Butyl Acetate	1.068	213.6	21.36	4.272	1.068		0.08544	0.1068	0.2136	0.4272	1.068	5.340	26.700	53.40	106.8
n-Octane	1.060	212.0	21.20	4.240	1.060		0.08480	0.1060	0.2120	0.4240	1.060	5.300	26.500	53.00	106.0
Tetrachloroethene	1.063	212.6	21.26	4.252	1.063		0.08504	0.1063	0.2126	0.4252	1.063	5.315	26.575	53.15	106.3
Chlorobenzene	1.066	213.2	21.32	4.264	1.066		0.08528	0.1066	0.2132	0.4264	1.066	5.330	26.650	53.30	106.6
Ethylbenzene	1.052	210.4	21.04	4.208	1.052		0.08416	0.1052	0.2104	0.4208	1.052	5.260	26.300	52.60	105.2
m-&p-Xylene	2.123	424.6	42.46	8.492	2.123		0.16984	0.2123	0.4246	0.8492	2.123	10.615	53.075	106.15	212.3
Bromoform	1.063	212.6	21.26	4.252	1.063		0.08504	0.1063	0.2126	0.4252	1.063	5.315	26.575	53.15	106.3
Styrene	1.058	211.6	21.16	4.232	1.058		0.08464	0.1058	0.2116	0.4232	1.058	5.290	26.450	52.90	105.8
o-Xylene	1.055	211.0	21.10	4.220	1.055		0.08440	0.1055	0.2110	0.4220	1.055	5.275	26.375	52.75	105.5
n-Nonane	1.054	210.8	21.08	4.216	1.054		0.08432	0.1054	0.2108	0.4216	1.054	5.270	26.350	52.70	105.4
1,1,2,2-Tetrachloroethane	1.057	211.4	21.14	4.228	1.057		0.08456	0.1057	0.2114	0.4228	1.057	5.285	26.425	52.85	105.7
Cumene	1.052	210.4	21.04	4.208	1.052		0.08416	0.1052	0.2104	0.4208	1.052	5.260	26.300	52.60	105.2
alpha-Pinene	1.046	209.2	20.92	4.184	1.046		0.08368	0.1046	0.2092	0.4184	1.046	5.230	26.150	52.30	104.6
n-Propylbenzene	1.064	212.8	21.28	4.256	1.064		0.08512	0.1064	0.2128	0.4256	1.064	5.320	26.600	53.20	106.4
3-Ethyltoluene	1.050	210.0	21.00	4.200	1.050		0.08400	0.1050	0.2100	0.4200	1.050	5.250	26.250	52.50	105.0
4-Ethyltoluene	1.049	209.8	20.98	4.196	1.049		0.08392	0.1049	0.2098	0.4196	1.049	5.245	26.225	52.45	104.9
1,3,5-Trimethylbenzene	1.049	209.8	20.98	4.196	1.049		0.08392	0.1049	0.2098	0.4196	1.049	5.245	26.225	52.45	104.9
alpha-Methylstyrene	1.049	209.8	20.98	4.196	1.049		0.08392	0.1049	0.2098	0.4196	1.049	5.245	26.225	52.45	104.9
2-Ethyltoluene	1.060	212.0	21.20	4.240	1.060		0.08480	0.1060	0.2120	0.4240	1.060	5.300	26.500	53.00	106.0
1,2,4-Trimethylbenzene	1.051	210.2	21.02	4.204	1.051		0.08408	0.1051	0.2102	0.4204	1.051	5.255	26.275	52.55	105.1
n-Decane	1.059	211.8	21.18	4.236	1.059		0.08472	0.1059	0.2118	0.4236	1.059	5.295	26.475	52.95	105.9
Benzyl Chloride	1.074	214.8	21.48	4.296	1.074		0.08592	0.1074	0.2148	0.4296	1.074	5.370	26.850	53.70	107.4
1,3-Dichlorobenzene	1.071	214.2	21.42	4.284	1.071		0.08568	0.1071	0.2142	0.4284	1.071	5.355	26.775	53.55	107.1
1,4-Dichlorobenzene	1.064	212.8	21.28	4.256	1.064		0.08512	0.1064	0.2128	0.4256	1.064	5.320	26.600	53.20	106.4
sec-Butylbenzene	1.055	211.0	21.10	4.220	1.055		0.08440	0.1055	0.2110	0.4220	1.055	5.275	26.375	52.75	105.5
p-Isopropyltoluene	1.026	205.2	20.52	4.104	1.026		0.08208	0.1026	0.2052	0.4104	1.026	5.130	25.650	51.30	102.6
1,2,3-Trimethylbenzene	1.026	205.2	20.52	4.104	1.026		0.08208	0.1026	0.2052	0.4104	1.026	5.130	25.650	51.30	102.6
1,2-Dichlorobenzene	1.083	216.6	21.66	4.332	1.083		0.08664	0.1083	0.2166	0.4332	1.083	5.415	27.075	54.15	108.3
d-Limonene	1.005	201.0	20.10	4.020	1.005		0.08040	0.1005	0.2010	0.4020	1.005	5.025	25.125	50.25	100.5
1,2-Dibromo-3-chloropropane	1.051	210.2	21.02	4.204	1.051		0.08408	0.1051	0.2102	0.4204	1.051	5.255	26.275	52.55	105.1
n-Undecane	1.053	210.6	21.06	4.212	1.053		0.08424	0.1053	0.2106	0.4212	1.053	5.265	26.325	52.65	105.3
1,2,4-Trichlorobenzene	1.097	219.4	21.94	4.388	1.097		0.08776	0.1097	0.2194	0.4388	1.097	5.485	27.425	54.85	109.7
Naphthalene	1.056	211.2	21.12	4.224	1.056		0.08448	0.1056	0.2112	0.4224	1.056	5.280	26.400	52.80	105.6
n-Dodecane	1.056	211.2	21.12	4.224	1.056		0.08448	0.1056	0.2112	0.4224	1.056	5.280	26.400	52.80	105.6
Hexachloro-1,3-butadiene	1.057	211.4	21.14	4.228	1.057		0.08456	0.1057	0.2114	0.4228	1.057	5.285	26.425	52.85	105.7
Methacrylonitrile	1.067	213.4	21.34	4.268	1.067		0.08536	0.1067	0.2134	0.4268	1.067	5.335	26.675	53.35	106.7
Cyclohexanone	1.039	207.8	20.78	4.156	1.039		0.08312	0.1039	0.2078	0.4156	1.039	5.195	25.975	51.95	103.9
tert-Butylbenzene	1.050	210.0	21.00	4.200	1.050		0.08400	0.1050	0.2100	0.4200	1.050	5.250	26.250	52.50	105.0
n-Butylbenzene	1.054	210.8	21.08	4.216	1.054		0.08432	0.1054	0.2108	0.4216	1.054	5.270	26.350	52.70	105.4

Q:\TO15 Std. Concentrations\MS09 Std. Conc\2018\R903071 8\ICAL Conc. (Primary Source)

Date Updated: 08/29/17
Version: 0

00884325

Calibration Status Report MS09

Method : I:\MS09\Methods\R9030718.M (RTE Integrator)
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Thu Mar 08 08:49:25 2018
Response via : Initial Calibration

3/8/18

#	ID	Conc	ISTD Conc	Path\File
1	0.08	0	13	I:\MS09\Data\2018_03\07\03071803.D
2	0.10	0	13	I:\MS09\Data\2018_03\07\03071804.D
3	0.20	0	13	I:\MS09\Data\2018_03\07\03071805.D
4	0.40	0	13	I:\MS09\Data\2018_03\07\03071806.D
5	1.0	1	13	I:\MS09\Data\2018_03\07\03071807.D
6	5.0	5	13	I:\MS09\Data\2018_03\07\03071808.D
7	25	26	13	I:\MS09\Data\2018_03\07\03071809.D
8	50	52	13	I:\MS09\Data\2018_03\07\03071810.D
9	100	104	13	I:\MS09\Data\2018_03\07\03071811.D

#	ID	Update Time	Quant Time	Acquisition Time
1	0.08	Mar 08 08:47 2018	Mar 08 08:39 2018	7 Mar 2018 15:51
2	0.10	Mar 08 08:47 2018	Mar 08 08:38 2018	7 Mar 2018 16:25
3	0.20	Mar 08 08:47 2018	Mar 08 08:37 2018	7 Mar 2018 16:59
4	0.40	Mar 08 08:48 2018	Mar 08 08:35 2018	7 Mar 2018 17:33
5	1.0	Mar 08 08:48 2018	Mar 08 08:34 2018	7 Mar 2018 18:07
6	5.0	Mar 08 08:48 2018	Mar 08 08:33 2018	7 Mar 2018 18:40
7	25	Mar 08 08:48 2018	Mar 08 08:30 2018	7 Mar 2018 19:14
8	50	Mar 08 08:49 2018	Mar 08 08:41 2018	7 Mar 2018 19:48
9	100	Mar 08 08:49 2018	Mar 08 08:43 2018	7 Mar 2018 20:22

R9030718.M Thu Mar 08 09:26:59 2018

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071803.D
Acq On : 7 Mar 2018 15:51 Operator: SC
Sample : 0.08ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:39:53 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

3/8/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	125209	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	669894	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	322472	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	295445	12.604	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.80%				
57) Toluene-d8 (SS2)	13.68	98	769828	12.963	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.68%				
73) Bromofluorobenzene (SS3)	17.17	174	173385	11.946	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.60%				
Target Compounds							Qvalue
2) Propene	3.99	42	2776	0.136	ng		97
3) Dichlorodifluoromethan...	4.09	85	3190	0.110	ng	#	97
4) Chloromethane	4.29	50	3098	0.108	ng		94
5) 1,2-Dichloro-1,1,2,2-t...	4.46	135	1114	0.096	ng		94
6) Vinyl Chloride	4.58	62	2400	0.105	ng		99
7) 1,3-Butadiene	4.75	54	1878	0.110	ng		90
8) Bromomethane	5.06	94	1172	0.106	ng		81
9) Chloroethane	5.28	64	1085	0.100	ng		99
10) Ethanol	5.48	45	7871	0.670	ng		88
11) Acetonitrile	5.70	41	3873	0.117	ng	#	64
12) Acrolein	5.84	56	1142	0.116	ng		84
13) Acetone	6.00	58	8195	0.735	ng	#	80
14) Trichlorofluoromethane	6.16	101	2541	0.110	ng		97
15) 2-Propanol (Isopropanol)	6.35	45	10765	0.250	ng		93
16) Acrylonitrile	6.49	53	2159	0.105	ng		92
17) 1,1-Dichloroethene	6.86	96	1203	0.103	ng	#	71
18) 2-Methyl-2-Propanol (t...	7.04	59	8944	0.227	ng		92
19) Methylene Chloride	7.00	84	3367	0.248	ng		81
20) 3-Chloro-1-propene (Al...	7.13	41	3009	0.107	ng		87
21) Trichlorotrifluoroethane	7.33	151	888	0.098	ng		89
22) Carbon Disulfide	7.29	76	8165	0.166	ng		96
23) trans-1,2-Dichloroethene	8.01	61	2114	0.100	ng		93
24) 1,1-Dichloroethane	8.23	63	3178	0.114	ng		91
25) Methyl tert-Butyl Ether	8.35	73	4814	0.117	ng		90
26) Vinyl Acetate	8.41	86	852	0.343	ng	#	9
27) 2-Butanone (MEK)	8.69	72	1072	0.113	ng	#	60
28) cis-1,2-Dichloroethene	9.11	61	2320	0.110	ng		97
29) Diisopropyl Ether	9.38	87	1225	0.111	ng	#	64
30) Ethyl Acetate	9.37	61	1134	0.206	ng		85
31) n-Hexane	9.36	57	2872	0.103	ng	#	83
32) Chloroform	9.41	83	2902	0.120	ng		92
34) Tetrahydrofuran (THF)	9.84	72	1000	0.107	ng	#	58
35) Ethyl tert-Butyl Ether	9.93	87	1462	0.098	ng	#	65
36) 1,2-Dichloroethane	10.16	62	2447	0.113	ng		98
38) 1,1,1-Trichloroethane	10.43	97	2351	0.108	ng		95
39) Isopropyl Acetate	10.81	61	1941	0.205	ng	#	64
40) 1-Butanol	10.83	56	3998	0.266	ng		83
41) Benzene	10.89	78	7474	0.126	ng		99
42) Carbon Tetrachloride	11.03	117	1985	0.109	ng		92
43) Cyclohexane	11.17	84	4101	0.196	ng	#	83
44) tert-Amyl Methyl Ether	11.50	73	5211	0.127	ng		96
45) 1,2-Dichloropropane	11.70	63	1692	0.110	ng		89
46) Bromodichloromethane	11.88	83	1901	0.100	ng		94
47) Trichloroethene	11.94	130	1280	0.103	ng		83
48) 1,4-Dioxane	11.94	88	1104	0.111	ng		91
49) 2,2,4-Trimethylpentane...	12.00	57	7509	0.109	ng		91

Data File: I:\MS09\Data\2018_03\07\03071803.D
Acq On : 7 Mar 2018 15:51 Operator: SC
Sample : 0.08ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

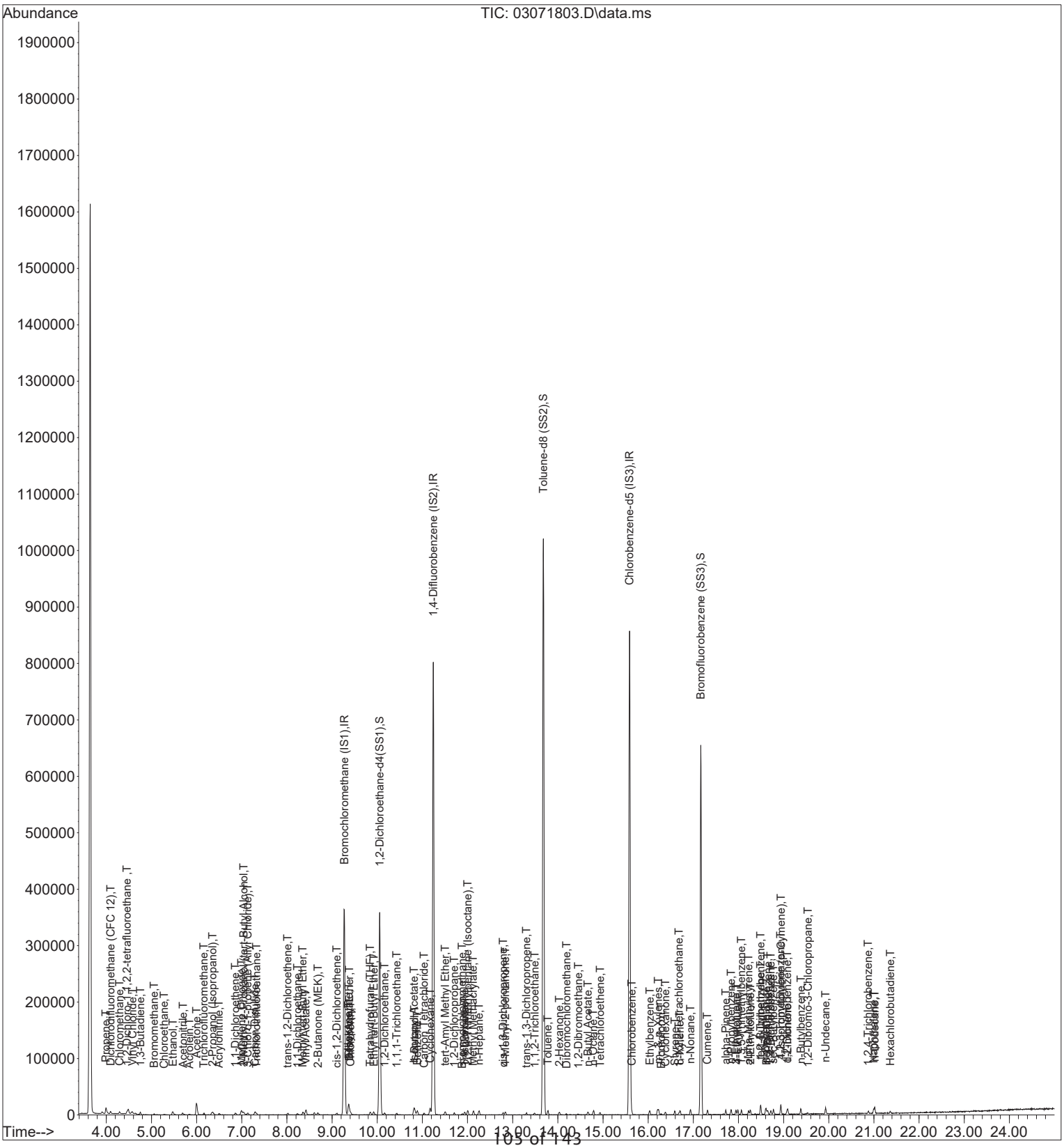
Quant Time: Mar 08 08:39:53 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.12	100	809	0.170	ng	#	47
51) n-Heptane	12.26	71	1545	0.105	ng		85
52) cis-1,3-Dichloropropene	12.79	75	2419	0.102	ng		95
53) 4-Methyl-2-pentanone	12.83	58	1333	0.093	ng	#	63
54) trans-1,3-Dichloropropene	13.30	75	2336	0.108	ng		91
55) 1,1,2-Trichloroethane	13.49	97	1371	0.112	ng		98
58) Toluene	13.78	91	6314	0.116	ng		99
59) 2-Hexanone	14.04	43	4386	0.118	ng		86
60) Dibromochloromethane	14.19	129	1205	0.094	ng		89
61) 1,2-Dibromoethane	14.45	107	1343	0.105	ng		97
62) n-Butyl Acetate	14.66	43	4639	0.110	ng		89
63) n-Octane	14.78	57	1435	0.103	ng		91
64) Tetrachloroethene	14.94	166	1079	0.095	ng		86
65) Chlorobenzene	15.64	112	4022	0.123	ng		99
66) Ethylbenzene	16.04	91	6587	0.111	ng		98
67) m- & p-Xylenes	16.22	91	10510	0.227	ng		96
68) Bromoform	16.29	173	912	0.099	ng		95
69) Styrene	16.59	104	3388	0.102	ng		93
70) o-Xylene	16.70	91	5158	0.110	ng		90
71) n-Nonane	16.94	43	4207	0.113	ng		89
72) 1,1,2,2-Tetrachloroethane	16.68	83	2136	0.096	ng		91
74) Cumene	17.31	105	6029	0.104	ng		96
75) alpha-Pinene	17.72	93	3204	0.111	ng		96
76) n-Propylbenzene	17.84	91	7594	0.104	ng		94
77) 3-Ethyltoluene	17.94	105	5720	0.102	ng		97
78) 4-Ethyltoluene	17.99	105	5547	0.103	ng		95
79) 1,3,5-Trimethylbenzene	18.06	105	4863	0.106	ng		96
80) alpha-Methylstyrene	18.22	118	2115	0.094	ng		81
81) 2-Ethyltoluene	18.26	105	5723	0.103	ng		100
82) 1,2,4-Trimethylbenzene	18.49	105	5189	0.109	ng		95
83) n-Decane	18.60	57	3549	0.109	ng		93
84) Benzyl Chloride	18.62	91	3819	0.087	ng		89
85) 1,3-Dichlorobenzene	18.65	146	2574	0.107	ng		98
86) 1,4-Dichlorobenzene	18.72	146	2628	0.110	ng		98
87) sec-Butylbenzene	18.77	105	6742	0.105	ng		96
88) 4-Isopropyltoluene (p-...	18.94	119	6227	0.106	ng		96
89) 1,2,3-Trimethylbenzene	18.93	105	4759	0.100	ng		99
90) 1,2-Dichlorobenzene	19.08	146	2550	0.113	ng		99
91) d-Limonene	19.09	68	1813	0.080	ng		97
92) 1,2-Dibromo-3-Chloropr...	19.54	157	487	0.064	ng	#	26
93) n-Undecane	19.93	57	3403	0.100	ng		98
94) 1,2,4-Trichlorobenzene	20.87	180	1432	0.095	ng	#	88
95) Naphthalene	20.99	128	6182	0.115	ng		96
96) n-Dodecane	21.02	57	3484	0.110	ng		97
97) Hexachlorobutadiene	21.36	225	884	0.094	ng		97
98) Cyclohexanone	16.38	55	2313	0.116	ng		95
99) tert-Butylbenzene	18.49	119	4575	0.102	ng		93
100) n-Butylbenzene	19.38	91	5599	0.103	ng		95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\07\03071803.D
Acq On : 7 Mar 2018 15:51 Operator: SC
Sample : 0.08ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:39:53 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071804.D
Acq On : 7 Mar 2018 16:25 Operator: SC
Sample : 0.10ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

3/8/18

Quant Time: Mar 08 08:38:33 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	122625	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	657646	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	319887	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	291377	12.692	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.52%				
57) Toluene-d8 (SS2)	13.68	98	754982	12.816	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.56%				
73) Bromofluorobenzene (SS3)	17.17	174	171990	11.946	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.60%				
Target Compounds							Qvalue
2) Propene	3.99	42	3021	0.151	ng		91
3) Dichlorodifluoromethan...	4.09	85	3649	0.129	ng	#	96
4) Chloromethane	4.29	50	3520	0.125	ng		98
5) 1,2-Dichloro-1,1,2,2-t...	4.46	135	1441	0.127	ng		86
6) Vinyl Chloride	4.57	62	2843	0.127	ng		96
7) 1,3-Butadiene	4.75	54	2081	0.124	ng	#	84
8) Bromomethane	5.06	94	1640	0.152	ng		90
9) Chloroethane	5.28	64	1280	0.121	ng		96
10) Ethanol	5.47	45	8726	0.758	ng		99
11) Acetonitrile	5.69	41	4724	0.146	ng		76
12) Acrolein	5.83	56	1304	0.135	ng		91
13) Acetone	6.00	58	9091	0.832	ng	#	77
14) Trichlorofluoromethane	6.15	101	2982	0.132	ng		94
15) 2-Propanol (Isopropanol)	6.35	45	11599	0.275	ng		92
16) Acrylonitrile	6.50	53	2585	0.128	ng		100
17) 1,1-Dichloroethene	6.86	96	1545	0.135	ng		89
18) 2-Methyl-2-Propanol (t...	7.03	59	10840	0.281	ng		94
19) Methylene Chloride	7.00	84	3528	0.266	ng		80
20) 3-Chloro-1-propene (Al...	7.14	41	3428	0.124	ng		92
21) Trichlorotrifluoroethane	7.32	151	1062	0.120	ng		86
22) Carbon Disulfide	7.29	76	9192	0.191	ng		93
23) trans-1,2-Dichloroethene	8.02	61	2722	0.131	ng		87
24) 1,1-Dichloroethane	8.23	63	3490	0.128	ng		92
25) Methyl tert-Butyl Ether	8.35	73	5343	0.132	ng		93
26) Vinyl Acetate	8.41	86	1310	0.539	ng	#	88
27) 2-Butanone (MEK)	8.68	72	1098	0.118	ng	#	32
28) cis-1,2-Dichloroethene	9.10	61	2561	0.124	ng		97
29) Diisopropyl Ether	9.37	87	1581	0.147	ng	#	93
30) Ethyl Acetate	9.36	61	1199	0.223	ng		96
31) n-Hexane	9.36	57	3535	0.130	ng	#	96
32) Chloroform	9.40	83	3147	0.133	ng		95
34) Tetrahydrofuran (THF)	9.84	72	1172	0.129	ng	#	53
35) Ethyl tert-Butyl Ether	9.92	87	1931	0.132	ng		92
36) 1,2-Dichloroethane	10.16	62	2864	0.135	ng		94
38) 1,1,1-Trichloroethane	10.43	97	2885	0.135	ng		93
39) Isopropyl Acetate	10.81	61	2263	0.243	ng	#	58
40) 1-Butanol	10.84	56	4673	0.317	ng	#	76
41) Benzene	10.89	78	8116	0.139	ng		97
42) Carbon Tetrachloride	11.03	117	2207	0.124	ng		94
43) Cyclohexane	11.17	84	5337	0.260	ng		92
44) tert-Amyl Methyl Ether	11.50	73	5568	0.138	ng		97
45) 1,2-Dichloropropane	11.71	63	2015	0.133	ng		94
46) Bromodichloromethane	11.89	83	2121	0.114	ng		95
47) Trichloroethene	11.94	130	1687	0.138	ng		95
48) 1,4-Dioxane	11.94	88	1288	0.132	ng		97
49) 2,2,4-Trimethylpentane...	12.00	57	8708	0.129	ng		92

Data File: I:\MS09\Data\2018_03\07\03071804.D
Acq On : 7 Mar 2018 16:25 Operator: SC
Sample : 0.10ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:38:33 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

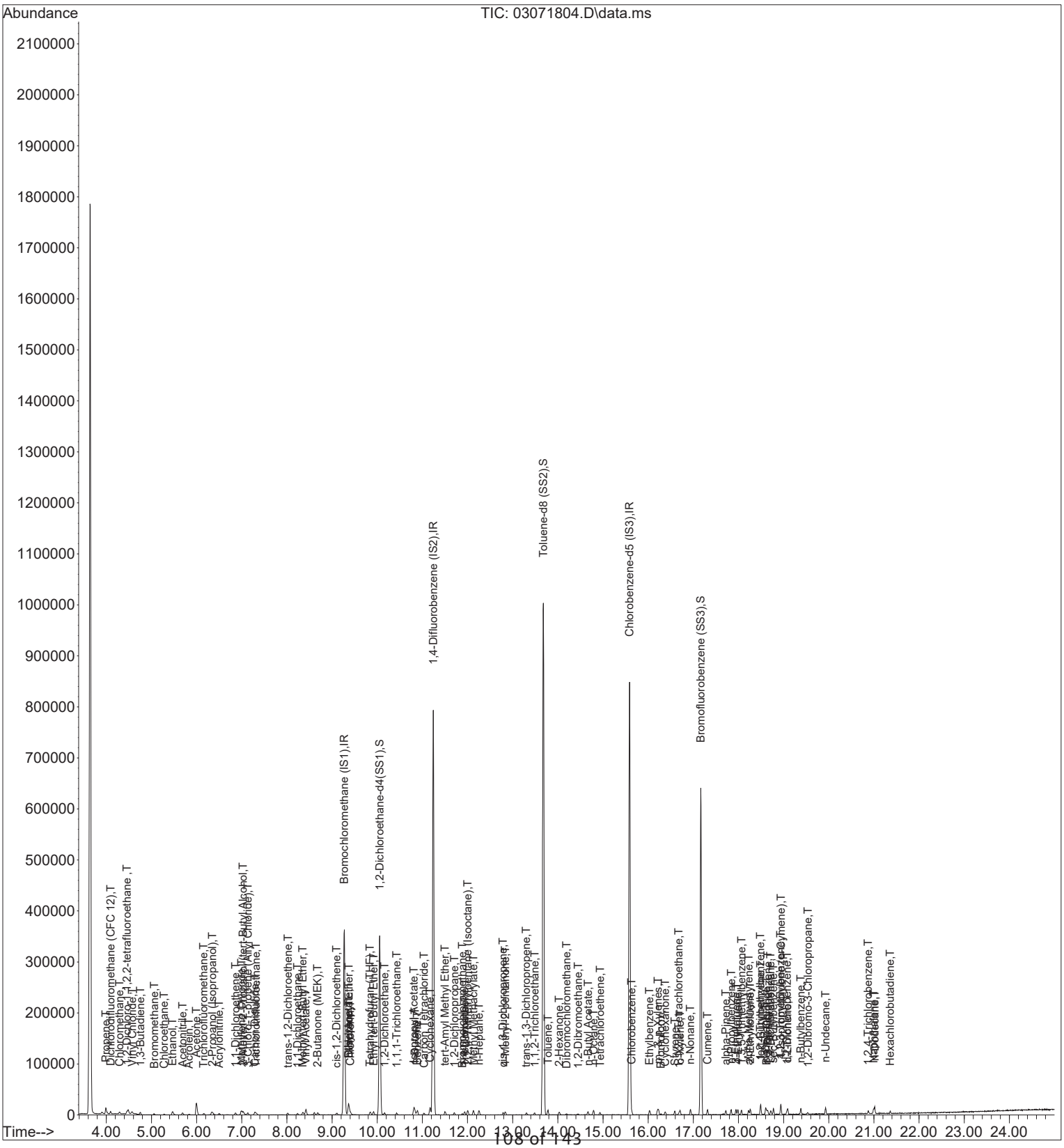
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.13	100	1112	0.239	ng	#	70
51) n-Heptane	12.26	71	1711	0.119	ng		92
52) cis-1,3-Dichloropropene	12.78	75	2872	0.124	ng		92
53) 4-Methyl-2-pentanone	12.83	58	1672	0.119	ng		80
54) trans-1,3-Dichloropropene	13.30	75	2489	0.118	ng		95
55) 1,1,2-Trichloroethane	13.49	97	1511	0.126	ng		94
58) Toluene	13.78	91	7238	0.135	ng		99
59) 2-Hexanone	14.03	43	4932	0.133	ng		81
60) Dibromochloromethane	14.19	129	1435	0.113	ng		94
61) 1,2-Dibromoethane	14.45	107	1800	0.141	ng		85
62) n-Butyl Acetate	14.67	43	5422	0.129	ng		87
63) n-Octane	14.79	57	1705	0.124	ng	#	87
64) Tetrachloroethene	14.94	166	1386	0.124	ng		97
65) Chlorobenzene	15.63	112	4430	0.137	ng		98
66) Ethylbenzene	16.03	91	7480	0.127	ng		99
67) m- & p-Xylenes	16.22	91	11449	0.249	ng		98
68) Bromoform	16.28	173	1053	0.115	ng		83
69) Styrene	16.59	104	4214	0.128	ng		96
70) o-Xylene	16.71	91	5823	0.125	ng		93
71) n-Nonane	16.93	43	4467	0.121	ng		93
72) 1,1,2,2-Tetrachloroethane	16.68	83	2363	0.107	ng		100
74) Cumene	17.32	105	7397	0.129	ng		92
75) alpha-Pinene	17.72	93	3752	0.131	ng		99
76) n-Propylbenzene	17.84	91	9063	0.125	ng		96
77) 3-Ethyltoluene	17.94	105	6958	0.125	ng		97
78) 4-Ethyltoluene	17.99	105	6368	0.120	ng		99
79) 1,3,5-Trimethylbenzene	18.07	105	5417	0.119	ng		99
80) alpha-Methylstyrene	18.23	118	2719	0.122	ng		94
81) 2-Ethyltoluene	18.26	105	6940	0.126	ng		96
82) 1,2,4-Trimethylbenzene	18.49	105	5945	0.126	ng		91
83) n-Decane	18.60	57	4286	0.132	ng		96
84) Benzyl Chloride	18.62	91	4607	0.105	ng		90
85) 1,3-Dichlorobenzene	18.65	146	3298	0.139	ng		100
86) 1,4-Dichlorobenzene	18.71	146	3104	0.130	ng		96
87) sec-Butylbenzene	18.77	105	8020	0.126	ng		99
88) 4-Isopropyltoluene (p-...	18.94	119	6927	0.119	ng		99
89) 1,2,3-Trimethylbenzene	18.93	105	5874	0.124	ng		89
90) 1,2-Dichlorobenzene	19.07	146	2717	0.121	ng		97
91) d-Limonene	19.09	68	2299	0.103	ng		97
92) 1,2-Dibromo-3-Chloropr...	19.54	157	594	0.078	ng	#	32
93) n-Undecane	19.93	57	4221	0.125	ng		94
94) 1,2,4-Trichlorobenzene	20.87	180	1905	0.128	ng		95
95) Naphthalene	21.00	128	7409	0.139	ng		94
96) n-Dodecane	21.02	57	3890	0.124	ng		94
97) Hexachlorobutadiene	21.36	225	1111	0.119	ng		89
98) Cyclohexanone	16.38	55	2892	0.147	ng		92
99) tert-Butylbenzene	18.49	119	5541	0.124	ng		93
100) n-Butylbenzene	19.38	91	6820	0.127	ng		98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071804.D
Acq On : 7 Mar 2018 16:25 Operator: SC
Sample : 0.10ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:38:33 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071805.D
Acq On : 7 Mar 2018 16:59 Operator: SC
Sample : 0.20ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

3/8/18

Quant Time: Mar 08 08:37:13 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	120495	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	641455	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	312633	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	285400	12.652	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.20%				
57) Toluene-d8 (SS2)	13.68	98	737920	12.817	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.56%				
73) Bromofluorobenzene (SS3)	17.17	174	168157	11.950	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 95.60%				
Target Compounds							Qvalue
2) Propene	3.98	42	4940	0.252	ng		93
3) Dichlorodifluoromethan...	4.09	85	6849	0.246	ng		99
4) Chloromethane	4.29	50	6223	0.225	ng		98
5) 1,2-Dichloro-1,1,2,2-t...	4.45	135	2325	0.209	ng		97
6) Vinyl Chloride	4.57	62	4872	0.222	ng		99
7) 1,3-Butadiene	4.75	54	3842	0.234	ng		92
8) Bromomethane	5.05	94	2300	0.217	ng		86
9) Chloroethane	5.27	64	2383	0.229	ng		93
10) Ethanol	5.46	45	14845	1.312	ng		100
11) Acetonitrile	5.69	41	7904	0.249	ng		83
12) Acrolein	5.83	56	2319	0.245	ng		98
13) Acetone	6.00	58	15442	1.439	ng	#	78
14) Trichlorofluoromethane	6.16	101	5323	0.240	ng		98
15) 2-Propanol (Isopropanol)	6.31	45	21263	0.514	ng		92
16) Acrylonitrile	6.50	53	4586	0.231	ng		98
17) 1,1-Dichloroethene	6.86	96	2647	0.236	ng	#	82
18) 2-Methyl-2-Propanol (t...	7.02	59	19116	0.504	ng		93
19) Methylene Chloride	6.99	84	5077	0.389	ng		88
20) 3-Chloro-1-propene (Al...	7.14	41	6230	0.230	ng		86
21) Trichlorotrifluoroethane	7.33	151	1997	0.230	ng		89
22) Carbon Disulfide	7.29	76	13944	0.295	ng		95
23) trans-1,2-Dichloroethene	8.01	61	4965	0.244	ng		95
24) 1,1-Dichloroethane	8.23	63	6259	0.234	ng		99
25) Methyl tert-Butyl Ether	8.35	73	10186	0.257	ng		96
26) Vinyl Acetate	8.42	86	2061	0.863	ng	#	38
27) 2-Butanone (MEK)	8.68	72	2178	0.238	ng	#	66
28) cis-1,2-Dichloroethene	9.11	61	4740	0.233	ng		97
29) Diisopropyl Ether	9.37	87	2812	0.266	ng	#	93
30) Ethyl Acetate	9.36	61	2450	0.463	ng		94
31) n-Hexane	9.36	57	6257	0.234	ng	#	96
32) Chloroform	9.41	83	5607	0.240	ng		98
34) Tetrahydrofuran (THF)	9.84	72	2268	0.253	ng	#	77
35) Ethyl tert-Butyl Ether	9.92	87	3291	0.228	ng	#	80
36) 1,2-Dichloroethane	10.17	62	5133	0.246	ng		94
38) 1,1,1-Trichloroethane	10.43	97	4842	0.233	ng		94
39) Isopropyl Acetate	10.81	61	3959	0.436	ng	#	55
40) 1-Butanol	10.82	56	7734	0.537	ng	#	76
41) Benzene	10.89	78	14497	0.254	ng		99
42) Carbon Tetrachloride	11.04	117	3999	0.230	ng		95
43) Cyclohexane	11.17	84	9732	0.486	ng		98
44) tert-Amyl Methyl Ether	11.50	73	9125	0.232	ng		93
45) 1,2-Dichloropropane	11.70	63	3602	0.244	ng		97
46) Bromodichloromethane	11.88	83	4329	0.238	ng		98
47) Trichloroethene	11.94	130	3100	0.260	ng		90
48) 1,4-Dioxane	11.93	88	2573	0.270	ng		96
49) 2,2,4-Trimethylpentane...	12.00	57	15030	0.228	ng		90

Data File: I:\MS09\Data\2018_03\07\03071805.D
Acq On : 7 Mar 2018 16:59 Operator: SC
Sample : 0.20ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:37:13 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

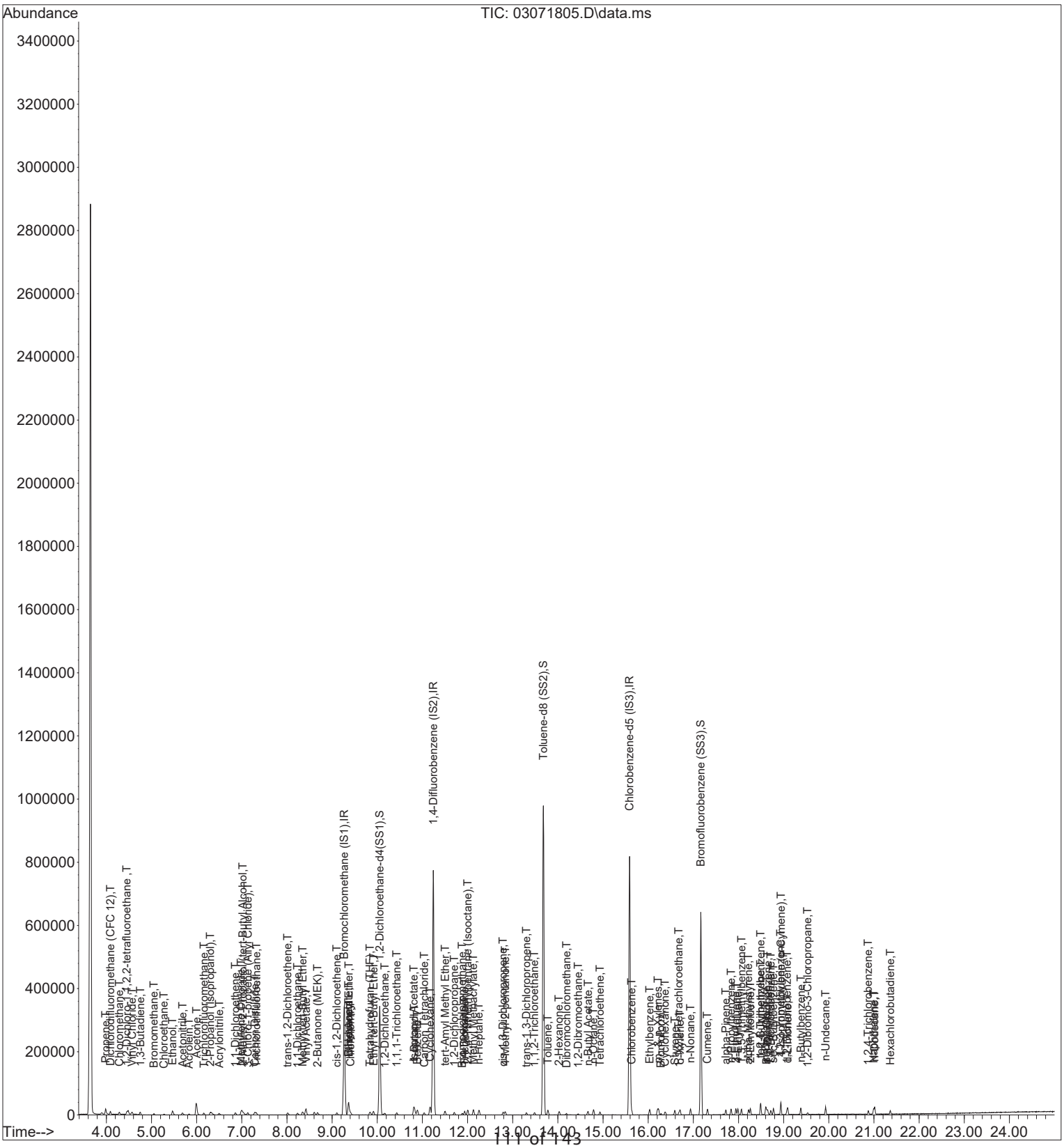
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.13	100	1901	0.418	ng	#	71
51) n-Heptane	12.25	71	2940	0.209	ng	#	79
52) cis-1,3-Dichloropropene	12.79	75	5518	0.243	ng		98
53) 4-Methyl-2-pentanone	12.83	58	3107	0.227	ng	#	84
54) trans-1,3-Dichloropropene	13.30	75	4740	0.229	ng		99
55) 1,1,2-Trichloroethane	13.48	97	2763	0.236	ng		95
58) Toluene	13.78	91	12638	0.241	ng		98
59) 2-Hexanone	14.03	43	8999	0.249	ng		90
60) Dibromochloromethane	14.19	129	2953	0.237	ng		98
61) 1,2-Dibromoethane	14.45	107	2848	0.229	ng		99
62) n-Butyl Acetate	14.67	43	9624	0.234	ng		93
63) n-Octane	14.79	57	3409	0.253	ng		85
64) Tetrachloroethene	14.93	166	2536	0.231	ng		99
65) Chlorobenzene	15.63	112	7637	0.241	ng		94
66) Ethylbenzene	16.03	91	13931	0.242	ng		95
67) m- & p-Xylenes	16.22	91	20422	0.455	ng		97
68) Bromoform	16.28	173	2018	0.225	ng		97
69) Styrene	16.59	104	7284	0.227	ng		99
70) o-Xylene	16.71	91	10593	0.234	ng		90
71) n-Nonane	16.94	43	8290	0.231	ng		92
72) 1,1,2,2-Tetrachloroethane	16.68	83	4633	0.216	ng		93
74) Cumene	17.31	105	12911	0.230	ng		96
75) alpha-Pinene	17.72	93	6685	0.238	ng		91
76) n-Propylbenzene	17.84	91	16245	0.230	ng		99
77) 3-Ethyltoluene	17.94	105	12645	0.233	ng		99
78) 4-Ethyltoluene	17.99	105	11766	0.226	ng		99
79) 1,3,5-Trimethylbenzene	18.07	105	10236	0.230	ng		94
80) alpha-Methylstyrene	18.22	118	4681	0.215	ng		97
81) 2-Ethyltoluene	18.26	105	12447	0.231	ng		98
82) 1,2,4-Trimethylbenzene	18.49	105	10112	0.219	ng		97
83) n-Decane	18.60	57	7869	0.249	ng		94
84) Benzyl Chloride	18.62	91	8940	0.209	ng		93
85) 1,3-Dichlorobenzene	18.65	146	5365	0.231	ng		98
86) 1,4-Dichlorobenzene	18.72	146	5381	0.231	ng		99
87) sec-Butylbenzene	18.77	105	13989	0.225	ng		98
88) 4-Isopropyltoluene (p-...	18.94	119	12322	0.216	ng		95
89) 1,2,3-Trimethylbenzene	18.93	105	10553	0.228	ng		96
90) 1,2-Dichlorobenzene	19.07	146	5274	0.241	ng		99
91) d-Limonene	19.09	68	4322	0.197	ng		97
92) 1,2-Dibromo-3-Chloropr...	19.53	157	1147	0.155	ng	#	28
93) n-Undecane	19.93	57	7466	0.225	ng		100
94) 1,2,4-Trichlorobenzene	20.87	180	3290	0.225	ng		95
95) Naphthalene	20.99	128	12617	0.243	ng		99
96) n-Dodecane	21.01	57	7411	0.242	ng		94
97) Hexachlorobutadiene	21.36	225	2033	0.222	ng		98
98) Cyclohexanone	16.37	55	4712	0.244	ng		89
99) tert-Butylbenzene	18.49	119	9604	0.220	ng		99
100) n-Butylbenzene	19.38	91	11936	0.227	ng		100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071805.D
Acq On : 7 Mar 2018 16:59 Operator: SC
Sample : 0.20ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:37:13 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071806.D
Acq On : 7 Mar 2018 17:33 Operator: SC
Sample : 0.40ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:35:55 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

3/8/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.27	130	119065	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	636307	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	307408	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	282245	12.662	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.28%				
57) Toluene-d8 (SS2)	13.68	98	723738	12.784	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.24%				
73) Bromofluorobenzene (SS3)	17.17	174	167552	12.110	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.88%				
Target Compounds							Qvalue
2) Propene	3.97	42	8881	0.459	ng		92
3) Dichlorodifluoromethan...	4.08	85	12965	0.471	ng		99
4) Chloromethane	4.28	50	11958	0.437	ng		96
5) 1,2-Dichloro-1,1,2,2-t...	4.45	135	4760	0.432	ng		99
6) Vinyl Chloride	4.56	62	9790	0.451	ng		96
7) 1,3-Butadiene	4.74	54	7513	0.463	ng		91
8) Bromomethane	5.05	94	4887	0.467	ng		100
9) Chloroethane	5.27	64	4868	0.472	ng		96
10) Ethanol	5.47	45	28235	2.526	ng		99
11) Acetonitrile	5.68	41	15134	0.482	ng		87
12) Acrolein	5.83	56	4181	0.446	ng		97
13) Acetone	5.99	58	29285	2.761	ng	#	79
14) Trichlorofluoromethane	6.16	101	10066	0.459	ng		98
15) 2-Propanol (Isopropanol)	6.28	45	40511	0.991	ng		90
16) Acrylonitrile	6.50	53	8910	0.454	ng		98
17) 1,1-Dichloroethene	6.86	96	5461	0.492	ng		89
18) 2-Methyl-2-Propanol (t...	6.99	59	36722	0.980	ng		92
19) Methylene Chloride	6.99	84	7908	0.613	ng		84
20) 3-Chloro-1-propene (Al...	7.13	41	12522	0.468	ng		91
21) Trichlorotrifluoroethane	7.32	151	4051	0.472	ng		100
22) Carbon Disulfide	7.29	76	24260	0.519	ng		98
23) trans-1,2-Dichloroethene	8.01	61	9723	0.483	ng		88
24) 1,1-Dichloroethane	8.23	63	12144	0.460	ng		97
25) Methyl tert-Butyl Ether	8.34	73	18923	0.483	ng		98
26) Vinyl Acetate	8.41	86	4322	1.832	ng	#	50
27) 2-Butanone (MEK)	8.67	72	4228	0.467	ng	#	63
28) cis-1,2-Dichloroethene	9.11	61	9434	0.470	ng		89
29) Diisopropyl Ether	9.36	87	5463	0.523	ng	#	91
30) Ethyl Acetate	9.36	61	5163	0.987	ng		95
31) n-Hexane	9.36	57	12792	0.484	ng		98
32) Chloroform	9.42	83	10687	0.464	ng		97
34) Tetrahydrofuran (THF)	9.83	72	4684	0.529	ng	#	90
35) Ethyl tert-Butyl Ether	9.92	87	7036	0.494	ng		91
36) 1,2-Dichloroethane	10.16	62	10386	0.505	ng		98
38) 1,1,1-Trichloroethane	10.44	97	10029	0.486	ng		97
39) Isopropyl Acetate	10.80	61	8268	0.918	ng	#	69
40) 1-Butanol	10.83	56	14815	1.037	ng		81
41) Benzene	10.88	78	26124	0.462	ng		98
42) Carbon Tetrachloride	11.04	117	8071	0.469	ng		97
43) Cyclohexane	11.17	84	18424	0.928	ng		98
44) tert-Amyl Methyl Ether	11.50	73	18047	0.462	ng		92
45) 1,2-Dichloropropane	11.71	63	6742	0.461	ng		96
46) Bromodichloromethane	11.88	83	8380	0.463	ng		98
47) Trichloroethene	11.94	130	5841	0.493	ng		99
48) 1,4-Dioxane	11.93	88	4547	0.481	ng		88
49) 2,2,4-Trimethylpentane...	12.00	57	29677	0.454	ng		90

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071806.D
Acq On : 7 Mar 2018 17:33 Operator: SC
Sample : 0.40ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

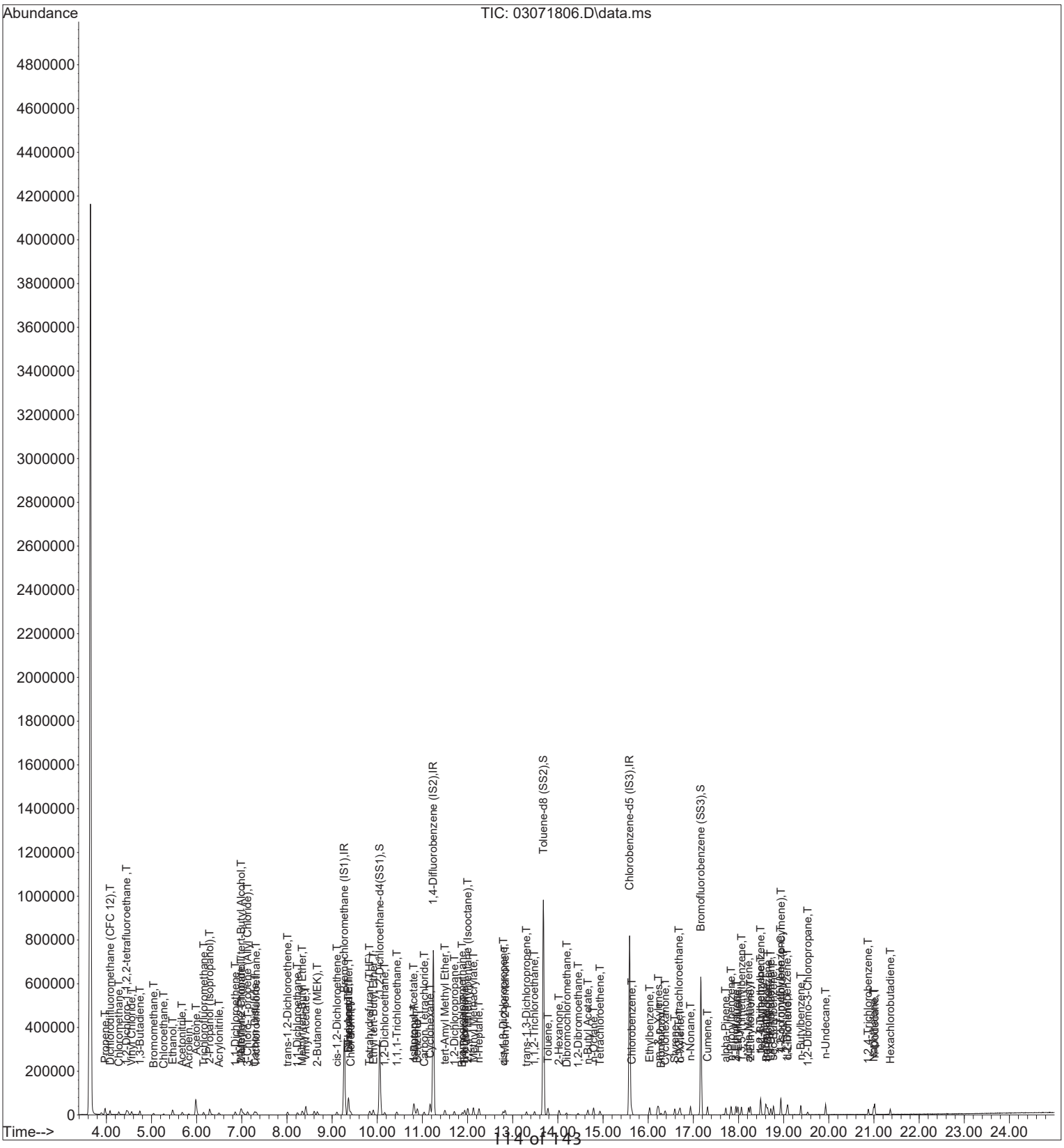
Quant Time: Mar 08 08:35:55 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.13	100	4161	0.922	ng		90
51) n-Heptane	12.25	71	6627	0.476	ng		96
52) cis-1,3-Dichloropropene	12.79	75	10509	0.467	ng		96
53) 4-Methyl-2-pentanone	12.83	58	6153	0.453	ng		87
54) trans-1,3-Dichloropropene	13.30	75	9324	0.455	ng		97
55) 1,1,2-Trichloroethane	13.48	97	5170	0.446	ng		93
58) Toluene	13.78	91	23692	0.459	ng		100
59) 2-Hexanone	14.03	43	17184	0.483	ng		90
60) Dibromochloromethane	14.20	129	5489	0.448	ng		97
61) 1,2-Dibromoethane	14.45	107	6018	0.492	ng		98
62) n-Butyl Acetate	14.66	43	19627	0.486	ng		92
63) n-Octane	14.79	57	6037	0.455	ng		94
64) Tetrachloroethene	14.93	166	5018	0.466	ng		99
65) Chlorobenzene	15.64	112	14779	0.475	ng		95
66) Ethylbenzene	16.03	91	26179	0.463	ng		99
67) m- & p-Xylenes	16.23	91	40008	0.907	ng		97
68) Bromoform	16.28	173	4164	0.472	ng		93
69) Styrene	16.59	104	14343	0.455	ng		97
70) o-Xylene	16.71	91	20062	0.450	ng		97
71) n-Nonane	16.94	43	16002	0.453	ng		89
72) 1,1,2,2-Tetrachloroethane	16.68	83	9166	0.434	ng		99
74) Cumene	17.32	105	24871	0.451	ng		100
75) alpha-Pinene	17.72	93	12978	0.470	ng		90
76) n-Propylbenzene	17.84	91	31757	0.457	ng		97
77) 3-Ethyltoluene	17.94	105	24287	0.455	ng		99
78) 4-Ethyltoluene	17.99	105	23252	0.454	ng		99
79) 1,3,5-Trimethylbenzene	18.07	105	20124	0.459	ng		96
80) alpha-Methylstyrene	18.22	118	9076	0.424	ng		94
81) 2-Ethyltoluene	18.26	105	24008	0.452	ng		99
82) 1,2,4-Trimethylbenzene	18.49	105	20277	0.446	ng		96
83) n-Decane	18.60	57	15305	0.492	ng		96
84) Benzyl Chloride	18.62	91	18161	0.432	ng		96
85) 1,3-Dichlorobenzene	18.65	146	10621	0.464	ng		99
86) 1,4-Dichlorobenzene	18.72	146	10769	0.471	ng		99
87) sec-Butylbenzene	18.77	105	27598	0.452	ng		98
88) 4-Isopropyltoluene (p-...	18.94	119	24250	0.432	ng		96
89) 1,2,3-Trimethylbenzene	18.93	105	20674	0.454	ng		94
90) 1,2-Dichlorobenzene	19.07	146	10447	0.485	ng		100
91) d-Limonene	19.09	68	9125	0.424	ng		97
92) 1,2-Dibromo-3-Chloropr...	19.53	157	2599	0.356	ng	#	53
93) n-Undecane	19.93	57	14879	0.457	ng		95
94) 1,2,4-Trichlorobenzene	20.87	180	6820	0.475	ng		97
95) Naphthalene	20.99	128	23755	0.465	ng		99
96) n-Dodecane	21.02	57	13664	0.454	ng		98
97) Hexachlorobutadiene	21.36	225	3771	0.419	ng		98
98) Cyclohexanone	16.38	55	9597	0.506	ng		93
99) tert-Butylbenzene	18.49	119	19160	0.446	ng		98
100) n-Butylbenzene	19.38	91	23104	0.446	ng		99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\07\03071806.D
Acq On : 7 Mar 2018 17:33 Operator: SC
Sample : 0.40ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071803 (4/5)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Mar 08 08:35:55 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071807.D
Acq On : 7 Mar 2018 18:07 Operator: SC
Sample : 1.0ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071802 (4/5)
ALS Vial : 6 Sample Multiplier: 1

3/8/18

Quant Time: Mar 08 08:34:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.28	130	118303	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	11.24	114	627478	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	309155	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.05	65	281956	12.731	ng		-0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.84%				
57) Toluene-d8 (SS2)	13.68	98	724642	12.728	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.84%				
73) Bromofluorobenzene (SS3)	17.17	174	172432	12.392	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.12%				
Target Compounds							Qvalue
2) Propene	3.96	42	22903	1.190	ng		96
3) Dichlorodifluoromethan...	4.07	85	33036	1.207	ng		100
4) Chloromethane	4.27	50	30758	1.132	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.44	135	12697	1.160	ng		99
6) Vinyl Chloride	4.56	62	25310	1.174	ng		98
7) 1,3-Butadiene	4.74	54	18540	1.149	ng		89
8) Bromomethane	5.04	94	11872	1.141	ng		100
9) Chloroethane	5.26	64	11576	1.131	ng		99
10) Ethanol	5.48	45	73308	6.601	ng		100
11) Acetonitrile	5.68	41	36195	1.160	ng		91
12) Acrolein	5.82	56	10792	1.159	ng		94
13) Acetone	5.98	58	68402	6.490	ng	#	69
14) Trichlorofluoromethane	6.15	101	26545	1.219	ng		99
15) 2-Propanol (Isopropanol)	6.29	45	104483	2.572	ng		95
16) Acrylonitrile	6.50	53	23286	1.193	ng		98
17) 1,1-Dichloroethene	6.86	96	13279	1.204	ng	#	80
18) 2-Methyl-2-Propanol (t...	6.96	59	90549	2.431	ng		94
19) Methylene Chloride	6.99	84	16585	1.294	ng		82
20) 3-Chloro-1-propene (Al...	7.13	41	30361	1.142	ng		92
21) Trichlorotrifluoroethane	7.32	151	10358	1.213	ng		93
22) Carbon Disulfide	7.28	76	57189	1.232	ng		99
23) trans-1,2-Dichloroethene	8.01	61	24018	1.200	ng		96
24) 1,1-Dichloroethane	8.24	63	30705	1.171	ng		100
25) Methyl tert-Butyl Ether	8.33	73	45816	1.177	ng		99
26) Vinyl Acetate	8.41	86	11392	4.861	ng	#	44
27) 2-Butanone (MEK)	8.66	72	10979	1.220	ng	#	73
28) cis-1,2-Dichloroethene	9.11	61	24053	1.207	ng		92
29) Diisopropyl Ether	9.36	87	12656	1.219	ng	#	66
30) Ethyl Acetate	9.36	61	12744	2.452	ng		94
31) n-Hexane	9.36	57	31843	1.212	ng		100
32) Chloroform	9.42	83	27807	1.214	ng		100
34) Tetrahydrofuran (THF)	9.83	72	10696	1.217	ng	#	82
35) Ethyl tert-Butyl Ether	9.90	87	15492	1.094	ng	#	87
36) 1,2-Dichloroethane	10.17	62	24414	1.194	ng		99
38) 1,1,1-Trichloroethane	10.43	97	24519	1.206	ng		95
39) Isopropyl Acetate	10.81	61	21652	2.437	ng	#	73
40) 1-Butanol	10.82	56	36710	2.606	ng		83
41) Benzene	10.89	78	62730	1.125	ng		100
42) Carbon Tetrachloride	11.04	117	20507	1.208	ng		100
43) Cyclohexane	11.17	84	45771	2.339	ng		93
44) tert-Amyl Methyl Ether	11.49	73	39557	1.026	ng		94
45) 1,2-Dichloropropane	11.70	63	17724	1.229	ng		96
46) Bromodichloromethane	11.89	83	21818	1.224	ng		100
47) Trichloroethene	11.94	130	14266	1.221	ng		98
48) 1,4-Dioxane	11.92	88	11962	1.284	ng		92
49) 2,2,4-Trimethylpentane...	12.00	57	76590	1.189	ng		91

Data File: I:\MS09\Data\2018_03\07\03071807.D
Acq On : 7 Mar 2018 18:07 Operator: SC
Sample : 1.0ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071802 (4/5)
ALS Vial : 6 Sample Multiplier: 1

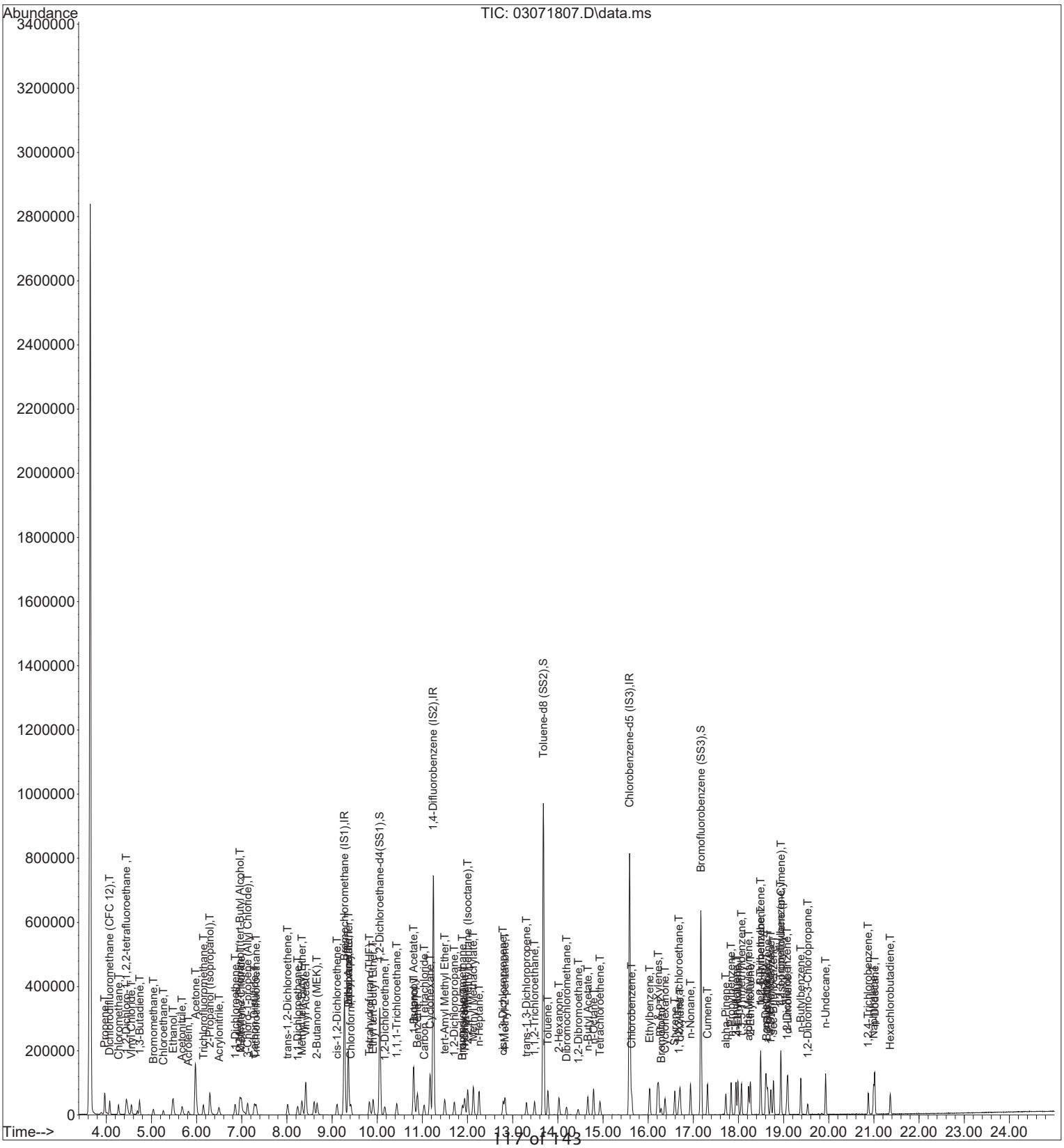
Quant Time: Mar 08 08:34:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.13	100	10481	2.356	ng	#	82
51) n-Heptane	12.26	71	16383	1.192	ng		95
52) cis-1,3-Dichloropropene	12.79	75	27827	1.255	ng		99
53) 4-Methyl-2-pentanone	12.82	58	16379	1.224	ng		84
54) trans-1,3-Dichloropropene	13.30	75	23710	1.173	ng		99
55) 1,1,2-Trichloroethane	13.48	97	14002	1.224	ng		98
58) Toluene	13.78	91	59998	1.155	ng		100
59) 2-Hexanone	14.03	43	44581	1.246	ng		91
60) Dibromochloromethane	14.19	129	14952	1.214	ng		99
61) 1,2-Dibromoethane	14.45	107	15322	1.246	ng		96
62) n-Butyl Acetate	14.66	43	50743	1.250	ng		93
63) n-Octane	14.79	57	15968	1.197	ng		90
64) Tetrachloroethene	14.93	166	12678	1.170	ng		100
65) Chlorobenzene	15.63	112	36360	1.161	ng		97
66) Ethylbenzene	16.03	91	69399	1.219	ng		98
67) m- & p-Xylenes	16.22	91	106094	2.392	ng		97
68) Bromoform	16.29	173	10983	1.238	ng		96
69) Styrene	16.59	104	38897	1.226	ng		96
70) o-Xylene	16.71	91	52407	1.168	ng		97
71) n-Nonane	16.94	43	42242	1.188	ng		90
72) 1,1,2,2-Tetrachloroethane	16.68	83	24706	1.163	ng		99
74) Cumene	17.32	105	66042	1.190	ng		97
75) alpha-Pinene	17.72	93	27016	0.973	ng		94
76) n-Propylbenzene	17.84	91	85690	1.225	ng		97
77) 3-Ethyltoluene	17.94	105	63824	1.189	ng		99
78) 4-Ethyltoluene	17.99	105	63535	1.235	ng		99
79) 1,3,5-Trimethylbenzene	18.07	105	53221	1.207	ng		98
80) alpha-Methylstyrene	18.22	118	26174	1.217	ng		99
81) 2-Ethyltoluene	18.26	105	65709	1.231	ng		98
82) 1,2,4-Trimethylbenzene	18.49	105	55113	1.205	ng		99
83) n-Decane	18.60	57	38890	1.242	ng		97
84) Benzyl Chloride	18.62	91	46642	1.104	ng		99
85) 1,3-Dichlorobenzene	18.65	146	28101	1.222	ng		100
86) 1,4-Dichlorobenzene	18.72	146	28718	1.248	ng		99
87) sec-Butylbenzene	18.77	105	75448	1.228	ng		97
88) 4-Isopropyltoluene (p-...	18.94	119	67264	1.192	ng		97
89) 1,2,3-Trimethylbenzene	18.93	105	54909	1.200	ng		98
90) 1,2-Dichlorobenzene	19.07	146	27679	1.277	ng		99
91) d-Limonene	19.09	68	24333	1.123	ng		98
92) 1,2-Dibromo-3-Chloropr...	19.53	157	7949	1.083	ng	#	71
93) n-Undecane	19.93	57	41782	1.276	ng		96
94) 1,2,4-Trichlorobenzene	20.87	180	18082	1.253	ng		99
95) Naphthalene	20.99	128	65288	1.271	ng		98
96) n-Dodecane	21.02	57	39848	1.318	ng		96
97) Hexachlorobutadiene	21.36	225	11225	1.241	ng		94
98) Cyclohexanone	16.37	55	24629	1.292	ng		92
99) tert-Butylbenzene	18.49	119	51518	1.193	ng		99
100) n-Butylbenzene	19.38	91	66538	1.278	ng		96

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\07\03071807.D
Acq On : 7 Mar 2018 18:07 Operator: SC
Sample : 1.0ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071802 (4/5)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Mar 08 08:34:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071808.D
Acq On : 7 Mar 2018 18:40 Operator: SC
Sample : 5.0ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071802 (4/5)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Mar 08 08:33:11 2018 3/8/18
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.28	130	119689	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	11.25	114	632211	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	15.59	82	313236	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.06	65	282707	12.617	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.96%				
57) Toluene-d8 (SS2)	13.68	98	727569	12.613	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.88%				
73) Bromofluorobenzene (SS3)	17.17	174	182370	12.936	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.52%				
Target Compounds							Qvalue
2) Propene	3.95	42	101543	5.217	ng		97
3) Dichlorodifluoromethan...	4.06	85	155514	5.616	ng		99
4) Chloromethane	4.25	50	139215	5.065	ng		98
5) 1,2-Dichloro-1,1,2,2-t...	4.44	135	59541	5.379	ng		100
6) Vinyl Chloride	4.54	62	118938	5.454	ng		97
7) 1,3-Butadiene	4.73	54	89759	5.500	ng		94
8) Bromomethane	5.04	94	53244	5.060	ng		99
9) Chloroethane	5.26	64	52306	5.050	ng		98
10) Ethanol	5.50	45	326960	29.098	ng		99
11) Acetonitrile	5.69	41	176873	5.602	ng		98
12) Acrolein	5.82	56	51875	5.507	ng		98
13) Acetone	5.98	58	318743	29.894	ng	#	73
14) Trichlorofluoromethane	6.15	101	124799	5.666	ng		99
15) 2-Propanol (Isopropanol)	6.31	45	494604	12.032	ng		97
16) Acrylonitrile	6.51	53	111105	5.628	ng		100
17) 1,1-Dichloroethene	6.85	96	61909	5.546	ng	#	78
18) 2-Methyl-2-Propanol (t...	6.97	59	433961	11.517	ng		95
19) Methylene Chloride	7.00	84	71593	5.523	ng		85
20) 3-Chloro-1-propene (Al...	7.13	41	149469	5.555	ng		92
21) Trichlorotrifluoroethane	7.32	151	47510	5.501	ng		97
22) Carbon Disulfide	7.28	76	260094	5.536	ng		100
23) trans-1,2-Dichloroethene	8.03	61	119045	5.879	ng		91
24) 1,1-Dichloroethane	8.25	63	139789	5.269	ng		100
25) Methyl tert-Butyl Ether	8.32	73	227009	5.765	ng		99
26) Vinyl Acetate	8.43	86	61446	25.915	ng	#	40
27) 2-Butanone (MEK)	8.67	72	52437	5.759	ng	#	77
28) cis-1,2-Dichloroethene	9.12	61	113895	5.648	ng		90
29) Diisopropyl Ether	9.36	87	57515	5.475	ng	#	58
30) Ethyl Acetate	9.36	61	60186	11.447	ng		95
31) n-Hexane	9.36	57	146334	5.503	ng		100
32) Chloroform	9.43	83	127772	5.514	ng		100
34) Tetrahydrofuran (THF)	9.82	72	50530	5.680	ng	#	85
35) Ethyl tert-Butyl Ether	9.91	87	80998	5.655	ng	#	89
36) 1,2-Dichloroethane	10.17	62	115716	5.592	ng		100
38) 1,1,1-Trichloroethane	10.44	97	116415	5.681	ng		96
39) Isopropyl Acetate	10.81	61	100817	11.262	ng	#	68
40) 1-Butanol	10.81	56	183323	12.916	ng		85
41) Benzene	10.90	78	291053	5.180	ng		99
42) Carbon Tetrachloride	11.04	117	97558	5.702	ng		100
43) Cyclohexane	11.17	84	223296	11.325	ng		96
44) tert-Amyl Methyl Ether	11.49	73	209264	5.388	ng		95
45) 1,2-Dichloropropane	11.71	63	81262	5.593	ng		100
46) Bromodichloromethane	11.89	83	102519	5.707	ng		100
47) Trichloroethene	11.95	130	66124	5.618	ng		100
48) 1,4-Dioxane	11.93	88	57557	6.131	ng		94
49) 2,2,4-Trimethylpentane...	12.00	57	361168	5.565	ng		92

Data File: I:\MS09\Data\2018_03\07\03071808.D
Acq On : 7 Mar 2018 18:40 Operator: SC
Sample : 5.0ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071802 (4/5)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Mar 08 08:33:11 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

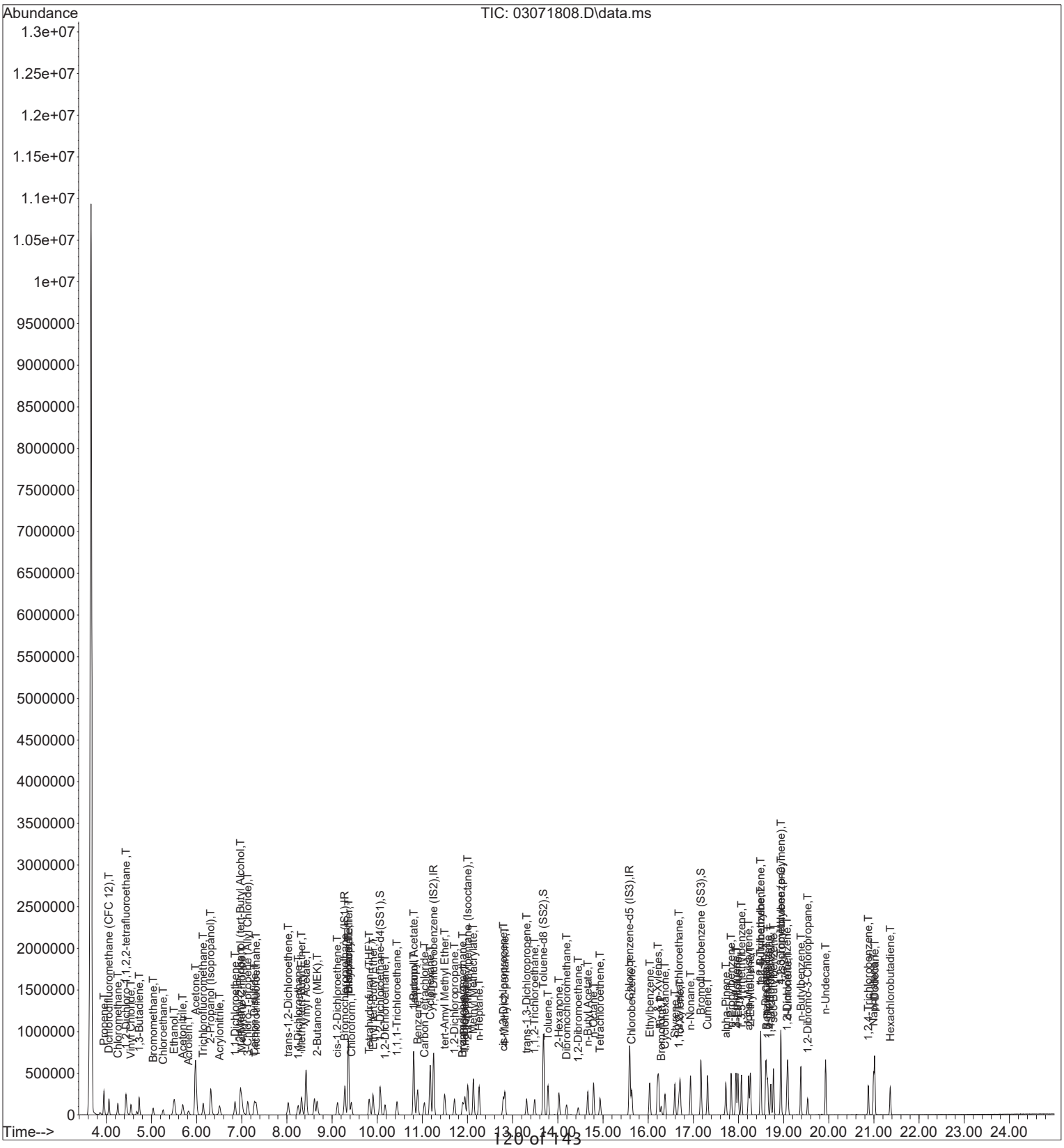
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.13	100	53048	11.837	ng	#	86
51) n-Heptane	12.26	71	78750	5.688	ng		95
52) cis-1,3-Dichloropropene	12.79	75	134465	6.019	ng		98
53) 4-Methyl-2-pentanone	12.82	58	79639	5.906	ng		83
54) trans-1,3-Dichloropropene	13.31	75	120813	5.933	ng		98
55) 1,1,2-Trichloroethane	13.48	97	64598	5.606	ng		99
58) Toluene	13.78	91	286219	5.436	ng		99
59) 2-Hexanone	14.03	43	221485	6.112	ng		93
60) Dibromochloromethane	14.19	129	72425	5.804	ng		98
61) 1,2-Dibromoethane	14.45	107	71151	5.709	ng		99
62) n-Butyl Acetate	14.66	43	249030	6.053	ng		95
63) n-Octane	14.79	57	73512	5.441	ng		96
64) Tetrachloroethene	14.93	166	61278	5.581	ng		100
65) Chlorobenzene	15.63	112	175224	5.522	ng		99
66) Ethylbenzene	16.04	91	331975	5.756	ng		98
67) m- & p-Xylenes	16.22	91	516653	11.495	ng		97
68) Bromoform	16.29	173	53788	5.983	ng		100
69) Styrene	16.59	104	195468	6.080	ng		97
70) o-Xylene	16.71	91	265755	5.848	ng		96
71) n-Nonane	16.94	43	207407	5.757	ng		93
72) 1,1,2,2-Tetrachloroethane	16.68	83	122737	5.701	ng		99
74) Cumene	17.32	105	327231	5.817	ng		98
75) alpha-Pinene	17.72	93	158030	5.616	ng		95
76) n-Propylbenzene	17.84	91	426002	6.011	ng		98
77) 3-Ethyltoluene	17.94	105	327844	6.026	ng		99
78) 4-Ethyltoluene	17.99	105	317715	6.094	ng		99
79) 1,3,5-Trimethylbenzene	18.07	105	273321	6.118	ng		97
80) alpha-Methylstyrene	18.22	118	142874	6.557	ng		99
81) 2-Ethyltoluene	18.26	105	327080	6.049	ng		99
82) 1,2,4-Trimethylbenzene	18.49	105	286460	6.179	ng		98
83) n-Decane	18.60	57	199462	6.287	ng		98
84) Benzyl Chloride	18.62	91	271390	6.337	ng		97
85) 1,3-Dichlorobenzene	18.65	146	144959	6.221	ng		100
86) 1,4-Dichlorobenzene	18.72	146	147480	6.327	ng		98
87) sec-Butylbenzene	18.77	105	383857	6.165	ng		99
88) 4-Isopropyltoluene (p-...	18.94	119	344339	6.024	ng		97
89) 1,2,3-Trimethylbenzene	18.94	105	284278	6.131	ng		99
90) 1,2-Dichlorobenzene	19.07	146	141081	6.424	ng		99
91) d-Limonene	19.09	68	134744	6.140	ng		98
92) 1,2-Dibromo-3-Chloropr...	19.53	157	44570	5.994	ng	#	75
93) n-Undecane	19.93	57	218681	6.590	ng		97
94) 1,2,4-Trichlorobenzene	20.88	180	98471	6.733	ng		98
95) Naphthalene	20.99	128	368402	7.079	ng		100
96) n-Dodecane	21.02	57	215122	7.021	ng		96
97) Hexachlorobutadiene	21.36	225	57949	6.321	ng		100
98) Cyclohexanone	16.37	55	123349	6.384	ng		92
99) tert-Butylbenzene	18.49	119	266455	6.088	ng		99
100) n-Butylbenzene	19.38	91	340625	6.460	ng		98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071808.D
Acq On : 7 Mar 2018 18:40 Operator: SC
Sample : 5.0ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071802 (4/5)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: Mar 08 08:33:11 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071809.D
Acq On : 7 Mar 2018 19:14 Operator: SC
Sample : 25ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

3/8/18

Quant Time: Mar 08 08:30:35 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Mar 07 08:47:49 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.30	130	135858	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	11.26	114	704690	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	15.59	82	354064	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.08	65	300948	11.832	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.64%				
57) Toluene-d8 (SS2)	13.68	98	818161	12.548	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.40%				
73) Bromofluorobenzene (SS3)	17.17	174	206887	12.982	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.84%				
Target Compounds							Qvalue
2) Propene	3.94	42	658861	29.821	ng		98
3) Dichlorodifluoromethan...	4.06	85	935554	29.766	ng		99
4) Chloromethane	4.26	50	887873	28.459	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.43	135	376724	29.981	ng		100
6) Vinyl Chloride	4.55	62	746235	30.146	ng		100
7) 1,3-Butadiene	4.73	54	623551	33.658	ng		95
8) Bromomethane	5.04	94	346168	28.983	ng		100
9) Chloroethane	5.26	64	341391	29.038	ng		100
10) Ethanol	5.54	45	2008473	157.473	ng		99
11) Acetonitrile	5.72	41	1059297	29.560	ng		99
12) Acrolein	5.84	56	313646	29.334	ng		99
13) Acetone	6.00	58	1889341	156.105	ng	#	78
14) Trichlorofluoromethane	6.15	101	733622	29.343	ng		100
15) 2-Propanol (Isopropanol)	6.34	45	2973598	63.731	ng		98
16) Acrylonitrile	6.53	53	695925	31.054	ng		99
17) 1,1-Dichloroethene	6.86	96	388370	30.651	ng	#	82
18) 2-Methyl-2-Propanol (t...	7.00	59	2658527	62.161	ng		97
19) Methylene Chloride	7.03	84	430811	29.278	ng		87
20) 3-Chloro-1-propene (Al...	7.15	41	902190	29.538	ng		95
21) Trichlorotrifluoroethane	7.32	151	296649	30.260	ng		97
22) Carbon Disulfide	7.29	76	1662208	31.171	ng		100
23) trans-1,2-Dichloroethene	8.04	61	730959	31.803	ng		93
24) 1,1-Dichloroethane	8.27	63	857611	28.476	ng		100
25) Methyl tert-Butyl Ether	8.33	73	1418577	31.736	ng		100
26) Vinyl Acetate	8.44	86	471470	175.176	ng	#	64
27) 2-Butanone (MEK)	8.68	72	327077	31.646	ng	#	84
28) cis-1,2-Dichloroethene	9.14	61	709686	31.002	ng		93
29) Diisopropyl Ether	9.36	87	367195	30.792	ng	#	70
30) Ethyl Acetate	9.37	61	385837	64.652	ng		94
31) n-Hexane	9.36	57	908797	30.109	ng		99
32) Chloroform	9.45	83	795422	30.240	ng		99
34) Tetrahydrofuran (THF)	9.82	72	323390	32.028	ng	#	89
35) Ethyl tert-Butyl Ether	9.91	87	546800	33.631	ng		94
36) 1,2-Dichloroethane	10.18	62	704733	30.003	ng		100
38) 1,1,1-Trichloroethane	10.45	97	715382	31.320	ng		98
39) Isopropyl Acetate	10.81	61	643773	64.519	ng	#	78
40) 1-Butanol	10.82	56	1123264	71.000	ng		88
41) Benzene	10.91	78	1802148	28.772	ng		100
42) Carbon Tetrachloride	11.06	117	609231	31.944	ng		100
43) Cyclohexane	11.18	84	1405299	63.944	ng		96
44) tert-Amyl Methyl Ether	11.50	73	1418592	32.770	ng		96
45) 1,2-Dichloropropane	11.72	63	510064	31.493	ng		100
46) Bromodichloromethane	11.90	83	654274	32.676	ng		99
47) Trichloroethene	11.95	130	417915	31.856	ng		100
48) 1,4-Dioxane	11.92	88	371416	35.496	ng		95
49) 2,2,4-Trimethylpentane...	12.01	57	2260494	31.248	ng		93

Data File: I:\MS09\Data\2018_03\07\03071809.D
Acq On : 7 Mar 2018 19:14 Operator: SC
Sample : 25ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

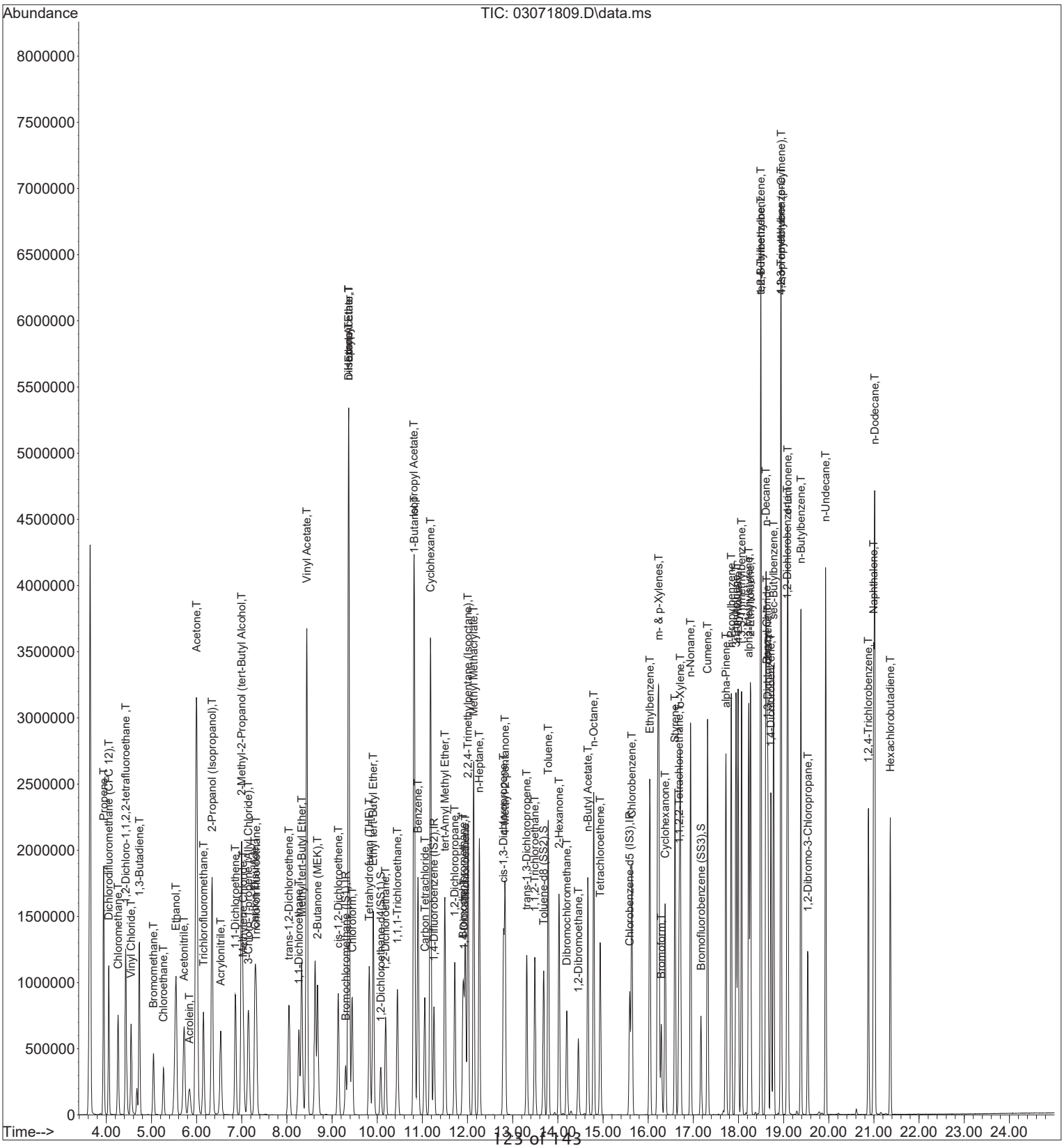
Quant Time: Mar 08 08:30:35 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Mar 07 08:47:49 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	12.14	100	350494	70.162	ng	90
51) n-Heptane	12.26	71	495664	32.121	ng	97
52) cis-1,3-Dichloropropene	12.80	75	868361	34.872	ng	99
53) 4-Methyl-2-pentanone	12.83	58	515404	34.290	ng	91
54) trans-1,3-Dichloropropene	13.31	75	782149	34.459	ng	99
55) 1,1,2-Trichloroethane	13.49	97	420286	32.720	ng	98
58) Toluene	13.79	91	1853038	31.137	ng	99
59) 2-Hexanone	14.03	43	1380639	33.705	ng	94
60) Dibromochloromethane	14.20	129	480702	34.081	ng	100
61) 1,2-Dibromoethane	14.45	107	466447	33.113	ng	100
62) n-Butyl Acetate	14.66	43	1570027	33.763	ng	96
63) n-Octane	14.79	57	484131	31.699	ng	95
64) Tetrachloroethene	14.94	166	412842	33.265	ng	100
65) Chlorobenzene	15.64	112	1153390	32.155	ng	99
66) Ethylbenzene	16.04	91	2152719	33.020	ng	98
67) m- & p-Xylenes	16.23	91	3408112	67.081	ng	97
68) Bromoform	16.29	173	369506	36.363	ng	100
69) Styrene	16.59	104	1304802	35.905	ng	98
70) o-Xylene	16.71	91	1730895	33.696	ng	97
71) n-Nonane	16.94	43	1301067	31.948	ng	94
72) 1,1,2,2-Tetrachloroethane	16.69	83	825660	33.927	ng	100
74) Cumene	17.32	105	2126582	33.447	ng	99
75) alpha-Pinene	17.72	93	1148184	36.101	ng	97
76) n-Propylbenzene	17.84	91	2718848	33.942	ng	99
77) 3-Ethyltoluene	17.94	105	2205848	35.867	ng	100
78) 4-Ethyltoluene	17.99	105	2006251	34.043	ng	99
79) 1,3,5-Trimethylbenzene	18.07	105	1784841	35.346	ng	98
80) alpha-Methylstyrene	18.23	118	958160	38.905	ng	98
81) 2-Ethyltoluene	18.26	105	2131613	34.877	ng	99
82) 1,2,4-Trimethylbenzene	18.50	105	1917659	36.597	ng	99
83) n-Decane	18.61	57	1259704	35.127	ng	99
84) Benzyl Chloride	18.63	91	1863755	38.502	ng	98
85) 1,3-Dichlorobenzene	18.65	146	953299	36.196	ng	100
86) 1,4-Dichlorobenzene	18.72	146	954987	36.245	ng	100
87) sec-Butylbenzene	18.78	105	2447630	34.779	ng	99
88) 4-Isopropyltoluene (p-...	18.94	119	2284237	35.351	ng	98
89) 1,2,3-Trimethylbenzene	18.94	105	1905376	36.355	ng	99
90) 1,2-Dichlorobenzene	19.08	146	919851	37.053	ng	100
91) d-Limonene	19.09	68	902520	36.381	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.54	157	310168	36.905	ng	84
93) n-Undecane	19.93	57	1371825	36.573	ng	98
94) 1,2,4-Trichlorobenzene	20.88	180	663252	40.118	ng	99
95) Naphthalene	20.99	128	2475065	42.074	ng	100
96) n-Dodecane	21.02	57	1402093	40.486	ng	98
97) Hexachlorobutadiene	21.36	225	390404	37.673	ng	98
98) Cyclohexanone	16.38	55	794399	36.375	ng	94
99) tert-Butylbenzene	18.50	119	1766990	35.715	ng	99
100) n-Butylbenzene	19.38	91	2155447	36.162	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\07\03071809.D
Acq On : 7 Mar 2018 19:14 Operator: SC
Sample : 25ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Mar 08 08:30:35 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Wed Mar 07 08:47:49 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071810.D
Acq On : 7 Mar 2018 19:48 Operator: SC
Sample : 50ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

3/8/18

Quant Time: Mar 08 08:41:44 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.31	130	162259	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	11.27	114	835680	12.500	ng		0.01
56) Chlorobenzene-d5 (IS3)	15.59	82	408120	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.09	65	339154	11.165	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 89.28%				
57) Toluene-d8 (SS2)	13.69	98	956991	12.733	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.84%				
73) Bromofluorobenzene (SS3)	17.17	174	232333	12.648	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.20%				
Target Compounds							Qvalue
2) Propene	3.95	42	1413075	53.551	ng		98
3) Dichlorodifluoromethan...	4.07	85	1965009	52.347	ng		100
4) Chloromethane	4.28	50	1865906	50.076	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.44	135	834935	55.635	ng		100
6) Vinyl Chloride	4.56	62	1659370	56.127	ng		100
7) 1,3-Butadiene	4.74	54	1383413	62.524	ng		96
8) Bromomethane	5.06	94	791807	55.508	ng		99
9) Chloroethane	5.28	64	772306	55.003	ng		100
10) Ethanol	5.57	45	4414011	289.768	ng		100
11) Acetonitrile	5.74	41	2393035	55.912	ng		100
12) Acrolein	5.86	56	704998	55.206	ng		99
13) Acetone	6.02	58	4191828	289.992	ng		87
14) Trichlorofluoromethane	6.16	101	1580781	52.939	ng		100
15) 2-Propanol (Isopropanol)	6.36	45	6480096	116.285	ng		99
16) Acrylonitrile	6.55	53	1584649	59.207	ng		100
17) 1,1-Dichloroethene	6.87	96	898321	59.361	ng		89
18) 2-Methyl-2-Propanol (t...	7.02	59	5899248	115.491	ng		98
19) Methylene Chloride	7.04	84	992606	56.483	ng		92
20) 3-Chloro-1-propene (Al...	7.16	41	1996343	54.726	ng		97
21) Trichlorotrifluoroethane	7.33	151	685726	58.566	ng		98
22) Carbon Disulfide	7.30	76	3796037	59.603	ng		100
23) trans-1,2-Dichloroethene	8.06	61	1646157	59.969	ng		95
24) 1,1-Dichloroethane	8.28	63	1912707	53.175	ng		100
25) Methyl tert-Butyl Ether	8.33	73	3161182	59.214	ng		100
26) Vinyl Acetate	8.46	86	1114582	346.744	ng	#	84
27) 2-Butanone (MEK)	8.69	72	737468	59.742	ng	#	91
28) cis-1,2-Dichloroethene	9.15	61	1570332	57.437	ng		95
29) Diisopropyl Ether	9.37	87	847129	59.480	ng	#	84
30) Ethyl Acetate	9.38	61	880947	123.596	ng		96
31) n-Hexane	9.37	57	2052846	56.945	ng		99
32) Chloroform	9.46	83	1747640	55.631	ng		99
34) Tetrahydrofuran (THF)	9.83	72	725213	60.138	ng		93
35) Ethyl tert-Butyl Ether	9.92	87	1213381	62.485	ng		95
36) 1,2-Dichloroethane	10.19	62	1491651	53.172	ng		99
38) 1,1,1-Trichloroethane	10.45	97	1556647	57.468	ng		98
39) Isopropyl Acetate	10.82	61	1446087	122.210	ng	#	87
40) 1-Butanol	10.84	56	2546542	135.733	ng		93
41) Benzene	10.91	78	4043535	54.438	ng		99
42) Carbon Tetrachloride	11.06	117	1323006	58.495	ng		99
43) Cyclohexane	11.18	84	3195282	122.602	ng		97
44) tert-Amyl Methyl Ether	11.50	73	3130495	60.980	ng		97
45) 1,2-Dichloropropane	11.73	63	1129447	58.804	ng		100
46) Bromodichloromethane	11.91	83	1424723	60.000	ng		100
47) Trichloroethene	11.96	130	947001	60.871	ng		100
48) 1,4-Dioxane	11.93	88	845900	68.170	ng		97
49) 2,2,4-Trimethylpentane...	12.01	57	4983905	58.096	ng		95

Data File: I:\MS09\Data\2018_03\07\03071810.D
Acq On : 7 Mar 2018 19:48 Operator: SC
Sample : 50ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

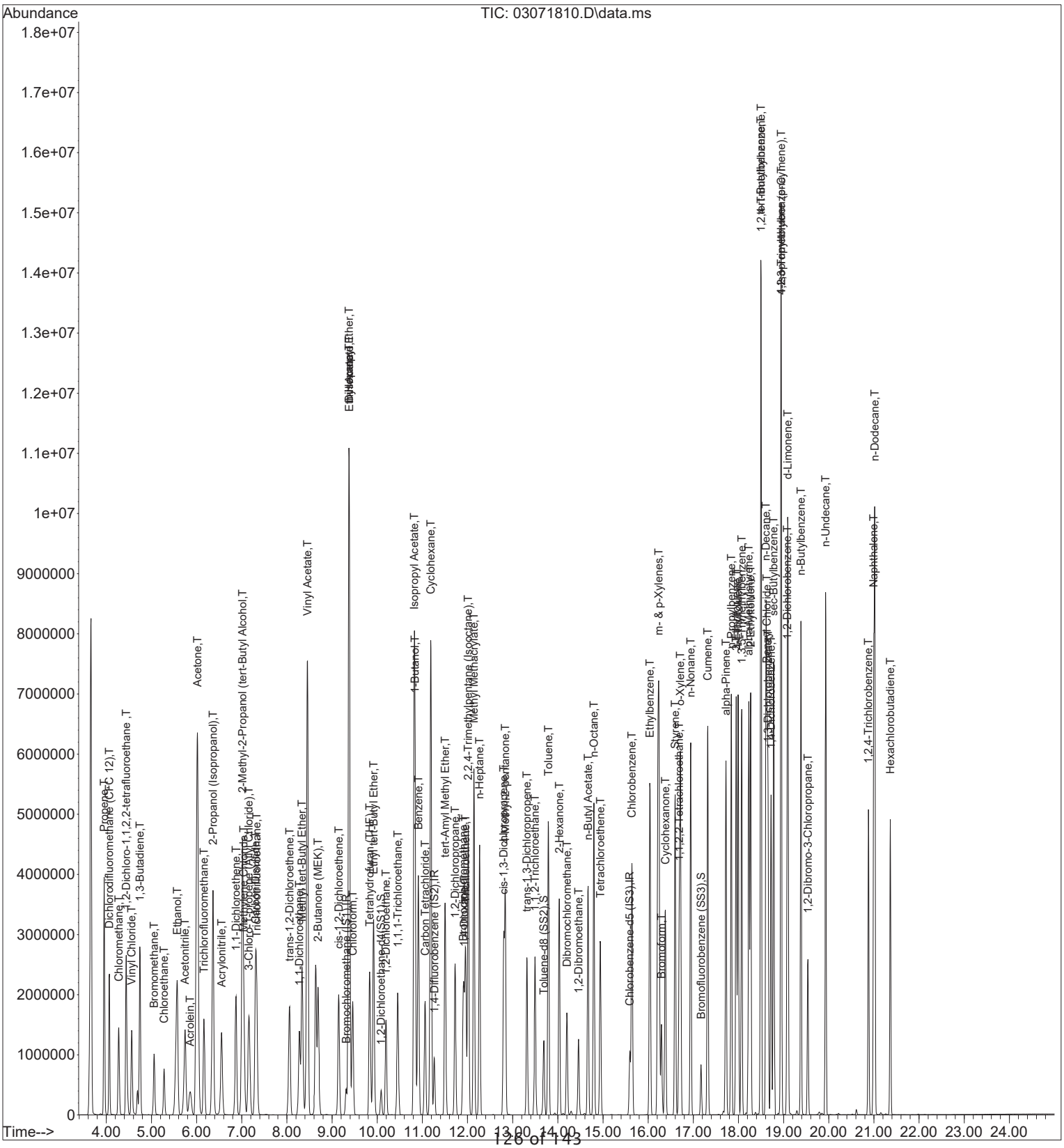
Quant Time: Mar 08 08:41:44 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	12.14	100	796750	134.494	ng	92
51) n-Heptane	12.27	71	1105912	60.434	ng	98
52) cis-1,3-Dichloropropene	12.80	75	1920077	65.021	ng	99
53) 4-Methyl-2-pentanone	12.83	58	1137696	63.827	ng	95
54) trans-1,3-Dichloropropene	13.31	75	1700477	63.174	ng	100
55) 1,1,2-Trichloroethane	13.49	97	938398	61.604	ng	99
58) Toluene	13.79	91	4087702	59.589	ng	100
59) 2-Hexanone	14.03	43	2953615	62.555	ng	96
60) Dibromochloromethane	14.20	129	1061621	65.299	ng	100
61) 1,2-Dibromoethane	14.46	107	1029921	63.430	ng	100
62) n-Butyl Acetate	14.67	43	3367416	62.824	ng	97
63) n-Octane	14.80	57	1054086	59.875	ng	97
64) Tetrachloroethene	14.94	166	924945	64.658	ng	100
65) Chlorobenzene	15.64	112	2537623	61.376	ng	100
66) Ethylbenzene	16.04	91	4748365	63.188	ng	99
67) m- & p-Xylenes	16.23	91	7496900	128.016	ng	99
68) Bromoform	16.29	173	821856	70.166	ng	99
69) Styrene	16.60	104	2884647	68.864	ng	99
70) o-Xylene	16.71	91	3766774	63.617	ng	99
71) n-Nonane	16.94	43	2714366	57.824	ng	96
72) 1,1,2,2-Tetrachloroethane	16.69	83	1825907	65.090	ng	100
74) Cumene	17.32	105	4594828	62.695	ng	100
75) alpha-Pinene	17.72	93	2475008	67.511	ng	97
76) n-Propylbenzene	17.84	91	5850838	63.367	ng	99
77) 3-Ethyltoluene	17.95	105	4644662	65.519	ng	100
78) 4-Ethyltoluene	17.99	105	4464879	65.728	ng	100
79) 1,3,5-Trimethylbenzene	18.07	105	3854832	66.228	ng	99
80) alpha-Methylstyrene	18.23	118	2086660	73.505	ng	99
81) 2-Ethyltoluene	18.27	105	4599675	65.291	ng	100
82) 1,2,4-Trimethylbenzene	18.50	105	4245434	70.289	ng	100
83) n-Decane	18.61	57	2686658	64.995	ng	100
84) Benzyl Chloride	18.63	91	4089328	73.290	ng	99
85) 1,3-Dichlorobenzene	18.66	146	2109359	69.483	ng	100
86) 1,4-Dichlorobenzene	18.72	146	2103366	69.256	ng	100
87) sec-Butylbenzene	18.78	105	5250668	64.727	ng	99
88) 4-Isopropyltoluene (p-...	18.94	119	5001963	67.158	ng	98
89) 1,2,3-Trimethylbenzene	18.94	105	4223473	69.911	ng	99
90) 1,2-Dichlorobenzene	19.08	146	2034653	71.104	ng	100
91) d-Limonene	19.09	68	1980980	69.277	ng	99
92) 1,2-Dibromo-3-Chloropr...	19.54	157	676667	69.849	ng	88
93) n-Undecane	19.93	57	2905478	67.201	ng	99
94) 1,2,4-Trichlorobenzene	20.88	180	1465359	76.896	ng	99
95) Naphthalene	21.00	128	5412451	79.820	ng	100
96) n-Dodecane	21.02	57	2998879	75.124	ng	99
97) Hexachlorobutadiene	21.36	225	857430	71.781	ng	100
98) Cyclohexanone	16.38	55	1722055	68.408	ng	96
99) tert-Butylbenzene	18.50	119	3894108	68.284	ng	100
100) n-Butylbenzene	19.38	91	4595514	66.887	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\07\03071810.D
Acq On : 7 Mar 2018 19:48 Operator: SC
Sample : 50ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Mar 08 08:41:44 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071811.D
Acq On : 7 Mar 2018 20:22 Operator: SC
Sample : 100ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

3/8/18

Quant Time: Mar 08 08:43:05 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.32	130	180078	12.500	ng		0.02
37) 1,4-Difluorobenzene (IS2)	11.27	114	931402	12.500	ng		0.02
56) Chlorobenzene-d5 (IS3)	15.60	82	447601	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.10	65	360165	10.683	ng		0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 85.44%				
57) Toluene-d8 (SS2)	13.69	98	1057140	12.825	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.56%				
73) Bromofluorobenzene (SS3)	17.18	174	257833	12.798	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.40%				
Target Compounds							Qvalue
2) Propene	3.96	42	3493195	119.281	ng		98
3) Dichlorodifluoromethan...	4.07	85	4129639	99.126	ng		100
4) Chloromethane	4.28	50	3603287	87.133	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.45	135	1816837	109.084	ng		100
6) Vinyl Chloride	4.57	62	3612146	110.088	ng		99
7) 1,3-Butadiene	4.75	54	2993779	121.916	ng		96
8) Bromomethane	5.07	94	1711722	108.122	ng		99
9) Chloroethane	5.29	64	1591523	102.131	ng		100
10) Ethanol	5.60	45	9495230	561.657	ng		100
11) Acetonitrile	5.77	41	5195432	109.377	ng		100
12) Acrolein	5.87	56	1539382	108.616	ng		99
13) Acetone	6.04	58	9003608	561.238	ng		95
14) Trichlorofluoromethane	6.17	101	3329962	100.483	ng		100
15) 2-Propanol (Isopropanol)	6.39	45	11826725	191.230	ng		99
16) Acrylonitrile	6.57	53	3461889	116.546	ng		100
17) 1,1-Dichloroethene	6.88	96	1972769	117.462	ng		92
18) 2-Methyl-2-Propanol (t...	7.04	59	12631279	222.816	ng		98
19) Methylene Chloride	7.06	84	2196468	112.619	ng		96
20) 3-Chloro-1-propene (Al...	7.17	41	4289259	105.948	ng		98
21) Trichlorotrifluoroethane	7.34	151	1533436	118.008	ng		100
22) Carbon Disulfide	7.31	76	8425777	119.206	ng		100
23) trans-1,2-Dichloroethene	8.07	61	3569705	117.175	ng		96
24) 1,1-Dichloroethane	8.29	63	4122189	103.261	ng		100
25) Methyl tert-Butyl Ether	8.34	73	6858935	115.765	ng		99
26) Vinyl Acetate	8.47	86	2522877	707.199	ng	#	68
27) 2-Butanone (MEK)	8.71	72	1612863	117.729	ng		96
28) cis-1,2-Dichloroethene	9.16	61	3396083	111.925	ng		96
29) Diisopropyl Ether	9.38	87	1900522	120.238	ng	#	96
30) Ethyl Acetate	9.39	61	1930366	244.029	ng		99
31) n-Hexane	9.38	57	4403772	110.071	ng		99
32) Chloroform	9.47	83	3763371	107.941	ng		99
34) Tetrahydrofuran (THF)	9.84	72	1594131	119.111	ng		95
35) Ethyl tert-Butyl Ether	9.93	87	2641387	122.564	ng		97
36) 1,2-Dichloroethane	10.20	62	3129942	100.531	ng		99
38) 1,1,1-Trichloroethane	10.46	97	3331422	110.350	ng		98
39) Isopropyl Acetate	10.83	61	3168994	240.291	ng		98
40) 1-Butanol	10.86	56	5522022	264.080	ng		95
41) Benzene	10.92	78	8862631	107.055	ng		99
42) Carbon Tetrachloride	11.07	117	2815265	111.681	ng		100
43) Cyclohexane	11.19	84	7088223	244.023	ng		99
44) tert-Amyl Methyl Ether	11.51	73	6794538	118.751	ng		98
45) 1,2-Dichloropropane	11.73	63	2472211	115.486	ng		100
46) Bromodichloromethane	11.91	83	3109017	117.475	ng		100
47) Trichloroethene	11.96	130	2122792	122.426	ng		100
48) 1,4-Dioxane	11.94	88	1913729	138.374	ng		98
49) 2,2,4-Trimethylpentane...	12.02	57	10731716	112.240	ng		96

Data File: I:\MS09\Data\2018_03\07\03071811.D
Acq On : 7 Mar 2018 20:22 Operator: SC
Sample : 100ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Mar 08 08:43:05 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

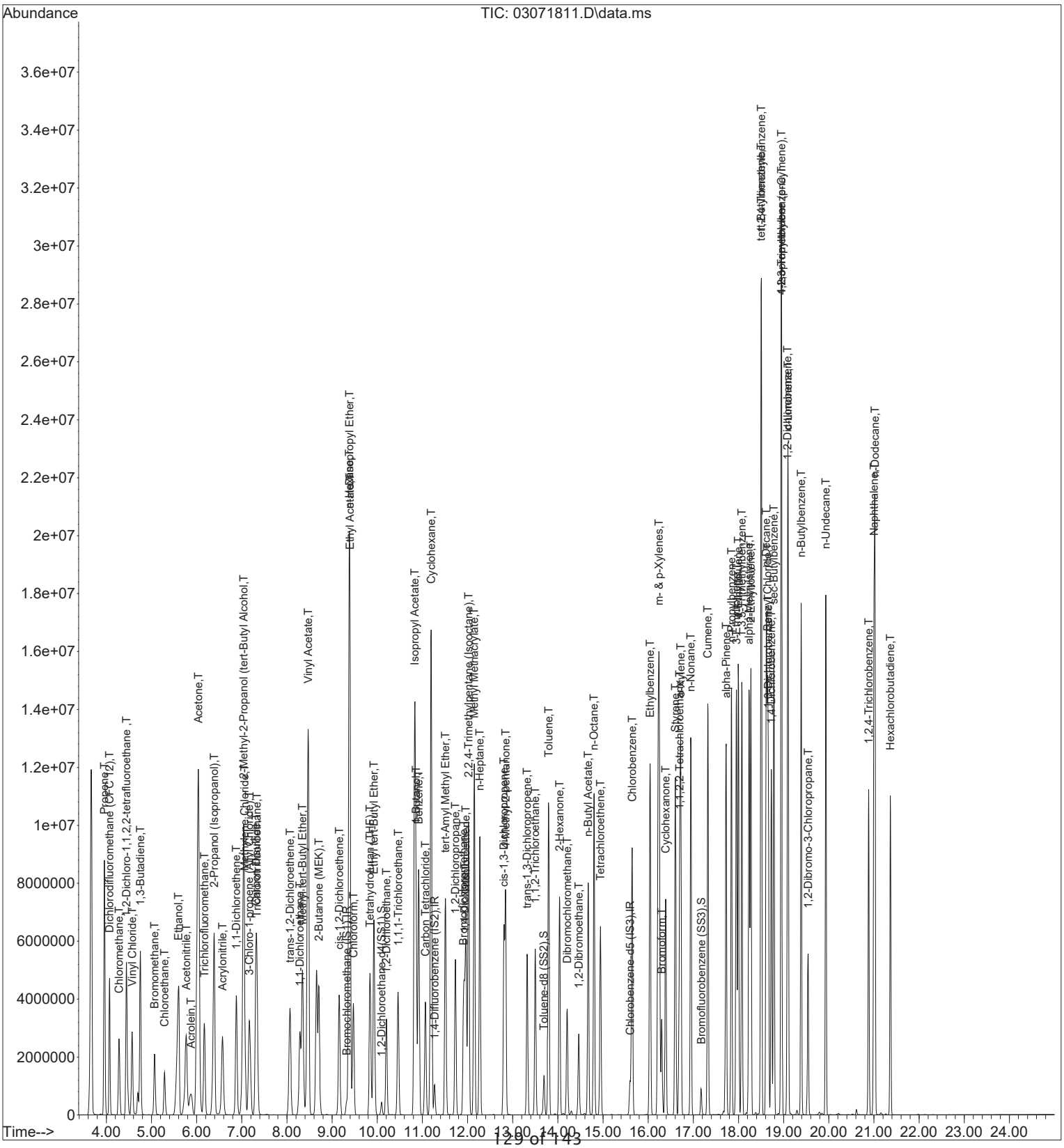
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	12.15	100	1799557	272.552	ng	96
51) n-Heptane	12.27	71	2430774	119.181	ng	98
52) cis-1,3-Dichloropropene	12.80	75	4192971	127.396	ng	100
53) 4-Methyl-2-pentanone	12.84	58	2477512	124.708	ng	98
54) trans-1,3-Dichloropropene	13.32	75	3686518	122.882	ng	100
55) 1,1,2-Trichloroethane	13.50	97	2082412	122.657	ng	99
58) Toluene	13.79	91	8964715	119.157	ng	100
59) 2-Hexanone	14.04	43	6286519	121.399	ng	98
60) Dibromochloromethane	14.21	129	2337486	131.094	ng	99
61) 1,2-Dibromoethane	14.46	107	2282080	128.150	ng	99
62) n-Butyl Acetate	14.67	43	7137400	121.413	ng	99
63) n-Octane	14.80	57	2307824	119.529	ng	98
64) Tetrachloroethene	14.94	166	2097030	133.661	ng	99
65) Chlorobenzene	15.64	112	5629959	124.158	ng	100
66) Ethylbenzene	16.04	91	10355115	125.643	ng	100
67) m- & p-Xylenes	16.24	91	16591774	258.328	ng	100
68) Bromoform	16.30	173	1868015	145.414	ng	99
69) Styrene	16.60	104	6394221	139.182	ng	98
70) o-Xylene	16.72	91	8361708	128.764	ng	99
71) n-Nonane	16.94	43	5716865	111.044	ng	99
72) 1,1,2,2-Tetrachloroethane	16.70	83	4139845	134.560	ng	100
74) Cumene	17.32	105	10020490	124.666	ng	99
75) alpha-Pinene	17.73	93	5487000	136.467	ng	97
76) n-Propylbenzene	17.85	91	12523380	123.670	ng	98
77) 3-Ethyltoluene	17.95	105	10209337	131.313	ng	99
78) 4-Ethyltoluene	18.00	105	9723749	130.518	ng	99
79) 1,3,5-Trimethylbenzene	18.07	105	8507182	133.267	ng	100
80) alpha-Methylstyrene	18.23	118	4667300	149.908	ng	99
81) 2-Ethyltoluene	18.27	105	10062401	130.233	ng	99
82) 1,2,4-Trimethylbenzene	18.51	105	9306951	140.499	ng	100
83) n-Decane	18.61	57	5735504	126.513	ng	98
84) Benzyl Chloride	18.64	91	9057573	148.013	ng	99
85) 1,3-Dichlorobenzene	18.66	146	4787086	143.779	ng	100
86) 1,4-Dichlorobenzene	18.73	146	4704561	141.240	ng	100
87) sec-Butylbenzene	18.78	105	11338330	127.443	ng	98
88) 4-Isopropyltoluene (p-...	18.95	119	10579840	129.520	ng	96
89) 1,2,3-Trimethylbenzene	18.95	105	9237037	139.414	ng	98
90) 1,2-Dichlorobenzene	19.09	146	4596750	146.471	ng	100
91) d-Limonene	19.10	68	4342185	138.457	ng	98
92) 1,2-Dibromo-3-Chloropr...	19.54	157	1506088	141.753	ng	93
93) n-Undecane	19.93	57	6100194	128.647	ng	99
94) 1,2,4-Trichlorobenzene	20.88	180	3298399	157.818	ng	100
95) Naphthalene	21.00	128	11726169	157.678	ng	98
96) n-Dodecane	21.02	57	6348632	145.009	ng	98
97) Hexachlorobutadiene	21.36	225	1968165	150.235	ng	100
98) Cyclohexanone	16.39	55	3743905	135.607	ng	97
99) tert-Butylbenzene	18.50	119	8417635	134.585	ng	98
100) n-Butylbenzene	19.39	91	9767751	129.629	ng	98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\07\03071811.D
Acq On : 7 Mar 2018 20:22 Operator: SC
Sample : 100ng TO-15 ICAL STD
Misc : S31-03061806/S31-03071801 (4/5)
ALS Vial : 7 Sample Multiplier: 1

Quant Time: Mar 08 08:43:05 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:32:52 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



00884354

Data File: I:\MS09\Data\2018_03\07\03071813.D
Acq On : 7 Mar 2018 21:30 Operator: SC
Sample : 25ng TO-15 ICV STD
Misc : S31-03061806/S31-03021804 (3/31)
ALS Vial : 8 Sample Multiplier: 1

3/8/18

Quant Time: Mar 08 09:01:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:49:25 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.30	130	174013	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	11.26	114	885900	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	15.59	82	417909	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.08	65	343026	10.804	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 86.40%				
57) Toluene-d8 (SS2)	13.68	98	1000081	12.731	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.84%				
73) Bromofluorobenzene (SS3)	17.17	174	237168	12.698	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 101.60%				
Target Compounds							Qvalue
2) Propene	3.94	42	873137	28.078	ng		99
3) Dichlorodifluoromethan...	4.06	85	1158958	25.551	ng		99
4) Chloromethane	4.26	50	1222414	27.777	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.43	135	522395	29.139	ng		100
6) Vinyl Chloride	4.55	62	1075401	29.947	ng		99
7) 1,3-Butadiene	4.73	54	897781	32.751	ng		97
8) Bromomethane	5.04	94	529386	29.150	ng		99
9) Chloroethane	5.26	64	513554	30.437	ng		100
10) Ethanol	5.54	45	3011325	148.319	ng		100
11) Acetonitrile	5.72	41	1532407	28.798	ng		99
12) Acrolein	5.84	56	452645	29.132	ng		100
13) Acetone	6.00	58	2686814	149.467	ng		92
14) Trichlorofluoromethane	6.15	101	926151	25.715	ng		99
15) 2-Propanol (Isopropanol)	6.34	45	4079212	57.034	ng		100
16) Acrylonitrile	6.53	53	988332	30.348	ng		100
17) 1,1-Dichloroethene	6.86	96	556438	29.909	ng		92
18) 2-Methyl-2-Propanol (t...	7.00	59	3600555	56.054	ng		99
19) Methylene Chloride	7.03	84	610366	27.936	ng		93
20) 3-Chloro-1-propene (Al...	7.15	41	1265030	29.249	ng		97
21) Trichlorotrifluoroethane	7.32	151	416678	29.581	ng		98
22) Carbon Disulfide	7.29	76	2348337	30.173	ng		100
23) trans-1,2-Dichloroethene	8.04	61	990307	29.744	ng		96
24) 1,1-Dichloroethane	8.27	63	1199896	27.257	ng		100
25) Methyl tert-Butyl Ether	8.33	73	1889122	28.323	ng		99
26) Vinyl Acetate	8.44	86	674695	174.019	ng	#	83
27) 2-Butanone (MEK)	8.68	72	452990	29.592	ng	#	92
28) cis-1,2-Dichloroethene	9.14	61	933498	28.306	ng		96
29) Diisopropyl Ether	9.36	87	503228	27.615	ng	#	82
30) Ethyl Acetate	9.37	61	529353	60.997	ng		96
31) n-Hexane	9.36	57	1199072	27.753	ng		100
32) Chloroform	9.44	83	1032797	26.853	ng		100
34) Tetrahydrofuran (THF)	9.82	72	441854	29.091	ng		93
35) Ethyl tert-Butyl Ether	9.91	87	729257	30.461	ng		95
36) 1,2-Dichloroethane	10.18	62	861747	25.094	ng		100
38) 1,1,1-Trichloroethane	10.45	97	892046	27.539	ng		99
39) Isopropyl Acetate	10.81	61	878870	61.745	ng	#	87
40) 1-Butanol	10.82	56	1617275	61.514	ng		96
41) Benzene	10.90	78	2470324	27.495	ng		100
42) Carbon Tetrachloride	11.05	117	763680	28.020	ng		99
43) Cyclohexane	11.18	84	1910902	60.786	ng		97
44) tert-Amyl Methyl Ether	11.50	73	1882961	29.666	ng		98
45) 1,2-Dichloropropane	11.72	63	681987	29.163	ng		100
46) Bromodichloromethane	11.90	83	840239	29.744	ng		100
47) Trichloroethene	11.95	130	563030	28.971	ng		100
48) 1,4-Dioxane	11.92	88	511300	31.151	ng		97
49) 2,2,4-Trimethylpentane...	12.01	57	3012222	29.345	ng		97

Data File: I:\MS09\Data\2018_03\07\03071813.D
Acq On : 7 Mar 2018 21:30 Operator: SC
Sample : 25ng TO-15 ICV STD
Misc : S31-03061806/S31-03021804 (3/31)
ALS Vial : 8 Sample Multiplier: 1

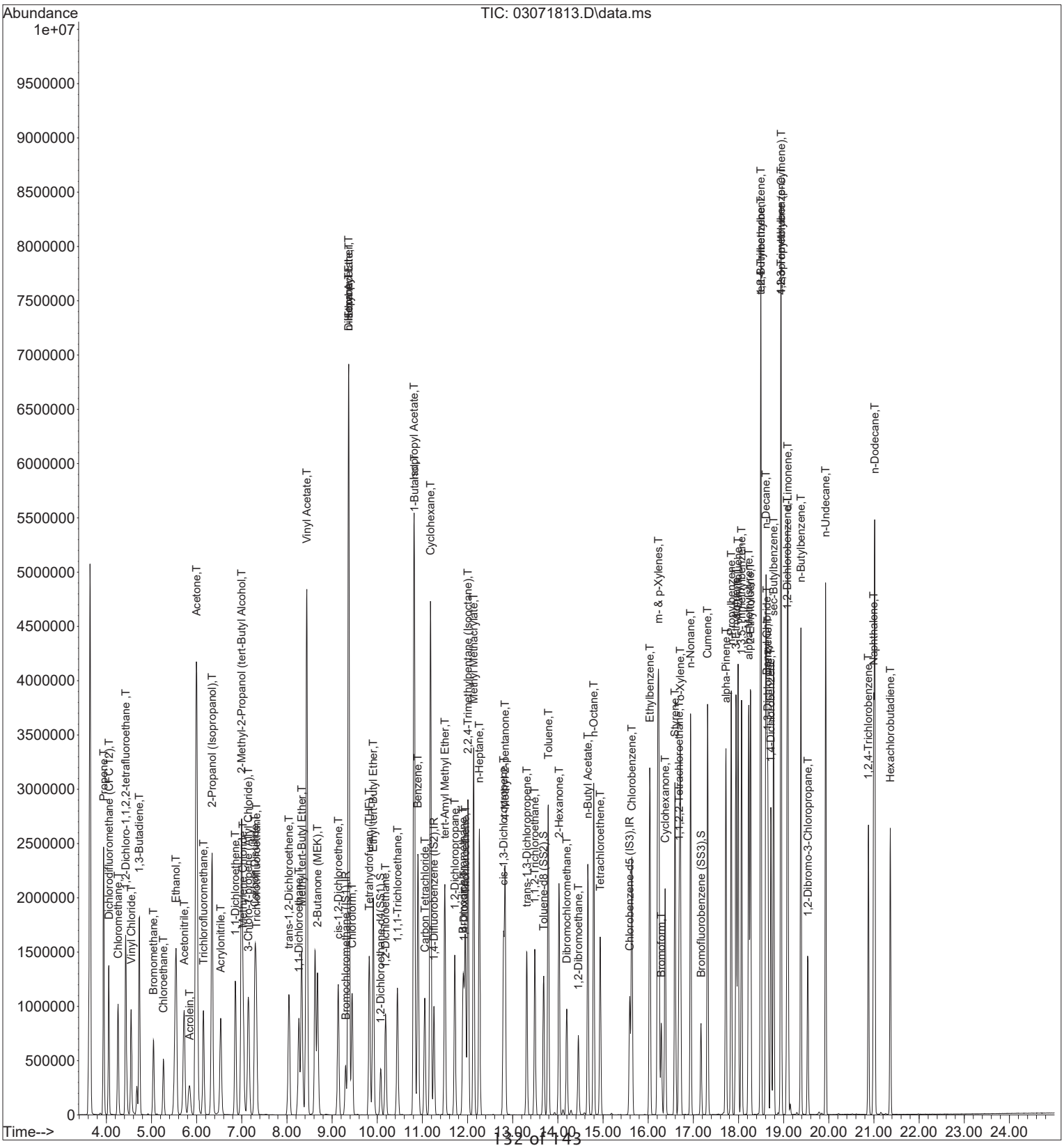
Quant Time: Mar 08 09:01:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:49:25 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	12.14	100	480408	66.527	ng	93
51) n-Heptane	12.26	71	657665	30.212	ng	98
52) cis-1,3-Dichloropropene	12.80	75	1071976	30.474	ng	99
53) 4-Methyl-2-pentanone	12.83	58	687817	31.750	ng	95
54) trans-1,3-Dichloropropene	13.31	75	989029	30.141	ng	99
55) 1,1,2-Trichloroethane	13.49	97	557843	29.876	ng	98
58) Toluene	13.79	91	2427558	29.744	ng	99
59) 2-Hexanone	14.03	43	1753411	29.990	ng	97
60) Dibromochloromethane	14.20	129	619260	32.409	ng	100
61) 1,2-Dibromoethane	14.45	107	606698	30.759	ng	99
62) n-Butyl Acetate	14.66	43	2043980	31.597	ng	98
63) n-Octane	14.79	57	625045	30.421	ng	97
64) Tetrachloroethene	14.94	166	543353	32.269	ng	99
65) Chlorobenzene	15.64	112	1492816	29.888	ng	100
66) Ethylbenzene	16.04	91	2780939	30.458	ng	99
67) m- & p-Xylenes	16.23	91	4310766	61.333	ng	99
68) Bromoform	16.29	173	467994	32.660	ng	100
69) Styrene	16.59	104	1650246	31.907	ng	99
70) o-Xylene	16.71	91	2180992	30.575	ng	98
71) n-Nonane	16.94	43	1609006	29.401	ng	96
72) 1,1,2,2-Tetrachloroethane	16.69	83	1050623	32.369	ng	100
74) Cumene	17.32	105	2690874	30.704	ng	99
75) alpha-Pinene	17.72	93	1448341	32.118	ng	98
76) n-Propylbenzene	17.84	91	3405707	30.985	ng	99
77) 3-Ethyltoluene	17.94	105	2682828	30.957	ng	100
78) 4-Ethyltoluene	17.99	105	2587074	31.381	ng	100
79) 1,3,5-Trimethylbenzene	18.07	105	2202522	30.858	ng	99
80) alpha-Methylstyrene	18.23	118	1189070	33.315	ng	99
81) 2-Ethyltoluene	18.26	105	2631568	30.878	ng	100
82) 1,2,4-Trimethylbenzene	18.50	105	2351426	31.171	ng	100
83) n-Decane	18.61	57	1558642	30.198	ng	99
84) Benzyl Chloride	18.63	91	2186805	33.272	ng	99
85) 1,3-Dichlorobenzene	18.65	146	1156418	30.430	ng	100
86) 1,4-Dichlorobenzene	18.72	146	1145074	29.964	ng	99
87) sec-Butylbenzene	18.78	105	3006160	30.539	ng	99
88) 4-Isopropyltoluene (p-...	18.94	119	2828741	30.802	ng	99
89) 1,2,3-Trimethylbenzene	18.94	105	2418821	31.574	ng	99
90) 1,2-Dichlorobenzene	19.08	146	1123623	31.234	ng	100
91) d-Limonene	19.09	68	1127597	32.703	ng	98
92) 1,2-Dibromo-3-Chloropr...	19.54	157	381419	32.488	ng	90
93) n-Undecane	19.93	57	1662390	31.086	ng	99
94) 1,2,4-Trichlorobenzene	20.88	180	766457	32.052	ng	99
95) Naphthalene	20.99	128	2656238	28.501	ng	100
96) n-Dodecane	21.02	57	1686357	31.966	ng	98
97) Hexachlorobutadiene	21.36	225	464410	31.502	ng	100
98) Cyclohexanone	16.38	55	1050819	31.364	ng	97
99) tert-Butylbenzene	18.50	119	2192620	31.475	ng	99
100) n-Butylbenzene	19.38	91	2584746	30.420	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS09\Data\2018_03\07\03071813.D
Acq On : 7 Mar 2018 21:30 Operator: SC
Sample : 25ng TO-15 ICV STD
Misc : S31-03061806/S31-03021804 (3/31)
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Mar 08 09:01:34 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Thu Mar 08 08:49:25 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEET

Data File Name: **03071813.D**
Data File Path: **I:\MS09\Data\2018_03\07**
Operator: **SC**
Date Acquired: **3/7/18** **21:30**

Acq. Method File: **TO15.M**
Sample Name: **25ng TO-15 ICV STD**
Misc Info: **S31-03061806/S31-03021804**
Instrument Name: **MS09**

3/8/18

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail	ICV/AZ 70-130%
2)	**Propene**	**3.94**	**28.078**	26.275	107	**54**	**133**	*	*
3)	**Dichlorodifluoromethane (CFC 1**	**4.06**	**25.551**	**26.600**	96	**64**	**115**	*	*
4)	**Chloromethane**	**4.26**	**27.777**	**26.250**	106	**47**	**140**	*	*
5)	**1,2-Dichloro-1,1,2,2-tetrafluoroet**	**4.43**	**29.139**	**26.325**	111	**60**	**112**	*	*
6)	**Vinyl Chloride**	**4.55**	**29.947**	**26.350**	114	**63**	**127**	*	*
7)	**1,3-Butadiene**	**4.73**	**32.751**	**26.225**	125	**57**	**149**	*	*
8)	**Bromomethane**	**5.04**	**29.150**	**26.225**	111	**63**	**132**	*	*
9)	**Chloroethane**	**5.26**	**30.437**	**26.250**	116	**68**	**129**	*	*
10)	**Ethanol**	**5.54**	**148.319**	**130.375**	114	**62**	**131**	*	*
11)	**Acetonitrile**	**5.72**	**28.798**	**26.200**	110	**56**	**136**	*	*
12)	**Acrolein**	**5.84**	**29.132**	**26.075**	112	**60**	**132**	*	*
13)	**Acetone**	**6.00**	**149.467**	**131.825**	113	**63**	**124**	*	*
14)	**Trichlorofluoromethane**	**6.15**	**25.715**	**26.025**	99	**65**	**113**	*	*
15)	**2-Propanol (Isopropanol)**	**6.34**	**57.034**	**52.775**	108	**62**	**135**	*	*
16)	**Acrylonitrile**	**6.53**	**30.348**	**26.450**	115	**68**	**138**	*	*
17)	**1,1-Dichloroethene**	**6.86**	**29.909**	**26.675**	112	**72**	**118**	*	*
18)	2-Methyl-2-Propanol (tert-Butyl Alc	7.00	56.054	53.350	105	61	128	*	*
19)	**Methylene Chloride**	**7.03**	**27.936**	**26.600**	105	**67**	**116**	*	*
20)	**3-Chloro-1-propene (Allyl Chlorid**	**7.15**	**29.249**	**26.525**	110	**61**	**143**	*	*
21)	**Trichlorotrifluoroethane**	**7.32**	**29.581**	**26.750**	111	**68**	**113**	*	*
22)	**Carbon Disulfide**	**7.29**	**30.173**	**26.725**	113	**68**	**120**	*	*
23)	**trans-1,2-Dichloroethene**	**8.04**	**29.744**	**26.700**	111	**71**	**125**	*	*
24)	**1,1-Dichloroethane**	**8.27**	**27.257**	**26.525**	103	**68**	**118**	*	*
25)	**Methyl tert-Butyl Ether**	**8.33**	**28.323**	**26.625**	106	**60**	**123**	*	*
26)	**Vinyl Acetate**	**8.44**	**174.019**	**132.750**	131	**73**	**135**	*	*
27)	**2-Butanone (MEK)**	**8.68**	**29.592**	**26.450**	112	**70**	**129**	*	*
28)	**cis-1,2-Dichloroethene**	**9.14**	**28.306**	**26.475**	107	**69**	**121**	*	*
29)	Diisopropyl Ether	9.36	27.615	26.600	104	65	117	*	*
30)	**Ethyl Acetate**	**9.37**	**60.997**	**53.300**	114	**66**	**140**	*	*
31)	**n-Hexane**	**9.36**	**27.753**	**26.625**	104	**61**	**124**	*	*
32)	**Chloroform**	**9.44**	**26.853**	**26.500**	101	**69**	**113**	*	*
34)	**Tetrahydrofuran (THF)**	**9.82**	**29.091**	**26.550**	110	**66**	**121**	*	*
35)	Ethyl tert-Butyl Ether	9.91	30.461	26.525	115	69	120	*	*
36)	**1,2-Dichloroethane**	**10.18**	**25.094**	**26.500**	95	**62**	**120**	*	*
38)	**1,1,1-Trichloroethane**	**10.45**	**27.539**	**26.525**	104	**65**	**116**	*	*
39)	Isopropyl Acetate	10.81	61.745	53.275	116	70	126	*	*
40)	1-Butanol	10.82	61.514	53.300	115	62	141	*	*
41)	**Benzene**	**10.90**	**27.495**	**26.625**	103	**66**	**111**	*	*
42)	**Carbon Tetrachloride**	**11.05**	**28.020**	**26.700**	105	**64**	**122**	*	*
43)	**Cyclohexane**	**11.18**	**60.786**	**53.150**	114	**69**	**115**	*	*
44)	tert-Amyl Methyl Ether	11.50	29.666	**26.550**	112	68	119	*	*
45)	**1,2-Dichloropropane**	**11.72**	**29.163**	**26.525**	110	**69**	**121**	*	*
46)	**Bromodichloromethane**	**11.90**	**29.744**	**26.700**	111	**69**	**123**	*	*
47)	**Trichloroethene**	**11.95**	**28.971**	**26.550**	109	**69**	**112**	*	*
48)	**1,4-Dioxane**	**11.92**	**31.151**	**26.600**	117	**74**	**123**	*	*
49)	2,2,4-Trimethylpentane (Isooctane)	12.01	29.345	26.525	111	67	120	*	*

Bold = 75 Compound List
*** = Pass**

Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEET

Data File Name: **03071813.D** **TO15.M**
Data File Path: **I:\MS09\Data\2018_03\07** Sample Name: **25ng TO-15 ICV STD**
Operator: **SC** Misc Info: **S31-03061806/S31-03021804 (**
Date Acquired: **3/7/18** **21:30** Instrument Name: **MS09**

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail	ICV/AZ 70-130%
50)	**Methyl Methacrylate**	**12.14**	**66.527**	**52.950**	126	**75**	**125**	FAIL	*
51)	**n-Heptane**	**12.26**	**30.212**	**26.625**	113	**68**	**118**	*	*
52)	**cis-1,3-Dichloropropene**	**12.80**	**30.474**	**26.025**	117	**74**	**129**	*	*
53)	**4-Methyl-2-pentanone**	**12.83**	**31.750**	**26.650**	119	**66**	**138**	*	*
54)	**trans-1,3-Dichloropropene**	**13.31**	**30.141**	**26.625**	113	**75**	**130**	*	*
55)	**1,1,2-Trichloroethane**	**13.49**	**29.876**	**26.500**	113	**73**	**117**	*	*
58)	**Toluene**	**13.79**	**29.744**	**26.400**	113	**66**	**114**	*	*
59)	**2-Hexanone**	**14.03**	**29.990**	**26.425**	113	**58**	**146**	*	*
60)	**Dibromochloromethane**	**14.20**	**32.409**	**26.450**	123	**67**	**130**	*	*
61)	**1,2-Dibromoethane**	**14.45**	**30.759**	**26.425**	116	**70**	**127**	*	*
62)	**n-Butyl Acetate**	**14.66**	**31.597**	**26.850**	118	**62**	**140**	*	*
63)	**n-Octane**	**14.79**	**30.421**	**26.525**	115	**65**	**121**	*	*
64)	**Tetrachloroethene**	**14.94**	**32.269**	**26.500**	122	**62**	**119**	**FAIL**	*
65)	**Chlorobenzene**	**15.64**	**29.888**	**26.525**	113	**66**	**115**	*	*
66)	**Ethylbenzene**	**16.04**	**30.458**	**26.475**	115	**69**	**117**	*	*
67)	**m- & p-Xylenes**	**16.23**	**61.333**	**52.975**	116	**67**	**117**	*	*
68)	**Bromoform**	**16.29**	**32.660**	**26.525**	123	**67**	**135**	*	*
69)	**Styrene**	**16.59**	**31.907**	**26.350**	121	**70**	**128**	*	*
70)	**o-Xylene**	**16.71**	**30.575**	**26.400**	116	**67**	**118**	*	*
71)	**n-Nonane**	**16.94**	**29.401**	**26.500**	111	**61**	**127**	*	*
72)	**1,1,2,2-Tetrachloroethane**	**16.69**	**32.369**	**26.450**	122	**70**	**125**	*	*
74)	**Cumene**	**17.32**	**30.704**	**26.525**	116	**68**	**116**	*	*
75)	**alpha-Pinene**	**17.72**	**32.118**	**26.600**	121	**69**	**122**	*	*
76)	**n-Propylbenzene**	**17.84**	**30.985**	**26.750**	116	**70**	**118**	*	*
77)	3-Ethyltoluene	17.94	30.957	26.450	117	68	117	*	*
78)	**4-Ethyltoluene**	**17.99**	**31.381**	**26.425**	**119**	**69**	**124**	*	*
79)	**1,3,5-Trimethylbenzene**	**18.07**	**30.858**	**26.500**	**116**	**65**	**117**	*	*
80)	alpha-Methylstyrene	18.23	33.315	26.525	**126**	71	132	*	*
81)	2-Ethyltoluene	18.26	30.878	26.700	**116**	67	119	*	*
82)	**1,2,4-Trimethylbenzene**	**18.50**	**31.171**	**26.550**	**117**	**67**	**124**	*	*
83)	n-Decane	18.61	30.198	26.625	**113**	63	129	*	*
84)	**Benzyl Chloride**	**18.63**	**33.272**	**26.550**	**125**	**75**	**142**	*	*
85)	**1,3-Dichlorobenzene**	**18.65**	**30.430**	**26.475**	**115**	**70**	**124**	*	*
86)	**1,4-Dichlorobenzene**	**18.72**	**29.964**	**26.750**	**112**	**63**	**124**	*	*
87)	sec-Butylbenzene	18.78	30.539	26.575	**115**	68	119	*	*
88)	4-Isopropyltoluene (p-Cymene)	18.94	30.802	26.600	**116**	65	122	*	*
89)	1,2,3-Trimethylbenzene	18.94	31.574	26.600	**119**	66	128	*	*
90)	**1,2-Dichlorobenzene**	**19.08**	**31.234**	**26.750**	**117**	**66**	**125**	*	*
91)	**d-Limonene**	**19.09**	**32.703**	**26.625**	**123**	**64**	**135**	*	*
92)	**1,2-Dibromo-3-Chloropropane**	**19.54**	**32.488**	**26.300**	**124**	**73**	**136**	*	*
93)	n-Undecane	19.93	31.086	26.775	**116**	67	135	*	*
94)	**1,2,4-Trichlorobenzene**	**20.88**	**32.052**	**27.200**	**118**	**70**	**141**	*	*
95)	**Naphthalene**	**20.99**	**28.501**	**26.125**	**109**	**71**	**146**	*	*
96)	n-Dodecane	21.02	31.966	26.825	**119**	69	152	*	*
97)	**Hexachlorobutadiene**	**21.36**	**31.502**	**26.550**	**119**	63	126	*	*
98)	Cyclohexanone	16.38	31.364	26.150	120	58	138	*	*
99)	tert-Butylbenzene	18.50	31.475	26.525	119	65	121	*	*
100)	n-Butylbenzene	19.38	30.420	26.575	114	71	125	*	*

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Data File: I:\MS09\Data\2018_03\20\03201801.D
Acq On : 20 Mar 2018 1:40 Operator: LH
Sample : CCV R9032018_25ng
Misc : S31-03061806/S31-02221803 (3/23)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Mar 20 08:59:51 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 3/20/18

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	IR	Bromochloromethane (IS1)	1.000	1.000	0.0	108	0.00
2	T	Propene	2.234	2.213	0.9	102	0.01
3	T	Dichlorodifluoromethane (CF	3.258	2.878	11.7	95	0.01
4	T	Chloromethane	3.161	2.970	6.0	99	0.01
5	T	1,2-Dichloro-1,1,2,2-tetraf	1.288	1.107	14.1	88	0.01
6	T	Vinyl Chloride	2.580	2.483	3.8	101	0.01
7	T	1,3-Butadiene	1.969	2.047	-4.0	102	0.00
8	T	Bromomethane	1.305	1.140	12.6	96	0.00
9	T	Chloroethane	1.212	1.149	5.2	100	0.00
10	T	Ethanol	1.458	1.367	6.2	105	0.00
11	T	Acetonitrile	3.822	3.620	5.3	106	0.00
12	T	Acrolein	1.116	1.015	9.1	100	0.00
13	T	Acetone	1.291	1.237	4.2	102	0.00
14	T	Trichlorofluoromethane	2.587	2.289	11.5	96	0.00
15	T	2-Propanol (Isopropanol)	5.138	4.949	3.7	103	0.00
16	T	Acrylonitrile	2.339	2.297	1.8	102	0.00
17	T	1,1-Dichloroethene	1.336	1.200	10.2	96	0.00
18	T	2-Methyl-2-Propanol (tert-B	4.614	4.315	6.5	101	0.00
19	T	Methylene Chloride	1.569	1.360	13.3	98	0.00
20	T	3-Chloro-1-propene (Allyl C	3.107	2.987	3.9	103	0.00
21	T	Trichlorotrifluoroethane	1.012	0.886	12.5	92	0.00
22	T	Carbon Disulfide	5.591	5.223	6.6	98	0.00
23	T	trans-1,2-Dichloroethene	2.392	2.307	3.6	100	0.00
24	T	1,1-Dichloroethane	3.162	2.844	10.1	100	0.00
25	T	Methyl tert-Butyl Ether	4.791	4.447	7.2	99	0.00
26	T	Vinyl Acetate	0.279	0.315	-12.9	104	0.00
27	T	2-Butanone (MEK)	1.100	1.032	6.2	98	0.00
28	T	cis-1,2-Dichloroethene	2.369	2.250	5.0	99	0.00
29	T	Diisopropyl Ether	1.309	1.141	12.8	97	0.00
30	T	Ethyl Acetate	0.623	0.622	0.2	101	0.00
31	T	n-Hexane	3.104	2.980	4.0	103	0.00
32	T	Chloroform	2.763	2.464	10.8	97	0.00
33	S	1,2-Dichloroethane-d4(SS1)	2.281	2.361	-3.5	115	0.00
34	T	Tetrahydrofuran (THF)	1.091	1.004	8.0	97	0.00
35	T	Ethyl tert-Butyl Ether	1.720	1.690	1.7	96	0.00
36	T	1,2-Dichloroethane	2.467	2.223	9.9	98	0.00
37	IR	1,4-Difluorobenzene (IS2)	1.000	1.000	0.0	111	0.00
38	T	1,1,1-Trichloroethane	0.457	0.411	10.1	96	0.00
39	T	Isopropyl Acetate	0.201	0.197	2.0	101	0.00
40	T	1-Butanol	0.371	0.350	5.7	103	0.00
41	T	Benzene	1.268	1.062	16.2	97	0.00
42	T	Carbon Tetrachloride	0.385	0.345	10.4	94	0.00
43	T	Cyclohexane	0.444	0.407	8.3	96	0.00
44	T	tert-Amyl Methyl Ether	0.896	0.843	5.9	98	0.00
45	T	1,2-Dichloropropane	0.330	0.302	8.5	98	0.00
46	T	Bromodichloromethane	0.399	0.377	5.5	96	0.00
47	T	Trichloroethene	0.274	0.227	17.2	90	0.00
48	T	1,4-Dioxane	0.232	0.215	7.3	96	0.00
49	T	2,2,4-Trimethylpentane (Iso	1.448	1.369	5.5	100	0.00
50	T	Methyl Methacrylate	0.102	0.100	2.0	94	0.00
51	T	n-Heptane	0.307	0.291	5.2	98	0.00
52	T	cis-1,3-Dichloropropene	0.496	0.478	3.6	96	0.00
53	T	4-Methyl-2-pentanone	0.306	0.309	-1.0	99	0.00
54	T	trans-1,3-Dichloropropene	0.463	0.446	3.7	95	0.00

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Quant Method : I:\MS09\Methods\R9030718.M
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QLast Update : Mon Mar 12 10:11:56 2018
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DataAcq Meth:TO15.M

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
55	T	1,1,2-Trichloroethane	0.263	0.240	8.7	95	0.00
56	IR	Chlorobenzene-d5 (IS3)	1.000	1.000	0.0	110	0.00
57	S	Toluene-d8 (SS2)	2.350	2.326	1.0	110	0.00
58	T	Toluene	2.441	2.130	12.7	94	0.00
59	T	2-Hexanone	1.749	1.678	4.1	100	0.00
60	T	Dibromochloromethane	0.572	0.542	5.2	93	0.00
61	T	1,2-Dibromoethane	0.590	0.522	11.5	92	0.00
62	T	n-Butyl Acetate	1.935	1.899	1.9	100	0.00
63	T	n-Octane	0.615	0.576	6.3	98	0.00
64	T	Tetrachloroethene	0.504	0.441	12.5	88	0.00
65	T	Chlorobenzene	1.494	1.270	15.0	91	0.00
66	T	Ethylbenzene	2.731	2.487	8.9	94	0.00
67	T	m- & p-Xylenes	2.102	1.931	8.1	93	0.00
68	T	Bromoform	0.429	0.397	7.5	88	0.00
69	T	Styrene	1.547	1.435	7.2	90	0.00
70	T	o-Xylene	2.134	1.981	7.2	94	0.00
71	T	n-Nonane	1.637	1.597	2.4	100	0.00
72	T	1,1,2,2-Tetrachloroethane	0.971	0.980	-0.9	97	0.00
73	S	Bromofluorobenzene (SS3)	0.559	0.539	3.6	101	0.00
74	T	Cumene	2.621	2.396	8.6	92	0.00
75	T	alpha-Pinene	1.349	1.318	2.3	93	0.00
76	T	n-Propylbenzene	3.288	3.078	6.4	93	0.00
77	T	3-Ethyltoluene	2.592	2.395	7.6	88	0.00
78	T	4-Ethyltoluene	2.466	2.332	5.4	95	0.00
79	T	1,3,5-Trimethylbenzene	2.135	2.008	5.9	92	0.00
80	T	alpha-Methylstyrene	1.068	1.018	4.7	86	0.00
81	T	2-Ethyltoluene	2.549	2.362	7.3	91	0.00
82	T	1,2,4-Trimethylbenzene	2.256	2.159	4.3	92	0.00
83	T	n-Decane	1.544	1.489	3.6	97	0.00
84	T	Benzyl Chloride	1.966	1.966	0.0	88	0.00
85	T	1,3-Dichlorobenzene	1.137	0.993	12.7	87	0.00
86	T	1,4-Dichlorobenzene	1.143	0.987	13.6	85	0.00
87	T	sec-Butylbenzene	2.944	2.738	7.0	92	0.00
88	T	4-Isopropyltoluene (p-Cymen	2.747	2.596	5.5	90	0.00
89	T	1,2,3-Trimethylbenzene	2.291	2.199	4.0	92	0.00
90	T	1,2-Dichlorobenzene	1.076	0.960	10.8	88	0.00
91	T	d-Limonene	1.031	1.079	-4.7	93	0.00
92	T	1,2-Dibromo-3-Chloropropane	0.351	0.342	2.6	90	0.00
93	T	n-Undecane	1.600	1.621	-1.3	97	0.00
94	T	1,2,4-Trichlorobenzene	0.715	0.622	13.0	80	0.00
95	T	Naphthalene	2.788	2.368	15.1	78	0.00
96	T	n-Dodecane	1.578	1.628	-3.2	95	0.00
97	T	Hexachlorobutadiene	0.441	0.407	7.7	86	0.00
98	T	Cyclohexanone	1.002	0.937	6.5	95	0.00
99	T	tert-Butylbenzene	2.084	1.975	5.2	91	0.00
100	T	n-Butylbenzene	2.541	2.421	4.7	92	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0

Quantitation Report (QT Reviewed)

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ALS Vial : 2 Sample Multiplier: 1

Quant Time: Mar 20 08:59:51 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 3/20/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	9.30	130	146904	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	11.26	114	779041	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	15.59	82	387844	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	10.08	65	346857	12.941	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.52%				
57) Toluene-d8 (SS2)	13.68	98	902077	12.374	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.96%				
73) Bromofluorobenzene (SS3)	17.17	174	209235	12.071	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.56%				
Target Compounds							Qvalue
2) Propene	3.95	42	674176	25.681	ng		98
3) Dichlorodifluoromethan...	4.06	85	886014	23.138	ng		100
4) Chloromethane	4.26	50	877947	23.631	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.43	135	332177	21.948	ng		100
6) Vinyl Chloride	4.56	62	752990	24.839	ng		98
7) 1,3-Butadiene	4.73	54	636864	27.520	ng		92
8) Bromomethane	5.05	94	332593	21.694	ng		99
9) Chloroethane	5.27	64	341637	23.984	ng		100
10) Ethanol	5.54	45	2117547	123.544	ng		100
11) Acetonitrile	5.72	41	1126329	25.073	ng		99
12) Acrolein	5.84	56	314194	23.953	ng		99
13) Acetone	6.00	58	1934063	127.446	ng	#	78
14) Trichlorofluoromethane	6.15	101	706740	23.244	ng		100
15) 2-Propanol (Isopropanol)	6.34	45	3063864	50.743	ng		98
16) Acrylonitrile	6.53	53	712730	25.924	ng		99
17) 1,1-Dichloroethene	6.86	96	374004	23.813	ng	#	78
18) 2-Methyl-2-Propanol (t...	6.99	59	2687797	49.566	ng		96
19) Methylene Chloride	7.03	84	422632	22.913	ng		82
20) 3-Chloro-1-propene (Al...	7.15	41	925113	25.337	ng		92
21) Trichlorotrifluoroethane	7.32	151	274103	23.050	ng		92
22) Carbon Disulfide	7.30	76	1631359	24.829	ng		100
23) trans-1,2-Dichloroethene	8.04	61	732632	26.065	ng		90
24) 1,1-Dichloroethane	8.27	63	854120	22.983	ng		100
25) Methyl tert-Butyl Ether	8.32	73	1398015	24.828	ng		99
26) Vinyl Acetate	8.44	86	488738	149.318	ng	#	47
27) 2-Butanone (MEK)	8.68	72	319034	24.687	ng	#	74
28) cis-1,2-Dichloroethene	9.13	61	705470	25.339	ng		89
29) Diisopropyl Ether	9.36	87	356909	23.200	ng	#	54
30) Ethyl Acetate	9.37	61	390234	53.264	ng		93
31) n-Hexane	9.36	57	933214	25.585	ng		99
32) Chloroform	9.44	83	767959	23.652	ng		99
34) Tetrahydrofuran (THF)	9.82	72	313809	24.473	ng	#	82
35) Ethyl tert-Butyl Ether	9.91	87	525743	26.013	ng	#	88
36) 1,2-Dichloroethane	10.18	62	689033	23.767	ng		100
38) 1,1,1-Trichloroethane	10.45	97	689298	24.199	ng		97
39) Isopropyl Acetate	10.81	61	647724	51.748	ng	#	73
40) 1-Butanol	10.82	56	1151759	49.817	ng		86
41) Benzene	10.90	78	1748574	22.132	ng		100
42) Carbon Tetrachloride	11.05	117	569636	23.768	ng		100
43) Cyclohexane	11.18	84	1353140	48.948	ng		91
44) tert-Amyl Methyl Ether	11.49	73	1387908	24.866	ng		95
45) 1,2-Dichloropropane	11.71	63	502339	24.427	ng		100
46) Bromodichloromethane	11.90	83	626020	25.201	ng		100
47) Trichloroethene	11.95	130	375330	21.962	ng		100
48) 1,4-Dioxane	11.92	88	356337	24.688	ng		92
49) 2,2,4-Trimethylpentane...	12.01	57	2260988	25.047	ng		93

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Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

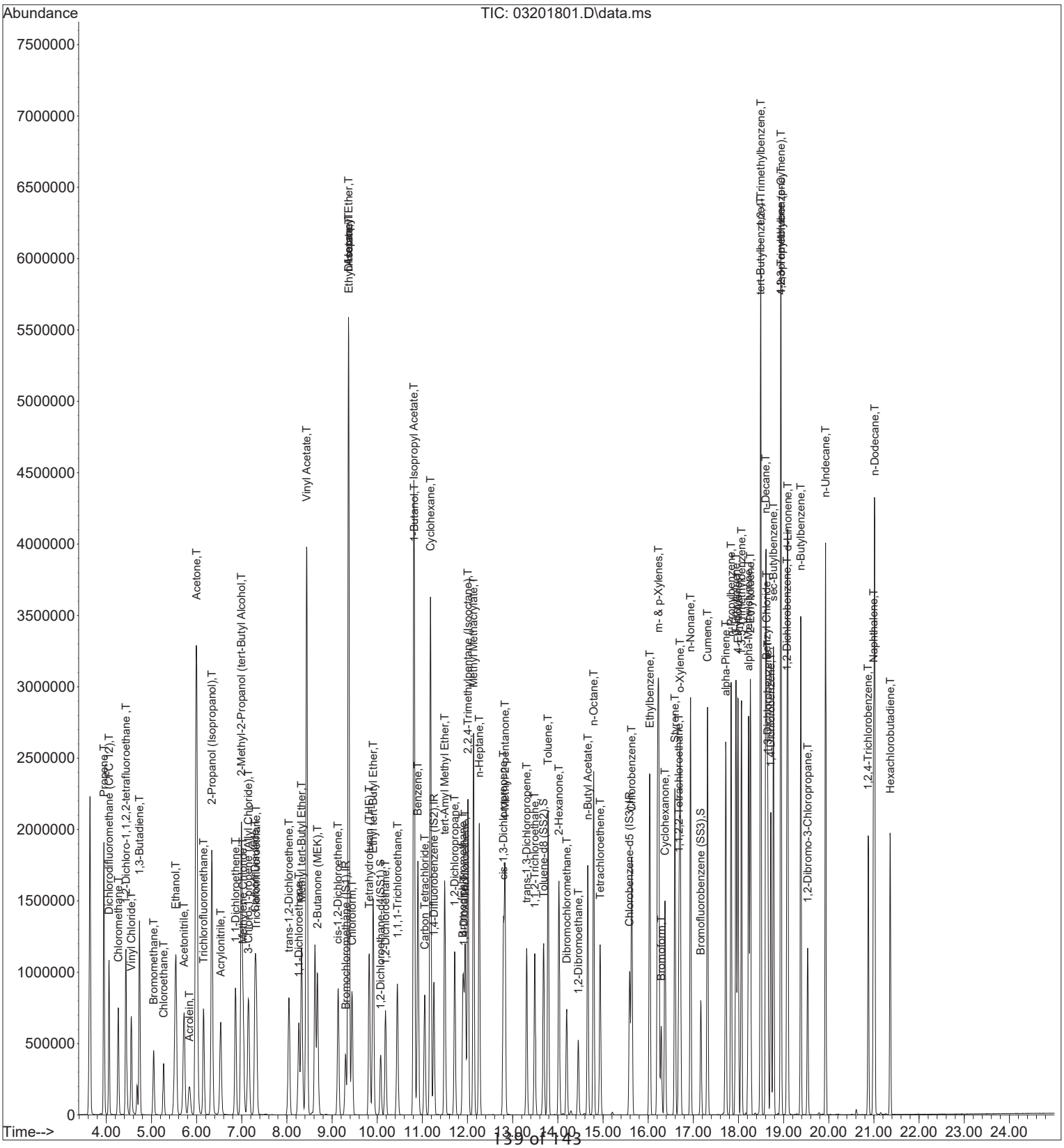
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	12.13	100	329808	51.937	ng	#	83
51) n-Heptane	12.26	71	483663	25.266	ng		94
52) cis-1,3-Dichloropropene	12.79	75	833576	26.947	ng		99
53) 4-Methyl-2-pentanone	12.83	58	510603	26.802	ng		87
54) trans-1,3-Dichloropropene	13.31	75	740701	25.669	ng		99
55) 1,1,2-Trichloroethane	13.49	97	397797	24.227	ng		97
58) Toluene	13.78	91	1741157	22.987	ng		99
59) 2-Hexanone	14.03	43	1379868	25.431	ng		92
60) Dibromochloromethane	14.20	129	446077	25.155	ng		100
61) 1,2-Dibromoethane	14.45	107	430649	23.526	ng		99
62) n-Butyl Acetate	14.66	43	1572968	26.201	ng		95
63) n-Octane	14.79	57	473651	24.839	ng		93
64) Tetrachloroethene	14.94	166	363589	23.267	ng		100
65) Chlorobenzene	15.63	112	1050226	22.657	ng		99
66) Ethylbenzene	16.04	91	2029553	23.952	ng		97
67) m- & p-Xylenes	16.23	91	3179513	48.745	ng		96
68) Bromoform	16.29	173	327006	24.590	ng		100
69) Styrene	16.59	104	1177898	24.540	ng		97
70) o-Xylene	16.71	91	1620889	24.484	ng		96
71) n-Nonane	16.94	43	1305655	25.707	ng		92
72) 1,1,2,2-Tetrachloroethane	16.68	83	803463	26.673	ng		99
74) Cumene	17.32	105	1955362	24.041	ng		98
75) alpha-Pinene	17.72	93	1069001	25.543	ng		95
76) n-Propylbenzene	17.84	91	2540033	24.900	ng		97
77) 3-Ethyltoluene	17.94	105	1950914	24.257	ng		98
78) 4-Ethyltoluene	17.99	105	1897233	24.797	ng		98
79) 1,3,5-Trimethylbenzene	18.07	105	1633843	24.665	ng		97
80) alpha-Methylstyrene	18.22	118	828036	24.998	ng		98
81) 2-Ethyltoluene	18.26	105	1942345	24.557	ng		98
82) 1,2,4-Trimethylbenzene	18.50	105	1760446	25.146	ng		98
83) n-Decane	18.60	57	1223505	25.542	ng		97
84) Benzyl Chloride	18.62	91	1637818	26.851	ng		97
85) 1,3-Dichlorobenzene	18.65	146	824918	23.390	ng		100
86) 1,4-Dichlorobenzene	18.72	146	814983	22.979	ng		99
87) sec-Butylbenzene	18.77	105	2240867	24.529	ng		98
88) 4-Isopropyltoluene (p-...	18.94	119	2065910	24.239	ng		97
89) 1,2,3-Trimethylbenzene	18.94	105	1749752	24.611	ng		97
90) 1,2-Dichlorobenzene	19.07	146	806081	24.144	ng		99
91) d-Limonene	19.09	68	840956	26.280	ng		96
92) 1,2-Dibromo-3-Chloropr...	19.53	157	279049	25.611	ng	#	74
93) n-Undecane	19.93	57	1324325	26.684	ng		97
94) 1,2,4-Trichlorobenzene	20.87	180	529691	23.868	ng		99
95) Naphthalene	20.99	128	1940075	22.431	ng		100
96) n-Dodecane	21.02	57	1333794	27.243	ng		96
97) Hexachlorobutadiene	21.36	225	334034	24.415	ng		100
98) Cyclohexanone	16.37	55	755496	24.297	ng		92
99) tert-Butylbenzene	18.49	119	1608924	24.886	ng		99
100) n-Butylbenzene	19.38	91	1978975	25.096	ng		99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS09\Data\2018_03\20\03201801.D
Acq On : 20 Mar 2018 1:40 Operator: LH
Sample : CCV R9032018_25ng
Misc : S31-03061806/S31-02221803 (3/23)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Mar 20 08:59:51 2018
Quant Method : I:\MS09\Methods\R9030718.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Mar 12 10:11:56 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



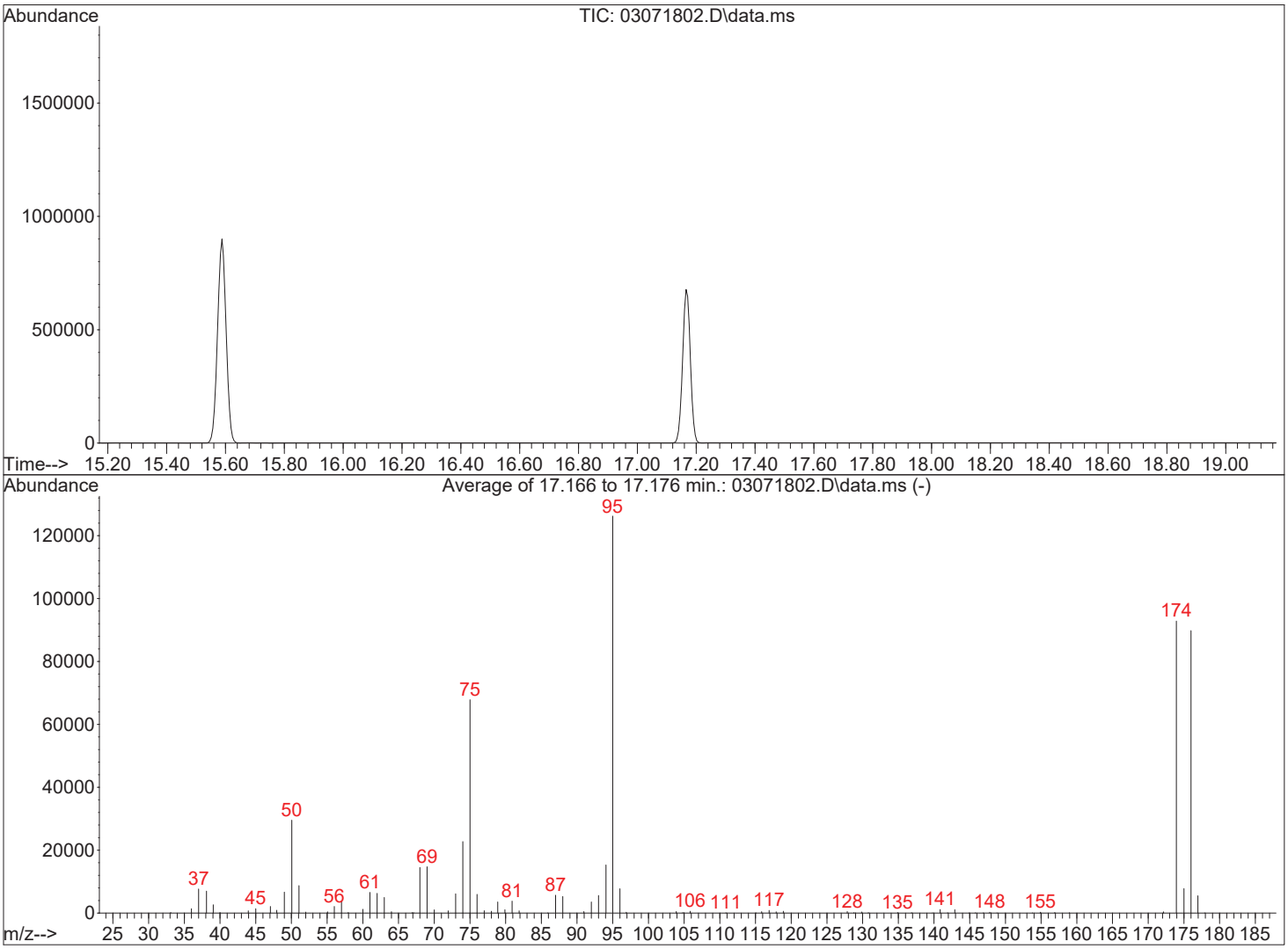
00884364

Data Path : I:\MS09\Data\2018_03\07\
Data File : 03071802.D
Acq On : 7 Mar 2018 15:17
Operator : SC
Sample : 12.5ng TO-15 BFB STD
Misc : S31-03061806
ALS Vial : 2 Sample Multiplier: 1

3/8/18

Integration File: RTEINTAlc.P

Method : I:\MS09\Methods\R9030718.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Thu Mar 08 08:32:52 2018



AutoFind: Scans 2658, 2659, 2660; Background Corrected with Scan 2647

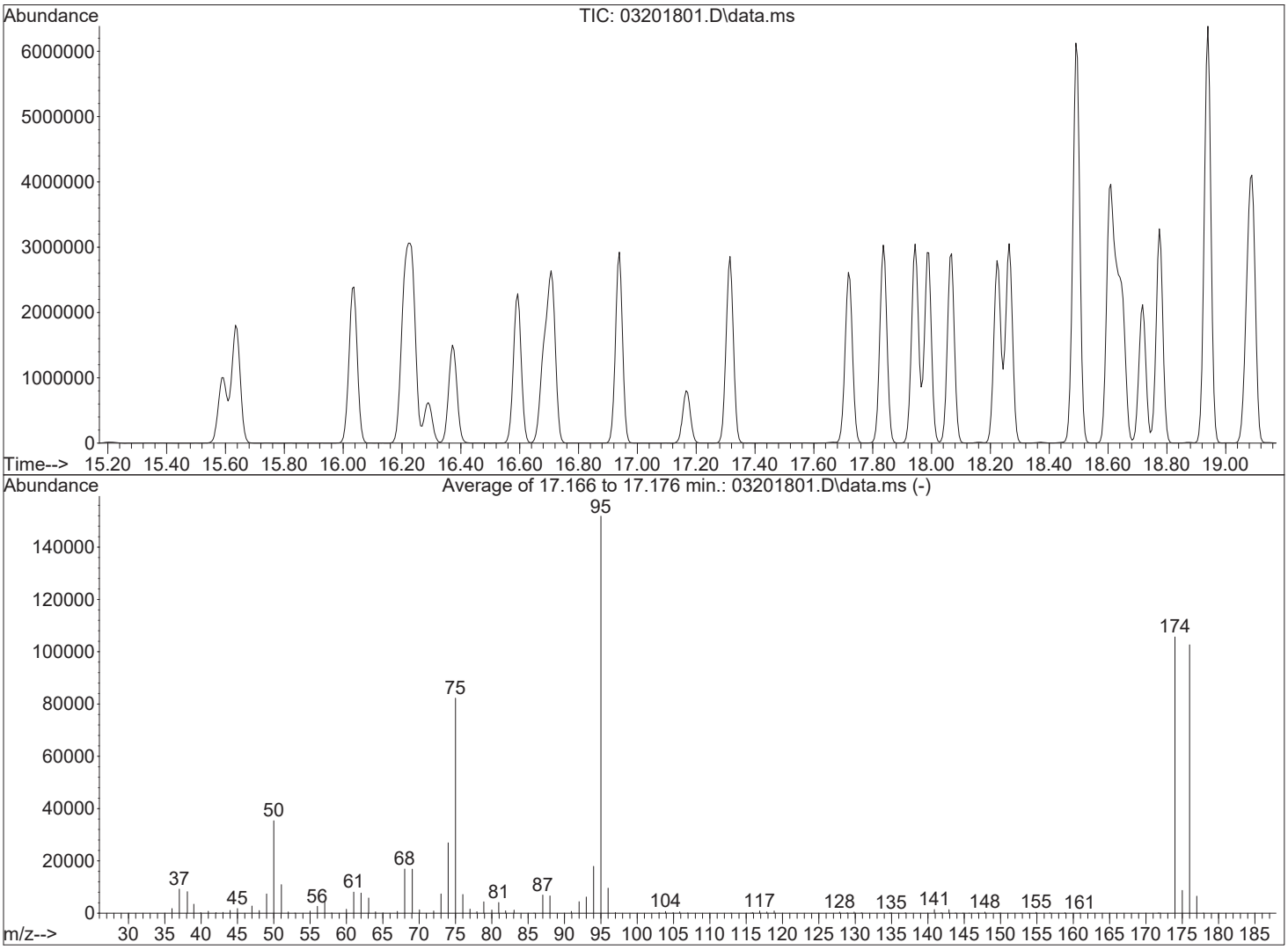
Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	23.4	29552	PASS
75	95	30	66	53.8	67851	PASS
95	95	100	100	100.0	126224	PASS
96	95	5	9	6.1	7755	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	120	73.6	92848	PASS
175	174	4	9	8.4	7777	PASS
176	174	93	101	96.7	89811	PASS
177	176	5	9	6.1	5506	PASS

00884365

Data Path : I:\MS09\Data\2018_03\20\
Data File : 03201801.D
Acq On : 20 Mar 2018 1:40
Operator : LH
Sample : CCV R9032018_25ng
Misc : S31-03061806/S31-02221803 (3/23)
ALS Vial : 2 Sample Multiplier: 1

Integration File: RTEINTAlc.P

Method : I:\MS09\Methods\R9030718.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Mon Mar 12 10:11:56 2018



AutoFind: Scans 2658, 2659, 2660; Background Corrected with Scan 2647

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	23.3	35344	PASS
75	95	30	66	54.2	82269	PASS
95	95	100	100	100.0	151837	PASS
96	95	5	9	6.3	9577	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	120	69.6	105675	PASS
175	174	4	9	8.3	8731	PASS
176	174	93	101	97.1	102656	PASS
177	176	5	9	6.4	6537	PASS

LH 3/20/18

Injection Log

Directory: J:\MS09\Data\2018_03\07\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
1	3/7/18 14:43	03071801.D	Blank (100mL)	S31-03061806	SC	2	
2	3/7/18 15:17	03071802.D	12.5ng TO-15 BFB STD	S31-03061806	SC	2	pass
3	3/7/18 15:51	03071803.D	0.08ng TO-15 ICAL STD	S31-03061806/S31-03071803 (4/5)	SC	5	
4	3/7/18 16:25	03071804.D	0.10ng TO-15 ICAL STD	S31-03061806/S31-03071803 (4/5)	SC	5	
5	3/7/18 16:59	03071805.D	0.20ng TO-15 ICAL STD	S31-03061806/S31-03071803 (4/5)	SC	5	
6	3/7/18 17:33	03071806.D	0.40ng TO-15 ICAL STD	S31-03061806/S31-03071803 (4/5)	SC	5	
7	3/7/18 18:07	03071807.D	1.0ng TO-15 ICAL STD	S31-03061806/S31-03071802 (4/5)	SC	6	
8	3/7/18 18:40	03071808.D	5.0ng TO-15 ICAL STD	S31-03061806/S31-03071802 (4/5)	SC	6	
9	3/7/18 19:14	03071809.D	25ng TO-15 ICAL STD	S31-03061806/S31-03071801 (4/5)	SC	7	
10	3/7/18 19:48	03071810.D	50ng TO-15 ICAL STD	S31-03061806/S31-03071801 (4/5)	SC	7	
11	3/7/18 20:22	03071811.D	100ng TO-15 ICAL STD	S31-03061806/S31-03071801 (4/5)	SC	7	
12	3/7/18 20:56	03071812.D	Blank (100mL)	S31-03061806	SC	2	
13	3/7/18 21:30	03071813.D	25ng TO-15 ICV STD	S31-03061806/S31-03021804 (3/31)	SC	8	pass
14	3/7/18 22:03	03071814.D	25ng TO-15 ICV STD	S31-03061806/S31-03021804 (3/31)	SC	8	
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Injection Log

00884367

Directory: I:\MS09\Data\2018_03\20\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
1	3/20/18 1:40	03201801.D	CCV R9032018_25ng	S31-03061806/S31-02221803 (3/23)	LH	2	passed
2	3/20/18 2:14	03201802.D	CCV C9032018_25ng	S31-03061806/S31-02261802 (3/27)	LH	3	passed
3	3/20/18 2:48	03201803.D	MB R032018_1000mL	S31-03061806/AC00463	LH	2	passed
4	3/20/18 3:21	03201804.D	LCS R9032018_25ng	S31-03061806/S31-03021804 (3/31)	LH	2	passed
5	3/20/18 3:55	03201805.D	LCSD R9032018_25ng	S31-03061806/S31-03021804 (3/31)	LH	2	passed
6	3/20/18 4:29	03201806.D	P1801293-001 (1000mL)	S31-03061806	LH	14	
7	3/20/18 5:03	03201807.D	P1801293-002 (1000mL)	S31-03061806	LH	15	
8	3/20/18 5:36	03201808.D	P1801293-003 (1000mL)	S31-03061806	LH	4	
9	3/20/18 6:10	03201809.D	P1801339-001 (1000mL)	S31-03061806	LH	5	
10	3/20/18 6:43	03201810.D	P1801339-001dup (1000mL)	S31-03061806	LH	5	passed
11	3/20/18 7:17	03201811.D	P1801339-002 (1000mL)	S31-03061806	LH	6	
12	3/20/18 9:36	03201812.D	P1801338-004dil (200mL)	S31-03061806	LH	10	
13	3/20/18 10:09	03201813.D	P1801338-005dil (50mL)	S31-03061806	LH	11	
14	3/20/18 10:43	03201814.D	P1801338-006dil (200mL)	S31-03061806	LH	12	
15	3/20/18 11:34	03201815.D	P1801370-001 (1000mL)	S31-03061806	LH	4	
16	3/20/18 12:07	03201816.D	P1801370-002 (1000mL)	S31-03061806	LH	5	
17	3/20/18 12:41	03201817.D	P1801370-003 (1000mL)	S31-03061806	LH	6	
18	3/20/18 13:14	03201818.D	P1801370-003dup (1000mL)	S31-03061806	LH	6	passed
19	3/20/18 13:48	03201819.D	P1801150-001dil (3.0mL)	S31-03061806	LH	1	
20	3/20/18 14:22	03201820.D	P1801150-001 (6.0mL)	S31-03061806	LH	1	
21	3/20/18 14:55	03201821.D	P1801150-002 (6.0mL)	S31-03061806	LH	1	
22	3/20/18 15:30	03201822.D	P1801150-002dil (3.0mL)	S31-03061806	LH	1	
23	3/20/18 16:17	03201823.D	P1801150-003 (1000mL)	S31-03061806	LH	4	
24	3/20/18 16:51	03201824.D	P1801150-004 (1000mL)	S31-03061806	LH	5	

LH 3/20/18

APPENDIX G
PROTOCOL FOR DISCHARGING GWTP EFFLUENT

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MEMORANDUM

DATE: August 28, 2017

PROJECT NAME: Remediation of Multiple Sites, Longhorn Army Ammunition Plant, Karnack, TX

TO:	Richard Mayer	Senior Project Engineer US Environmental Protection Agency Federal Facilities Section (6PD-F)
	April Palmie	Project and Grant Manager Superfund Section, Remediation Division Texas Commission on Environmental Quality
FROM:	Rose M. Zeiler, Ph.D.	Longhorn AAP Site Manager

SUBJECT: **Protocol for Discharging GWTP Effluent**
Longhorn Army Ammunition Plant, Karnack, TX
(Contract: W912DY-09-D-0059, Task Order DS01)

INTRODUCTION

The purpose of this memo is to document the protocol for discharging Longhorn Army Ammunition Plant groundwater treatment plant (GWTP) effluent to Harrison Bayou, the INF-Pond, or LHAAP-18/24.

The GWTP is designed to:

- Extract groundwater from LHAAP-18/24 and LHAAP-16 for hydraulic control;
- Remove metals by pH adjustment, polymer addition, and gravity separation;
- Remove volatile organic compounds (VOCs) by air stripping;
- Remove perchlorate in a fluidized bed reactor (FBR) and an ion exchange scavenger system; and
- Discharge the effluent continuously.

DISCHARGE CRITERIA

The discharge criteria established for discharge to Harrison Bayou are:

Parameter	Discharge Criteria (µg/L)	
	Daily Average	Daily Maximum
Volatiles		
1,1,1-Trichloroethane	3,417	7,230
1,1,2-Trichloroethane	102.5	216.9
1,1-Dichloroethane	6,633	14,032
1,1-Dichloroethene	119	253
1,2-Dichloroethane	85	181
Acetone	1,132	2,395
Benzene	85	181
Carbon Tetrachloride	85	181
Chlorobenzene	22,300	47,180
Chloroform	1,708	3,615
Ethylbenzene	26,954	57,025
Xylenes	39.5	83.6
Methylene Chloride	803	1,699
Styrene	2,829	5,987
Tetrachloroethene	85.4	180.7
Toluene	1,980	4,189
Trichloroethene	85	181
Vinyl Chloride	34	72
Anions		
Chloride	*	*
Sulfate	*	*
Perchlorate**	278	589
Metals		
Aluminum	777	1,644
Arsenic	365	772
Barium	1,000	2,000
Cadmium	1.6	3.4
Chromium, Total	355	752
Chromium, Hexavalent	58	124
Cobalt	5,433	11,495
Iron	1,132	2,395
Lead	2.2	4.6
Nickel	87	184
Manganese	7,323	15,494
Silver	1.4	3
Selenium	5.7	12
Vanadium	1,698	3,592
Zinc	146	310
Other		
Hexachlorobenzene	0.22	0.47
1,4-Dioxane		134.2
Oil and Grease		15
Chemical Oxygen Demand		200

* - Based upon flow in Harrison Bayou

** - Discharge criteria, when diverted to the INF Pond, is 17 µg/L

PROTOCOL FOR DISCHARGING GWTP EFFLUENT

In accordance with the *Sampling and Analysis Plan, Groundwater Treatment Plant and Well Fields* (SAP) Table 2-2, indicator parameters for the FBR, such as temperature, pH and oxidation reduction potential (ORP), are monitored in real time to predict FBR performance and perchlorate removal. Based upon these indicator parameters, the operator of the GWTP can make adjustments such as:

- Bring the ion exchange system online;
- Increase or decrease the addition rate of electron donor (acetic acid);
- Increase or decrease the nutrient addition rate (urea or phosphoric acid); or
- Increase or decrease the FBR recirculation rate

Samples of the GWTP effluent are collected weekly, analyzed for perchlorate, nutrients (ammonia-nitrogen and ortho-phosphate), total organic carbon (TOC), chloride, and sulfate, with the results received from the laboratory 14 days later. Other parameters (e.g. Record of Decision metals and volatiles) are collected and analyzed in GWTP effluent samples according to the frequencies listed in Table 2-1 of the SAP.

As shown in Figure 1, groundwater is continuously extracted, treated, and discharged. If Harrison Bayou is flowing and indicator parameters are within their historical optimal ranges, then the ion exchange vessels can be bypassed and the GWTP effluent sample will be collected after the FBR. If Harrison Bayou is not flowing or the indicator parameters are not within historical optimal ranges, then the ion exchange vessels will be put on line, and the GWTP effluent sample will be collected between the lead and lag ion exchange vessel. Professional judgement may also be used as to when to bring the ion exchange vessels online, such as after a power outage or during anticipated cold temperatures when the FBR has historically not performed optimally.

If a parameter is measured in the effluent at a concentration above the discharge criteria, then a confirmation sample and an effluent sample after the lag ion exchange vessel will be collected and analyzed for the parameter with a 24-hour turnaround time. Corrective measures (e.g. increased nutrient or electron donor addition rates, bring ion exchange vessels on line) will be implemented as appropriate to bring the parameter back within the discharge criteria. ***If an upset condition in the FBR leads to high concentrations of perchlorate going into the lead ion exchange vessel and breaking through at the sample location between the vessels, the lag vessel will still remove perchlorate before it is discharged to Harrison Bayou, the INF Pond, or LHAAP-18/24.*** It is estimated that the lag ion exchange vessel can remove all of the perchlorate from two weeks of typical groundwater extraction at a concentration of 920 µg/L. If the residual perchlorate concentration after the FBR and lead ion exchange vessel is only 600 µg/L, the lag ion exchange vessel could last almost 2.5 years before perchlorate would be detected in the discharged effluent.

If a parameter exceeds the discharge criteria by more than 40% (see Appendix A-2, SAP, Section 7c of Monitoring and Reporting Requirements) or reaches 920 µg/L of perchlorate, then the GWTP will be put into full recycle mode (no discharge) until the parameter is below the discharge criteria again. Appendix A-2 of the SAP requires GWTP data to be provided to TCEQ monthly including a list of noncompliance(s), if applicable.

Discharge to Harrison Bayou

As shown in Figure 1, the GWTP effluent will be discharged to Harrison Bayou as long as it has a measurable flow. The flowrate in Harrison Bayou is estimated by measuring the height of water with a staff gauge and velocity in feet/sec at intervals along the width as described in the Installation-Wide Work Plan, Standard Operating Procedures, Attachment 18 – Water Depth and Velocity Measurements (AECOM, July 2014).

The allowable flow rate of GWTP effluent that can be discharged to Harrison Bayou is given by:

$$QE \leq \frac{QS\,(CC - CA)}{(CE - CC)}$$

where Q_E = GWTP effluent flow Q_S = Harrison Bayou flow

C_C = Criteria concentration (100 mg/L for chloride, 50 mg/L for sulfate)

C_A = Ambient concentration = 10 mg/L

C_E = Chloride or sulfate concentration in GWTP effluent

The allowable GWTP effluent flow will be the lower of the calculated values given the measured concentrations of chloride and sulfate in the discharge stream. For each day that GWTP effluent is discharged to Harrison Bayou, the measured Harrison Bayou flow, the allowable effluent flow, and the actual effluent flow are recorded.

Discharge to INF Pond

If Harrison Bayou is not flowing, then GWTP effluent will be discharged to the Intermediate-Range Nuclear Forces (INF) Pond for temporary storage until Harrison Bayou flow resumes. Perchlorate concentration detected in the effluent must be 17 µg/L or less, when this occurs.

The INF Pond has a flexible membrane liner protected by a soil cover with a gravity discharge pipe (and valve) to Harrison Bayou. The INF Pond has a nominal capacity of 3 million gallons with a staff gage to measure the height of water stored in the pond. The GWTP operator maintains the INF Pond by visually inspecting for erosion, vegetative growth including tree growth along the anchor trench, and liner integrity and making necessary repairs. Periodically, accumulated debris must be removed from the influent and effluent piping to the INF Pond.

Prior to discharging to the INF Pond, a lead and lag ion exchange vessel will be brought online. The GWTP Operator will also confirm that the discharge valve is closed, will record the reading on the effluent totalizer, and will record the height of water using the staff gage. The GWTP Operator will then configure valves and pumps to direct GWTP effluent to the INF Pond. The height of water in the INF Pond and totalizer reading will be recorded at the beginning and end of each shift for the duration of active discharge. When the height of water in the pond reaches 3 feet below the height of the berm (freeboard), the GWTP Operator will stop discharging to the INF Pond and TCEQ will be notified. After the TCEQ acknowledges the INF Pond level, GWTP effluent may be discharged to the INF Pond again until 2 feet of freeboard is reached. The GWTP Operator will stop discharging to the INF Pond and TCEQ will be notified again. After the TCEQ acknowledges 2 feet of freeboard in the INF Pond,GWTP effluent may be discharged again until 1 foot of freeboard remains. No additional GWTP effluent can be accepted at the INF Pond until greater than 1 foot of freeboard is measured.

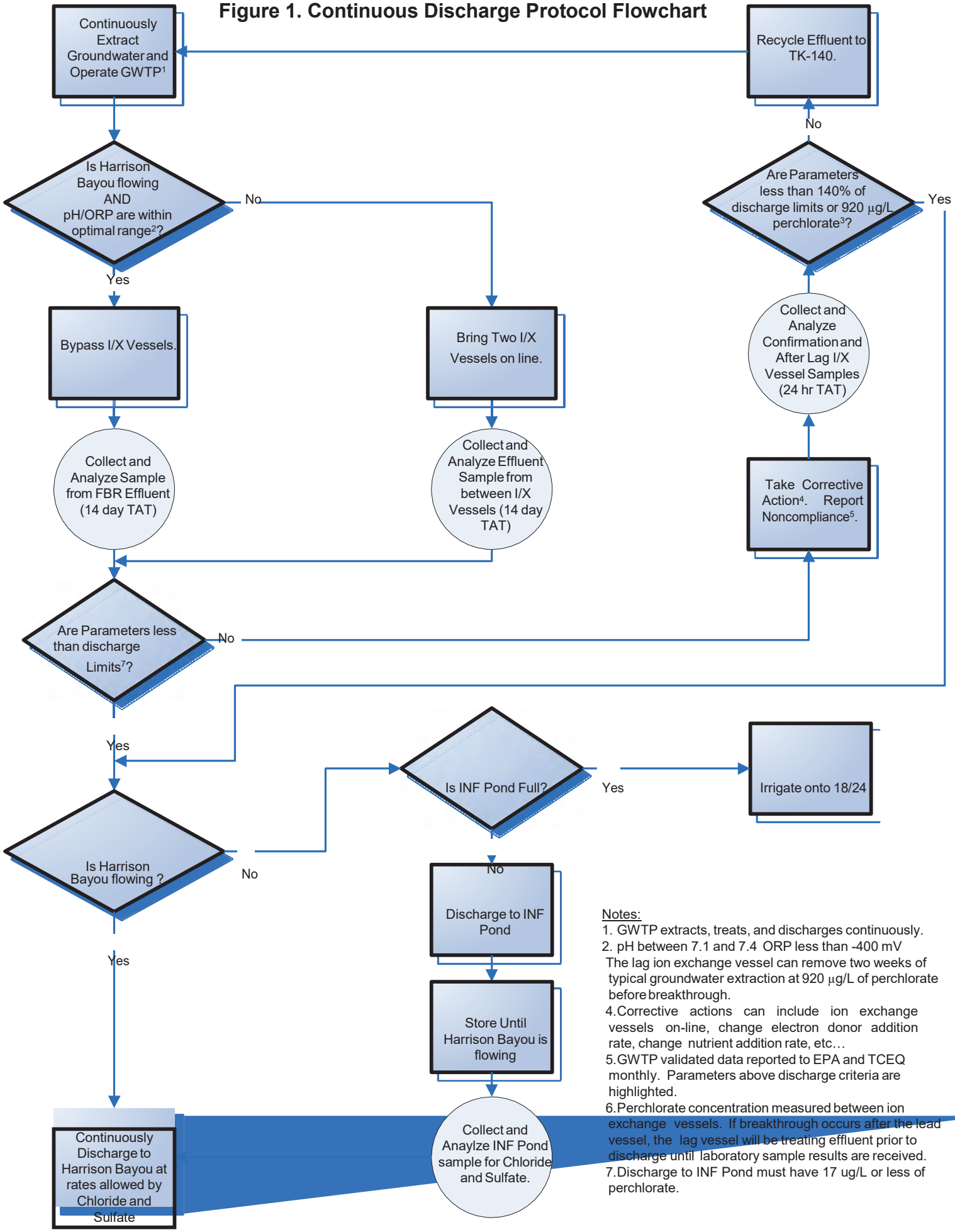
As soon as flow in Harrison Bayou returns, stored GWTP effluent from the INF Pond will be discharged. As with direct discharges from the GWTP to Harrison Bayou, the allowable flowrate of effluent from the INF Pond is calculated based upon the chloride and sulfate concentrations in the pond and the flow in Harrison Bayou. If effluent from the INF Pond and the GWTP are discharged simultaneously, total flow of both streams together should not exceed the calculated discharge level for either discharge location. For each day that INF Pond contents are discharged to Harrison Bayou, the measured Harrison Bayou flow, the allowable effluent flow, and the actual effluent flow are recorded.

Irrigation onto LHAAP-18/24

If Harrison Bayou is not flowing and the INF Pond has less than 1 foot of freeboard, then GWTP effluent will be irrigated onto LHAAP-18/24 using one of the three main sprinkler lines. To avoid pooling and runoff of irrigation water, only one line will be used for half a day at a time, with a separate line being used the second half of the day. If needed, the irrigation will occur 5 days a week for 8 hours each day (using 3 sprinklers in each line). If conditions are wet due to rain events, irrigation will not be conducted to avoid ponding and potential runoff, the GWTP will be put into recycle mode, and groundwater extraction will be interrupted if storage space is not available.

While irrigating, site inspections will be performed to ensure pooling and runoff are not occurring. During the irrigation activities, inspections will be performed twice a day, once approximately three hours and again approximately six hours into the 8-hour irrigation shift. The system will be inspected to ensure that the sprinkler heads are operating properly and not leaking large amounts of water. If ponding or runoff is observed, irrigation at that sprinkler line will cease, and irrigation at another sprinkler line will be started if possible. Volumes of GWTP effluent and twice daily inspections will be recorded daily and reported monthly until flow resumes in Harrison Bayou or greater than 1 foot of freeboard is available in the INF Pond.

Figure 1. Continuous Discharge Protocol Flowchart



Notes:

1. GWTP extracts, treats, and discharges continuously.
2. pH between 7.1 and 7.4 ORP less than -400 mV
   The lag ion exchange vessel can remove two weeks of typical groundwater extraction at 920 µg/L of perchlorate before breakthrough.
4. Corrective actions can include ion exchange vessels on-line, change electron donor addition rate, change nutrient addition rate, etc…
5. GWTP validated data reported to EPA and TCEQ monthly. Parameters above discharge criteria are highlighted.
6. Perchlorate concentration measured between ion exchange vessels. If breakthrough occurs after the lead vessel, the lag vessel will be treating effluent prior to discharge until laboratory sample results are received.
7. Discharge to INF Pond must have 17 ug/L or less of perchlorate.

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

July 23, 2018

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency
Federal Facilities Section R6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Draft Final Third Annual Remedial Action Operation Report, LHAAP-50, Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas, July 2018

Dear Mr. Mayer,

Two hard copies (HC) and two compact discs (CDs) for the above-referenced document are being transmitted to you for your records. The document, which addresses LHAAP-50 groundwater, includes revisions based upon the Environmental Protection Agency's (EPA) comments on the Draft received on June 22, 2018. In accordance with the Federal Facility Agreement, this Draft Final will be considered Final after 30 days without further comment. Response to comments on the Draft version of the document are included within this Draft Final.

The document was revised by Bhate Environmental Associates, Inc. (Bhate) on behalf of the Army as part of Bhate's Performance-Based Remediation contract for the facility. I ask that Kim Nemmers, Bhate's Project Manager, be copied on any communications related to the project.

The point of contact for this action is the undersigned. I may be contacted at 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished
A. Palmie, TCEQ, Austin, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
N. Smith, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 hard copy and 1 CD)
P. Srivastav, APTIM, Houston, TX (1 hard copy and 1 CD)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

July 23, 2018

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Draft Final Third Annual Remedial Action Operation Report, LHAAP-50, Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas, July 2018

Dear Ms. Palmie,

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The point of contact for this action is the undersigned. I may be contacted at 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.
.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished (letter only):
R. Mayer, USEPA Region 6, Dallas, TX
P. Bruckwicki, Caddo Lake NWR, TX
A. Williams, USACE, Tulsa District, OK
N. Smith, USAEC, San Antonio, TX
K. Nemmers, Bhate, Lakewood, CO
P. Srivastav, APTIM, Houston, TX

Response to Comments on
Draft Third Annual Remedial Action Operation Report, LHAAP-50, Former Sump Water Tank
Longhorn Army Ammunition Plant, Karnack Texas

Document Date: May 2018
Comment Date: June 22, 2018

Reviewer: Mr. Richard Mayer, U.S. Environmental Protection Agency
Respondent: Dr. Rose Zeiler, U.S. Army

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X)
2. Commenter Agrees (A) with response, or Does Not Agree (D) with response

Comment No.	Section/Page/ Paragraph	Comment	C, D, E, or X[1]	Response	A or D[2]	Comment
1	Page 1-3, Section 1.3, 2nd Paragraph	The text references figure 1-2 and mentions the storage tank that discharged wastewater to the creek. It probably is more appropriate to reference figure 3 which better illustrates Goose Prairie Creek, the roads and the monitoring well locations.	C	Reference to "**Figure 1-2**" on Page 1-3, Section 1.3, 2nd paragraph will be revised to "**Figure 1-3**".		
2	Page 2-2, Section 2.2, First Paragraph	Text states the following "*50WW02, 50WW03, and 50WW04 are primarily replaced by data from wells 50WW08, 50WW22, and 50WW21 respectively*." It is unfortunate wells 50WW03 and 50WW04 are dry since they are important to development of water level contours. Well 50WW03 is the most upgradient well or maybe called a background well, but 50WW22 is not an actual replacement for that well since perchlorate was detected at low levels (1 to 1.5 ppb).	E	In 2016, similar to 2015, 50WW02, 50WW03, and 50WW04 were dry. In 2016 and to be consistent with the use of data from 2015 in the 2nd Year RAO Report, data from nearby wells 50WW08, 50WW22 and 50WW21was used to replace the missing data from wells 50WW02, 50WW03, and 50WW04 for plume evaluation purposes. This substitution was previously approved by TCEQ and EPA when presented in the 2nd Year RAO Report. Additionally, the abandonment of 50WW03 was also approved in the 2nd Year RAO report. 50WW22 serves the same purpose as 50WW03: outside the plume to the southwest to evaluate lateral plume expansion.		
3.	Page 2-2, Section 2.2	The depression indicated in the May sampling event at well 50WW15 is very odd. Is there an explanation on why this occurred? Could it have been a misreading of the tape? What do the	E/C	Partially concur. We have examined the sample collection logs, and the readings were consistent for 50WW15 on 5/12/2016. While there is no evidence to conclude the tape was misread, the		

Comment No.	Section/Page/ Paragraph	Comment	C, D, E, or X[1]	Response	A or D[2]	Comment
		contours look like if that water level is removed from contouring?		calculated elevation from the reading at 50WW15 is anomalous in comparison to the surrounding wells. Therefore, 50WW15 will not be used to draw the potentiometric contours, and **Figure 2-1** will be revised.		
4.	Page 2-3, Section 2.2.2., Third Bullet	Well 50WW25 needs to be added to this bullet.	C	Text on page 2-3, Section 2.2.2, third bullet will be revised as follows: "Wells 50WW07, 50WW19, 50WW20, 50WW25, 50WW26, and 50WW28 were only sampled in May 2016 because they were eliminated from the monitoring program based on the recommendations in the 2nd Year RAO Report approved in November 2016 (AECOM 2016b)."		
5.	Page 2-5, Section 2.3, Last Paragraph	EPA is fine with eliminating surface water sampling locations GPW-1 and GPW-1A for Site 50 (verifying that soil excavation was successful for protecting surface water). In the future, Site 47 will need some surface water sampling approximately near the location of GPW-1A. In December of 2017, EPA detected perchlorate at 35 ppb from a real time surface water sampler at a location just south of GPW-1A.	C	Any future surface water monitoring plans related to LHAAP-47 will be included in the LHAAP-47 ROD/RD/RAWP.		
6.	Page 2-4, Section 2.2.3	EPA is fine with eliminating well 50WW02 from the monitoring program since there are two wells within 75 feet of this well which have similar contamination. According to Table 2-3, the last sampling event for well 50WW02 was 4/3/2009. This result detected perchlorate at 110 ppb, TCE at 8050 ppb, cis-1,2-Dichloroethene at 978 ppb and 1,2-Dichloroethane at 18 ppb.	C			
7.	Pages 2-3 and 2-4	The plume sizes (perchlorate mainly) changed quite a bit between the two sampling events. The main reason is that wells 50WW25 and 50WW24 had a detections of perchlorate in May, but a ND in November for 50WW24 and no result was	C	When perchlorate concentrations fluctuate above and below the cleanup levels at 50WW24, the plume size does change quite a bit as this well falls within or outside the plume contour. Even though concentrations and water levels were both lower at		

Comment No.	Section/Page/ Paragraph	Comment	C, D, E, or X[1]	Response	A or D[2]	Comment
		shown for 50WW25 in November. Water levels were lower on the second event for 50WW24, could this be an indication of contaminants being caught up in the formation towards the top of the water column? Well 50WW13 did show higher concentrations at top of the screen interval for both perchlorate and TCE.		50WW24 in November 2016, in prior events they did not always correlate, and therefore, it cannot be concluded that the contaminants are towards the top of the water column. Please note, there was no result for 50WW25 in November 2016 because 50WW25 was eliminated from the 3rd year monitoring program based on recommendations in the 2nd year Annual RAO Report.		
8.	Table 2-4, Page 2 of 2	Is there supposed to be more well information on this page or is it just a formatting issue?	C	This is a formatting issue. Page 2 of 2 provides the "Notes" for the table. The Well ID header row will be removed from Page 2 of 2.		
9.	Table 2-2d	Monitoring well 50WW10 has extremely high pH (9.5). Is there cement or bentonite contributing to this high pH? If VOC samples were acidified, it would cause a reaction that may have stripped VOCs out of sample. The Army might want to consider resampling the VOC samples without acid (with 48 turnaround time) to determine if there was any loss of VOCs due to reactions with the acid preservative.	E	Partially concur. The groundwater samples collected at 50WW10 in November 2017 show a pH range of 8.36 to 9.1 while the groundwater samples collected in May 2018 indicate a pH range of 6.62 to 7.05. We are unsure of what may have contributed to the increase in pH in the past but in the most recent sampling event (May 2018), the pH was in the neutral range (6.62 to 7.05). If high pH is encountered in the future, samples will be collected in unpreserved vials.		
10.	Page 2-5, Section 2.4	EPA can agree with the abandoning of well 50WW03 (the historical upgradient well) since it has been dry for quite some time. While EPA is aware that 50WW19 is only 60 feet away from well 50WW17 and that 50WW17 is screened at nearly the same vertical interval (22.3-66.8 ft.), why was well 50WW19 installed so close to well 50WW17? Since well 50WW1W17 screened interval length is 44.5 feet, for future sampling, it is not optimal for micro-purge sampling, unless the pump is placed in the vertical zone that any future migrating contamination is located in.	C	The location of monitoring wells 50WW17 and 50WW19 was approved in the Final Remedial Action Completion Report. Current sampling procedures use bladder pumps, which can be placed in selected vertical zones for sampling. Because of the long screen lengths at 50WW17 and 50WW19, samples were collected from discrete depth intervals in May 2016 (top, middle and bottom portion of the screen) from both wells to evaluate any differences in concentration with depth. The results were below or near the		

Comment No.	Section/Page/ Paragraph	Comment	C, D, E, or X[1]	Response	A or D[2]	Comment
				detection limits for all intervals. Please refer to **Table 2-2c** for results.		
11.	Figure 2-3	It might be more accurate if the plume contours encircling monitoring well 50WW25 were drawn to indicate the perchlorate contamination was coming from the Site 47 plume located directly north.	C	The perchlorate plume contour around 50WW25 will be dashed on the northern end to indicate that the plume is not delineated towards LHAAP-47. In the future, when LHAAP-47 data becomes available, it can be used to further define the perchlorate plume contour at LHAAP-50.		
12.	Figure 3-1	Please add the perchlorate concentrations to Figure 3-1d for well 50WW09. Also, please add the correct TCE concentrations to Figure 3-1b for well 50WW06 and Figure 3-1f for well 50WW12 or correct the scale accordingly.	E	Partially concur. Perchlorate concentrations have been well below cleanup levels at 50WW09 and therefore have not been added to **Figure 3-1d**. The scale will be converted to a logarithmic scale on all figures which will result in TCE concentrations showing up on Figures 3-1b and 3-1f.		
13.	Page 4-2, Conclusions	EPA agrees with the Army's conclusion that a contingency remedy implemented. What is the projected timeframes/schedule for implementing this remedy?	C	The exact timeline has not been determined at this time. The Army will draft an Explanation of Significant Difference (ESD) document, followed by the RD/RAWP.		
14.	Appendix F	Please revise well 50WW09, as the perchlorate concentration information is missing. It is interesting to note that the perchlorate results for the May 2016 sampling event was 2140 ppb and there was no perchlorate detected in the November 2016 event. This seems to occur quite often at some of the monitoring wells at Longhorn.	C	Figure 2-3 will be revised to indicate the correct perchlorate concentration of 0.2 U µg/L for 50WW09. Please refer to Table 2-2b and Appendix D, lab certificate L16050763. Because perchlorate concentrations were not detected above the cleanup level, Mann-Kendall analysis was not conducted for perchlorate for this well, and it is not included in Appendix F.		

Comment No.	Section/Page/ Paragraph	Comment	C, D, E, or X[1]	Response	A or D[2]	Comment
15.	General Comment	Reductive dehalogenation is supposed to be the mechanism by which MNA should occur. There are multiple indicators showing that the subsurface is not in the necessary anaerobic state across Site 50. Instead several wells are actually in an aerobic state, with no trend toward anaerobic conditions. Further monitoring without action is just delaying the inevitable; therefore, a contingency remedy is appropriate.	C			
16.	General Comment	The surface water sampling forms and pictures are a great addition to these reports. Very well done!	C			
17.	General Comment	Contaminant concentrations were highly variable in several wells during the two sampling events. Some examples are monitoring well 50WW12 detected perchlorate at 87,800 ppb in May but was at 25.300 ppb in November; monitoring well 50WW11 detected perchlorate at 1300 ppb in May but was at 13,400 ppb in November. Monitoring well 50WW13 detected perchlorate at 493 ppb in May but was at 8650 ppb in November. The results in future will need to be carefully analyzed to determine why such high variability in concentrations.	C	There is variability in both groundwater elevations and concentrations as shown on Figures 3-1e and 3-1f for 50WW11 and 50WW12 since 2013. Fluctuations in concentrations appear to be related to the groundwater elevations. Future monitoring will continue to measure groundwater elevations and concentrations and will be evaluated to determine if the patterns continue.		

Response to Comments on
Draft Third Annual Remedial Action Operation Report, LHAAP-50, Former Sump Water Tank
Longhorn Army Ammunition Plant, Karnack Texas

Document Date: May 2018
Comment Date: June 21, 2018

Reviewer: Ms. April Palmie, Texas Commission on Environmental Quality
Respondent: Dr. Rose Zeiler, U.S. Army

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X)
2. Commenter Agrees (A) with response, or Does Not Agree (D) with response

Comment No.	Section/Page/ Paragraph	Comment	C, D, E, or X[1]	Response	A or D[2]	Comment
1	NA	I do agree with the following suggested changes: to eliminate 50WW02 from the monitoring program, to discontinue surface water sampling at GPW-1 and GPW-1A and to abandon 50WW03 and 50WW19.	C			
2	NA	I also agree that MNA is not working, the plume is not stable or shrinking, and it is time to implement the contingency remedy.	C			

Draft Final
Third Annual Remedial Action Operation Report, LHAAP-50 Former Sump Water Tank
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for

U.S. Army Corps of Engineers, Tulsa District
Contracting Division
2488 East 81st Street
Tulsa, Oklahoma 74137-4290

Prepared by

bhate ENVIRONMENT & INFRASTRUCTURE

1608 13th Avenue south, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

Prepared by

APTIM

Aptim Federal Services, LLC
2500 CityWest, Suite 1700
Houston, Texas 77042

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Acronyms and Abbreviations

µg/L	micrograms per liter
1,1-DCE	1,1-dichloroethene
1,2-DCA	1,2-dichloroethane
AECOM	AECOM Technical Services, Inc.
APTIM	Aptim Federal Services, LLC
AST	aboveground storage tank
bgs	below ground surface
Bhate	Bhate Environmental, Inc.
cis-1,2-DCE	cis-1,2-dichloroethene
COCs	contaminants of concern
DO	dissolved oxygen
EPA	see USEPA
ft/ft	feet vertical per foot horizontal
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
LUCs	land use controls
MATOC	Multiple Award Task Order Contract
MCL	maximum contaminant level
MEGA	Multiple Environmental Government Acquisition
mg/L	milligrams per liter
MMRP	Military Munitions Response Program
MNA	monitored natural attenuation
mV	millivolts
No.	number
ORP	oxidation-reduction potential
PCE	tetrachloroethene
PCL	protective concentration level
RACR	Remedial Action Completion Report
RA-O	remedial action operation
RAOs	remedial action objectives
RAWP	Remedial Action Work Plan
ROD	Record of Decision
Shaw	Shaw Environmental & Infrastructure, Inc.
SOP	standard operating procedure
TAC	Texas Administrative Code

Acronyms and Abbreviations *(continued)*

TCE	trichloroethene
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UU/UE	unrestricted use and unlimited exposure
VC	vinyl chloride
VOC	volatile organic compound

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Tulsa District, contracted Bhate Environmental, Inc. (Bhate) under the Omaha Multiple Environmental Government Acquisition (MEGA) National Small Business Multiple Award Task Order Contract (MATOC), Environmental Remediation Services with Military Munitions Response Program (MMRP), Task Order Number (No.) W9128BV17F0150, to conduct environmental restoration at multiple sites at the former Longhorn Army Ammunition Plant (LHAAP). The Bhate Team is comprised of Bhate and Aptim Federal Services, LLC (APTIM). A *Final Record of Decision* (ROD) was executed for LHAAP-50 in September 2010 (USACE 2010). Groundwater monitoring at LHAAP-50 is ongoing as described in the *Final Remedial Action Completion Report* (RACR) (AECOM 2016a). This remedial action operation (RA-O) report represents the third year of RA-O implementation and summarizes the results of sampling activities and site inspections completed between January 2016 and November 2016. The *Draft Final 2nd Annual RA-O Report*, which covers the period between December 2014 and November 2015, was submitted in November 2016 (AECOM 2016b). This report encompasses and provides analysis for May and November 2016 monitored natural attenuation (MNA) data.

LHAAP is located in east-central Texas in the northeastern corner of Harrison County between State Highway 43 in Karnack, Texas, and the western shore of Caddo Lake (see **Figure 1-1** and **Figure 1-2**). The nearest cities are Marshall, Texas, approximately 14 miles to the southwest, and Shreveport, Louisiana, approximately 40 miles to the east. Caddo Lake is a large freshwater lake that bounds the former LHAAP installation to the north and east. The eastern fence is 3.5 miles from the Texas-Louisiana state border. LHAAP-50 is slated for transfer from the Army to the U.S. Fish and Wildlife Service (USFWS) for incorporation into the Caddo Lake National Wildlife Refuge in the future.

1.1 Remedial Action Objectives

The remedial action objectives (RAOs) for LHAAP-50, consistent with the reasonably anticipated future use as a national wildlife refuge, are:

- Protection of human health by preventing human exposure to the contaminated groundwater
- Protection of human health and environment by preventing contaminated groundwater from migrating into nearby surface water
- Protection of human health by preventing further potential degradation of groundwater and surface water from contaminated soil

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- Return of groundwater to its potential beneficial uses as drinking water, wherever practicable

1.2 Performance Objectives

The remedy selected for LHAAP-50 includes soil removal, land use controls (LUCs), and MNA. The performance objectives at LHAAP-50 consist of three components: excavation and off-site disposal of perchlorate-contaminated soil, physical inspections, and groundwater/ surface water monitoring. The need for additional plume delineation after the implementation of the remedial action (AECOM 2016a) delayed establishment of the LUC boundary. As a component of the LUC implementation, the civil survey of the LUC boundary was conducted in May 2015 and recorded in the Harrison County Courthouse in June 2015. Physical inspections are conducted annually to confirm compliance with the LUC objective of preventing human exposure to groundwater contamination at levels that pose an unacceptable risk to a future maintenance worker, and ensuring that there is no withdrawal or use of groundwater from the site for anything other than environmental monitoring and testing until the cleanup levels are attained. Groundwater monitoring has been in-progress at the site since October 2013.

According to the *Final Remedial Design* (Shaw 2011), groundwater monitoring is being performed to demonstrate that natural attenuation is an effective remedy that will attain the RAOs over time and that the groundwater plume will not migrate and discharge to nearby surface water bodies at levels that may present an unacceptable risk to human health and the environment. Groundwater monitoring is being performed in accordance with the Remedial Action Work Plan (RAWP) (AECOM 2013) to:

- Detect changes in environmental conditions that may reduce the efficacy of natural attenuation processes
- Identify potentially toxic and/or mobile transformation products
- Verify that the plume is not expanding and poses no unacceptable risk to downgradient receptors
- Detect new releases of contaminants to the environment that could impact effectiveness of the MNA remedy
- Verify attainment of the RAOs

Groundwater monitoring completed as part of the 2016 RA-O consisted of two semiannual groundwater gauging events of 23 wells in the shallow zone and one well in the intermediate zone as specified in the RAWP (AECOM 2013). The monitoring wells sampled in 2016 are listed in **Table 1-1**. Quarterly surface water sampling at points GPW-1 located at Goose Prairie

Creek and at GPW-1A located in a tributary to Goose Prairie Creek was conducted when surface water was present or after rain events exceeding 2 inches. This report summarizes the LUC compliance inspection, monitoring well inspection, maintenance, and repair, results of groundwater and surface water sampling, and an evaluation of MNA.

1.3 Site Description

LHAAP-50 (former sump water tank) is in the north-central portion of LHAAP and covers an area of approximately 1 acre (**Figure 1-2**). The site is an open area of grass and brush that is bounded by South Crocket Avenue to the northeast, a drainage ditch to the west, a railroad spur to the south, and Goose Prairie Creek to the north. Runoff from the northeastern portion of the site is generally toward the northeast. Runoff is collected by a drainage ditch to the northeast that runs parallel to South Crockett Avenue and eventually joins Goose Prairie Creek. Runoff from the southwestern portion of the site is collected to the west by a drainage ditch that carries the runoff north into Goose Prairie Creek. Goose Prairie Creek eventually empties into Caddo Lake.

When operational, LHAAP-50 contained a 47,000-gallon capacity aboveground storage tank (AST) which received industrial wastewater from various industrial waste production sumps throughout LHAAP between 1955 and 1988. After the solids were filtered, the storage tank contents were discharged into Goose Prairie Creek upstream of the Goose Prairie Creek bridge on South Crockett Avenue, south of 51st Street (see **Figure 1-3**). The flow in the creek was sufficient to dilute the water to safe levels (Jacobs 2002). If natural flow in the creek was considered insufficient, clean water was reportedly pumped into the creek to dilute the contents. The AST is no longer present.

The LUC area associated with the groundwater use restriction at LHAAP-50 extends beyond the northern, southern, eastern, and western historical site boundaries and encompasses a total of approximately 77.19 acres. The nearest significant surface water body to LHAAP-50 is Goose Prairie Creek, located approximately 80 feet north of the site, which eventually flows into Caddo Lake. LHAAP-50 has no known areas of archaeological or historical importance.

1.4 Conceptual Site Model

The nature and extent of contamination at LHAAP-50 was evaluated during field investigations conducted between 1992 and 2010. Releases associated with AST operation are the most likely source of contaminants released into the environment. Since the AST has been removed, there is no longer a potential release mechanism for leaks or spills. Perchlorate and volatile organic compounds (VOCs) were released via overland spills, and discharges to the soil and adjacent surface water.

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The contaminants of concern (COCs) at LHAAP-50 include dissolved phase perchlorate and VOCs including tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC) in groundwater, and perchlorate in soil. There are no COCs in other environmental media at the site. The presence of these COCs in the soil and groundwater represents the primary driver for remedial action, as there are no ecological risks at the site. The soil cleanup levels are the Texas Risk Reduction Rules Standard No. 2 industrial medium-specific concentrations. The groundwater cleanup levels are the U.S. Environmental Protection Agency (USEPA) maximum contaminant levels (MCLs). For perchlorate, the cleanup level is the Texas Risk Reduction Program groundwater residential protective concentration level (PCL).

The area of perchlorate contamination in soil was small and the concentrations of perchlorate did not pose an unacceptable risk to human health (hypothetical future maintenance worker) or ecological receptors. The perchlorate in soil is no longer present after removal and offsite disposal of approximately 183 cubic yards of perchlorate-contaminated soil in September 2013 as described in the Final RACR (AECOM 2016a). An area of groundwater contamination is observed in the shallow groundwater (upper and lower zones) which poses an unacceptable carcinogenic risk and non-carcinogenic hazard to a future maintenance worker under an industrial exposure scenario. There is no groundwater contamination in the intermediate groundwater zone. The potential exposure pathways are via use of groundwater as drinking water and migration of impacted groundwater into surface water. Shallow groundwater is not used as drinking water at the refuge and this potential exposure pathway is eliminated from any hypothetical receptor because LUCs are in place that prohibit the use of groundwater other than for environmental monitoring and testing. The nearest significant surface water body to LHAAP-50 is Goose Prairie Creek, approximately 80 feet to the north of the site.

In previous documents, the site hydrogeology was represented as consisting of a shallow zone (approximately 0 to 30 feet below ground surface [bgs]) and an intermediate zone (approximately 35 to 60 feet bgs). Drilling activities performed during implementation of the remedial action (AECOM 2016a) revealed only a shallow unconfined aquifer extending from ground surface to approximately 60 feet bgs across the site. While intermittent clay layers are present, no true aquiclude exists to prevent vertical communication between ground surface and approximately 60 feet bgs.

The intermediate groundwater zone was identified at 100 feet bgs, underlying a dry unit of clay with some interbedded sands. The clay unit is first encountered across the site at approximately 60 feet bgs.

Because the shallow zone is approximately 60 feet in thickness, the potential for differences in nature and extent of contaminant impacts between upper and lower portions of the shallow zone was recognized. To evaluate this concept, 17 new wells were installed in configurations to separately monitor the upper portion of the shallow zone (12 wells) and the lower portion of the shallow zone (five wells). Additionally, three fully penetrating wells (50WW17, 50WW19, and 50WW20) were installed with screened intervals across the entire saturated shallow zone. Monitoring well locations are shown on **Figure 1-3**.

Beginning with the 1st year RA-O report and in all future the zone formerly referred to as the shallow zone is referred to as the 'upper shallow' zone (0 to 30 feet bgs), the zone formerly referred to as the intermediate zone is referred to as the 'lower shallow' zone (30 to 60 feet bgs). The zone formerly referred to as the deep zone is referred to as the intermediate zone (>100 feet bgs).

Based on the groundwater gauging data conducted in November 2016, groundwater in the shallow water-bearing zone ranges from approximately 16.45 feet bgs to 25.33 feet bgs, flowing in a northeasterly direction at a gradient of approximately 0.0016 feet vertical per foot horizontal (ft/ft).

The intermediate water-bearing zone (intermediate zone) underlies the shallow zone at approximately 100 feet bgs. The groundwater surface within the intermediate water-bearing zone in November 2016 was 23.57 feet bgs, indicating confining conditions.

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2.0 SITE ACTIVITIES AT LHAAP-50

2.1 Annual LUC Compliance Inspection, Monitoring, and Repair

2.1.1 Annual LUC Compliance Inspection

The objectives of the LUCs at LHAAP-50 are to prevent human exposure to groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until the cleanup levels are attained. A restriction against use of groundwater will remain in effect until the levels of COCs in groundwater and soil allow unrestricted use and unlimited exposure (UU/UE). Notices of the groundwater use restrictions accompany all property transfer documents and were recorded at the Harrison County Courthouse in June 2015 in accordance with the Texas Administrative Code (TAC) Title 30, §335.566.

The LUCs address the area of the LHAAP-50 site that contains shallow zone groundwater VOC and perchlorate contamination.

A metes and bounds survey of the 77.19-acre LUC boundary has been completed and has been recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. Additionally, the survey plat, legal boundary, and description of the groundwater restriction, in conjunction with a locator map, were provided to the Texas Department of Licensing and Regulation in June 2015.

A LUC compliance inspection was conducted on August 1, 2016, during the 3rd RA-O reporting period. No change in land use has occurred. The Annual LUC Compliance Certification Documentation Form for the third year RA-O period is included in **Appendix A**. No compliance issues or concerns were noted during the annual inspection.

2.1.2 Well Field Operation and Maintenance

Inspections of the conditions/integrity of monitoring wells are conducted during each sampling event and the information recorded on the field sampling forms. **Appendix B** includes a photo log, which shows the condition of the wells during the inspection. Maintenance or repairs are performed as needed, based on observed conditions. For the third annual reporting period, no damage to well bollards, pads, or protective well casings and only minimal encroachment of weeds or brush on the well pads was observed. Mowing the area to control brush and weeds is conducted on a routine basis and as needed to allow access to the wells, typically before sampling events. Mowing is conducted more frequently during the warmer spring and summer months than during the colder fall and winter seasons.

2.2 Groundwater Monitoring

The semiannual groundwater event includes 28 wells for groundwater gauging (**Table 2-1**) and 27 wells for groundwater sampling (**Table 1-1**). During the 3rd year RA-O, semiannual groundwater gauging and sampling was completed in May 2016 and November 2016. The monitoring well locations are shown on **Figure 1-3**. Monitoring wells 50WW02, 50WW03, and 50WW04 have been dry for the 3 year monitoring period. An attempt was made to sample 50WW02, 50WW03, and 50WW04 after a heavy rainfall event in March 2016; however, the wells were found to be dry. Additionally, 50WW07 a cross-gradient well was also dry in the November 2016 sampling event. 50WW02, 50WW03, and 50WW04 are primarily replaced by data from wells 50WW08, 50WW22, and 50WW21, respectively. Therefore, there were no limitations on data available for use in the MNA evaluation. Monitoring well 50WW02 had reported historical concentrations of 110 micrograms per liter (µg/L) for perchlorate and 8,050 µg/L for TCE on April 3, 2009, which are above the cleanup levels.

Before collecting groundwater samples, the wells were gauged using a water level probe and the depth to water was recorded to the nearest 0.01 foot from the top of casing. Water samples were collected using the low-flow sampling technique as described in the groundwater sampling procedures found in the *Final Installation-Wide Work Plan* (AECOM 2014). The objective of using this method was to collect representative samples of the groundwater in the formation adjacent to the well screen, eliminating the mixing of stagnant water above and below the well screen. After water quality parameters stabilized and were within acceptable ranges per the Work Plan, samples were collected at the same low flow rate. Groundwater samples were collected from the bottom of the screen and top of the screen at 50WW13 denoted by 50WW13B and 50WW13T. Similarly, groundwater samples were collected from the bottom of the screen, middle of the screen and top of the screen denoted by 50WW17B, 50WW17M, and 50WW17T. Although monitoring well 50WW25 is physically located within the LHAAP-50 LUC boundary, the source of perchlorate in this well is at LHAAP-47 (AECOM 2016c).

Groundwater sampling forms are presented in **Appendix C**. Chain of custody forms, laboratory reports and data validation reports are presented in **Appendix D**.

2.2.1 Groundwater Elevations and Flow Direction

Groundwater elevation data for May and November 2016 is shown in **Table 2-1**. **Figure 2-1** and **Figure 2-2** depict the shallow groundwater potentiometric surface in May 2016 and November 2016, respectively, shallow groundwater at LHAAP-50 in May and November 2016 was interpreted to generally flow in an east-northeasterly direction (**Figures 2-1** and **Figure 2-2**). A depression in the potentiometric surface was observed at 50WW15 in May 2016, but not in November 2016. Groundwater elevations generally decreased across the site

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between May 2016 and November 2016, with a range between 0.5 feet and 1.8 feet, averaging a decrease of 1.4 feet.

On **Figures 2-1** and **2-2**, monitoring wells screened in the upper shallow zone or fully penetrating were used and wells that are screened in the lower shallow zone (50WW06, 50WW09, 50WW14, 50WW26, and 50WW27) were not used.

2.2.2 Groundwater Analytical Results

Analytical results for the semiannual samples are presented in **Tables 2-2a** to **2-2d** and mapped on **Figures 2-3** and **2-4**. Wells were sampled for VOCs and perchlorate during the semiannual sampling events of the 3rd year RA-O. The COCs (perchlorate, PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, VC, 1,1-DCE, 1,2-DCA, and MNA parameters (alkalinity, total organic carbon [TOC], phosphorous, sulfide, iron, manganese, anions, and dissolved gases) are included in **Tables 2-2a** to **2-2d**. The historic COC concentrations are shown in **Table 2-3**. All wells were sampled with the following exceptions:

- Wells 50WW03 and 50WW04 were eliminated from the monitoring program based on the recommendations in the 2nd Year RA-O Report.
- Well 50WW02 was dry during the 3rd year sampling events.
- Wells 50WW07, 50WW19, 50WW20, 50WW25, 50WW26, and 50WW28 were only sampled in May 2016 because they were eliminated from the monitoring program based on the recommendations in the 2nd year RA-O Report approved in November 2016 (AECOM 2016b).

Perchlorate, TCE, 1,1-DCE, 1,2-DCA, and cis-1,2-DCE are the COCs detected above their respective cleanup levels in the 3rd year RA-O sampling. Because monitoring well 50WW25 represents a separately sourced perchlorate plume from LHAAP-47, the results from this well will not be discussed further in this report. Further, well 50WW25 was eliminated from the 3rd year monitoring program based on the recommendations in the 2nd Annual RA-O Report (AECOM 2016b). During the May 2016 sampling event, several COCs were detected at multiple wells. In the shallow zone, perchlorate was detected at concentration above the PCL at 50WW08, 50WW11, 50WW12, 50WW13, and 50WW24 (upper shallow wells), 50WW06, 50WW09, and 50WW25 (lower shallow wells). TCE was detected at concentrations above the MCL at 50WW05, 50WW08, 50WW11, 50WW12, 50WW13, 50WW15 (upper shallow wells) 50WW06, and 50WW09 (lower shallow wells). 1,1-DCE was detected above the MCL at 50WW12.

During the November 2016 sampling event, COCs were detected at multiple wells. Perchlorate was detected at concentrations above the MCL at 50WW08, 50WW11, 50WW12, and

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50WW13 (upper shallow), 50WW06 (lower shallow). TCE was detected at concentrations above the MCL at 50WW05, 50WW08, 50WW11, 50WW12, 50WW13, and 50WW15, (upper shallow) 50WW06, 50WW09, and 50WW14 (lower shallow). Cis-1,2-DCE was detected at concentrations above the MCL at 50WW13, 1,2-DCA was detected at concentrations above the MCL at 50WW11 and 50WW13 and 1,1-DCE was detected at concentrations above the MCL at 50WW11.

Laboratory analytical results are included in **Appendix D**, and are discussed further in **Section 3.0**. Historical groundwater analytical results are presented in **Table 2-3**.

2.2.3 Groundwater Monitoring Optimization

Well 50WW02, was dry during the 3 years of sampling events and has been dry for a minimum of 8 years. It is recommended that well 50WW02 be eliminated from the monitoring program for the 4th Year RA-O sampling event. No other changes are recommended to the groundwater-monitoring program for the 4th Year RA-O Sampling Event. The proposed monitoring program is presented in **Table 2-4** and **Figure 2-5**.

2.3 Surface Water Sampling

No samples were collected from surface water location 50SW06. Sampling of this location is to evaluate the potential groundwater to surface water pathway. Samples were to be collected during the groundwater sampling events if there was water in the creek and if the groundwater elevation at the nearest well, 50WW16, was above the bottom of the creek elevation. The water level in 50WW16 in May 2016, was 178.61 ft amsl and in November 2016, was 176.7 ft amsl. The bottom of the creek elevation is 182.902 ft amsl, thus, the groundwater elevation was below the bottom of the creek and it was determined that there was no contribution to surface water from groundwater. Therefore, no sample was collected at 50SW06 (**Table 2-6**). Sampling of 50SW06 will continue and the need to continue sampling will be evaluated during the next Five Year Review.

Surface water samples were collected from GPW-1 and GPW-1A to evaluate the performance of the soil removal action (soil to surface water pathway). The LHAAP-50 Surface Water Sampling standard operating procedure (SOP) (GPW-1 & GPW-1A) in the Final RACR (AECOM 2016a) requires surface water sampling once a quarter on a scheduled work day if a significant precipitation event occurs. Samples were collected from GPW-1 in February, May, August and November 2016 during periods of runoff when surface soil would potentially impact surface water. GPW-1A was dry during these sampling events, and therefore, no samples were collected from this location.

Chain of custody forms, laboratory reports and data validation reports are presented in **Appendix D** for the samples from GPW-1. Surface water sample forms for sampling event

conducted in February 2016, May 2016, August 2016 and November 2016 are included in **Appendix E**. Perchlorate was detected but was at concentrations below the PCL of 17 µg/L in the four GPW-1 samples. The highest perchlorate concentration was detected in May 2016 at GPW-1 at 6.59 µg/L. None of the other COCs were detected above the PCLs/MCLs. Surface water sampling locations are shown on **Figure 2-6**. Surface water sampling data are included in **Table 2-5** and on **Figure 2-6**.

Table 2-6 summarizes the groundwater elevations for the closest monitoring well to surface water sampling location GPW-1 along Goose Prairie Creek, compared to the elevation of the bottom of the creek/ditch at those surface water sampling location. Groundwater elevation for the well closest to GPW-1 is only available for the May 2016 event and is not available for any of the other sampling events. Groundwater elevations from May 2016 indicate that groundwater is not contributing to surface water and that the surface water samples are representative of surface water run off.

As stated in the RAWP, the requirements for surface water sampling at GPW-1 and GPW-1A are to ensure that soil at LHAAP-50 is not contaminating nearby surface water (AECOM 2013). Surface water samples were scheduled to be collected quarterly for two years at GPW-1 following completion of the soil excavation (AECOM 2013). Soil excavation was completed in 2013. In 2014 and 2015, the perchlorate concentrations in surface water in the creek at GPW-1 were below the PCL, and continued to remain below the PCL in 2016 (AECOM 2016b). Samples were also collected from GPW-1A to assess potential contributions to GPW-1 from the perchlorate contaminated surface soil area at LHAAP-47. GPW-1A had one perchlorate exceedance above the PCL in February 2015, and has not had any exceedance since then. During the three years (2014, 2015 and 2016), perchlorate levels in the creek have been consistently below the PCL (3 years post excavation). Therefore, it is recommended that surface water sampling be discontinued at GPW-1 and GPW-1A.

2.4 Well Abandonment

The RAWP (AECOM 2013) states that recommendations for well abandonment would be made in the MNA Performance Evaluation Report. After eight quarters of MNA sampling, wells 50WW03 and 50WW19 are recommended for abandonment (AECOM 2016b).

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3.0 NATURAL ATTENUATION EVALUATION

The following sections present the results of the natural attenuation evaluation in accordance with the three lines of evidence discussed in the RAWP (AECOM 2013) for LHAAP-50 groundwater COCs. The discussion below pertains only to the shallow aquifer where COCs are detected above cleanup levels.

3.1 First Line of Evidence: Change in COC Concentrations over Time and with Distance

Natural attenuation is the combination of multiple mechanisms, including biodegradation, volatilization, dilution, advection, and absorption that reduce contaminant concentrations. The decrease of COC concentrations over time in the absence of any other treatment is evidence of natural attenuation. The change in groundwater COC concentrations over time at select wells at LHAAP-50 are included on **Figure 3-1**.

Twenty-four monitoring wells had samples collected and analyzed for VOCs and perchlorate as indicated in **Table 1-1**. The Final RACR (AECOM 2016a) identified these wells to monitor effectiveness of natural attenuation at LHAAP-50 because of their placement relative to VOC and perchlorate plumes. Of the 24 wells sampled in May and November 2016, eleven wells had COCs above cleanup levels (50WW05, 50WW06, 50WW08, 50WW09, 50WW11, 50WW12, 50WW13, 50WW14, 50WW15, 50WW24, and 50WW25). The other wells in the monitoring program did not contain COCs above the cleanup levels in the 3rd year RA-O sampling events.

The presence of TCE daughter compounds cis-1,2-DCE and VC indicate that reductive dechlorination is occurring within the shallow zone plume.

Mann-Kendall statistical trend analysis was completed for the data collected through the 3rd Year RA-O period for various COCs for ten impacted monitoring wells with COC concentrations above the cleanup levels in the November 2016 event (50WW05, 50WW06, 50WW08, 50WW09, 50WW11, 50WW12, 50WW13, 50WW14, 50WW15, and 50WW24). The trend analysis results are presented in **Appendix F** in graphical format with statistical results presented below the Mann-Kendall analysis. The dates are presented on the x-axis of each graph in **Appendix F** and the concentrations of COCs are presented on the y-axis in µg/L.

The Mann-Kendall Test is a nonparametric statistical test to assess trends and is especially suited for evaluation of concentration-time series data to establish if trends are present (Gilbert, R.O. 1987). This is a general test to determine whether concentrations tend to increase or decrease with time. The test uses a time-ordered sequence of concentrations, calculating the

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difference between a more recent concentration and earlier concentrations. A score of one is assigned for each positive difference; a score of negative one is assigned for each negative difference. The Mann-Kendall statistic (S) is the sum of the scores. The total number of samples (n) and the value of S are used in upper tail probabilities for the null distribution of Kendall's K statistic table to obtain a probability value ($\boldsymbol{\rho}$) for the trend (Gilbert, R.O. 1987) (Hollander, M. and Wolfe, D.A. 1973). If $\boldsymbol{\rho}$ is less than the critical value (α), then the trend is considered statistically significant, at that level, with a confidence level of 1-α. The critical value for a 90% confidence level is α = 0.1; therefore, if $\boldsymbol{\rho}$ is ≤ 0.1, the trend is statistically significant at a 90% confidence level.

If the trend is determined not to be statistically significant, a measurement of the variability in the data set is evaluated to determine if the trend is stable. Where the data appear to fluctuate around a value, the trend may be stable if there is sufficiently low variation between the mean concentration ($\bar{X}$) and the least squares regression line for the time-concentration series (i.e., the trend line). The statistical measure of this variability is the coefficient of variation (*CV*), which is the quotient of the standard deviation (s) divided by the mean ($\bar{X}$):

$$CV = \frac{s}{\bar{X}}$$

If the coefficient of variation is less than 1, the trend is interpreted as being stable.

Half of the detection limit was used for non-detect results, where applicable. Field duplicate data was not used, only the original sample. The Mann-Kendall Test was conducted for each of wells that showed an exceedance in concentration above the PCL/MCL. A summary table of the Mann-Kendall results is presented in **Table 3-1**.

Well 50WW05

TCE is the only COC detected above the cleanup levels in this well in 2016. The TCE concentrations have decreased from the baseline concentration of 280 µg/L in 2013 to 129 µg/L in May 2016 and increased to 184 µg/L in November 2016. The presence of PCE/TCE daughter products such as cis-1,2-DCE indicates that reductive dechlorination is taking place. The overall decreasing trend and the presence of daughter products are evidence supporting MNA at this well.

The Mann-Kendall trend analysis for 50WW05 was conducted for TCE. The results indicate a significant decreasing trend for TCE at a 95% confidence. TCE concentration trend is shown on **Figure 3-1**.

Well 50WW06

Perchlorate and TCE are the only COCs detected above cleanup levels in this well in 2016. Perchlorate and TCE concentrations have increased compared to the baseline concentrations and continue to fluctuate. For example, perchlorate decreased from 5,860 µg/L in November 2015, to 2,140 µg/L in May 2016, and increased to 5,240 µg/L in November 2016. The overall increase in concentrations of perchlorate and TCE suggest that MNA is not reducing concentrations at 50WW06.

The Mann-Kendall trend analysis for 50WW06 was conducted for perchlorate and TCE. The results indicate a statistically significant increasing trend for perchlorate. A statistical significant trend for TCE was not observed but concentrations appear to be increasing. These results indicate that COCs are migrating into this well. It was also noted that upgradient well, 50WW11, has higher concentrations of both perchlorate and TCE than those detected at 50WW06. TCE and perchlorate concentration trends are shown on **Figure 3-1**.

Well 50WW08

Perchlorate and TCE are the only COCs detected above the cleanup levels in this well in 2016. TCE concentration fluctuations continue with an increase from 375 µg/L in August 2015 to 383 µg/L in May 2016 and then a slight decrease to 379 µg/L in November 2016. Perchlorate concentrations have slightly decreased from 157 µg/L in August 2015 to 146 µg/L in May 2016 and have further reduced to 126 µg/L in November 2016.

The Mann-Kendall trend analysis for 50WW08 was conducted for perchlorate and TCE. The results indicate no significant trend in concentrations for these COCs. The coefficient of variation indicates TCE concentrations are stable and perchlorate concentrations are not stable. Although there is not a significant decreasing trend in perchlorate concentrations, the concentrations have reduced since baseline (6,404 µg/L) and have fluctuated from 56.3 µg/L to 200 µg/L TCE and perchlorate concentration trends are shown on **Figure 3-1**.

Well 50WW09

TCE is the only COC detected above the cleanup levels in 2016. Even though TCE concentrations have been decreasing since August 2015, the concentrations are higher than observed during the baseline sampling event in 2013. TCE concentrations increased from 0.26 µg/L in the baseline sampling event in November 2013 to 126 µg/L in November 2016.

The Mann-Kendall trend analysis was conducted for TCE. The results indicate a statistically significant increasing trend. The TCE concentration trend is shown on **Figure 3-1**.

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Well 50WW11

Perchlorate, TCE, 1,1-DCE, and 1,2-DCA were detected above their respective cleanup levels in 2016. Perchlorate concentrations decreased from 22,800 µg/L in November 2015 to the lowest observed concentration of 1,300 µg/L in May 2016 and then increased to 13,400 µg/L in November 2016. Similar to perchlorate, TCE concentrations have fluctuated with a decrease from 2,670 µg/L in November 2015 to 254 µg/L in May 2016 and then an increase to 2,800 µg/L in November 2016. Based on the perchlorate and TCE concentrations over the course of the 3 years of RA-O monitoring, it appears that the fluctuations over time may be seasonal. 1,1-DCE and 1,2-DCA were detected above their MCLs in November 2016. These compounds also seem to fluctuate seasonally as the concentrations are below the MCL in the spring sampling events, including in May 2015.

The Mann-Kendall trend analysis for 50WW11 was conducted for perchlorate, TCE, 1,1-DCE, and 1,2-DCA. The results indicate no significant trend in concentrations for these COCs. The coefficient of variation indicates perchlorate, TCE, 1,1-DCE and 1,2-DCA concentrations are stable. TCE and perchlorate concentration trends are shown on **Figure 3-1**.

Well 50WW12

Perchlorate and TCE are the only COCs detected in this well above their cleanup levels in 2016. The concentrations of perchlorate increased from 37,900 µg/L in November 2015 to 87,800 µg/L in May 2016 and decreased to 25,300 µg/L in November 2016. TCE was detected for the first time above its MCL in May 2015 at a concentration of 33.9 µg/L and has fluctuated up to 417 µg/L in May 2016 before decreasing to 109 µg/L in November 2016.

The Mann-Kendall trend analysis for 50WW12 was conducted for perchlorate and TCE. The results indicate no significant trend in concentrations for perchlorate. However, the levels are stable around the mean, suggesting that contaminant may be moving into the zone at the same rate as it is being reduced. The TCE results indicate statistically significant increasing trend. These results indicate migration of COCs in the plume towards this well. TCE and perchlorate concentration trends are shown on **Figure 3-1**.

Well 50WW13

Perchlorate, TCE, cis-1,2-DCE, and 1,2-DCA were detected above their cleanup levels in 2016. For the May 2016 monitoring event, the Army requested that groundwater samples be collected from the bottom of the screen and top of the screen at this well. The samples were collected and are denoted by sample ID 50WW13B (bottom) and 50WW13T (top). Perchlorate and TCE concentrations were found to be higher at the top of the screen interval compared to the bottom of the screen interval. Though sample results were found to be higher at the top of

screen interval compared to the bottom of screen interval, they were within the same order of magnitude. Perchlorate concentrations were 256 µg/L at the bottom of the well and 493 µg/L at the top of the well. TCE concentrations were 322 µg/L at the bottom of the well and 529 µg/L at the top of the well.

Large fluctuations have been observed with each of the COCs since the baseline sampling event in October 2013. Since 2015, concentrations of perchlorate have ranged from 126 µg/L to 11,400 µg/L. TCE levels from the same period of time have ranged from 322 µg/L to 7,710 µg/L. Similar fluctuations have been observed with cis-1,2-DCE, and 1,2-DCA as shown on **Figure 3-1**.

The Mann-Kendall trend analysis for 50WW13 was conducted for perchlorate, TCE, cis-1,2-DCE, and 1,2-DCA. The results indicate no significant trend in concentrations for perchlorate, TCE, cis-1,2-DCE, and 1,2-DCA. The coefficient of variation indicates TCE, cis-1,2-DCE and 1,2-DCA concentrations are stable but perchlorate concentrations are not stable.

Well 50WW14

TCE is the only COC detected in this well above the cleanup levels in 2016. TCE levels have fluctuated in the last year of sampling. TCE concentrations reduced from 5.78 µg/L in November 2015 to below the MCL at 1.75 µg/L in May 2016 and then increased to 10.9 µg/L in November 2016.

The Mann-Kendall trend analysis for 50WW14 was conducted for TCE. The results indicate a statistically significant decreasing trend. The TCE concentration trend is shown on **Figure 3-1**.

Well 50WW15

TCE is the only COC detected in this well above their cleanup level in 2016. TCE levels have fluctuated in the last year of sampling, decreasing from 8.2 µg/L in November 2015 to 5.32 µg/L in May 2016 and then increasing to 9.52 µg/L in November 2016.

The Mann-Kendall trend analysis in 50WW15 was conducted for TCE. The results indicate a statistically significant decreasing trend. The TCE concentration trend is shown on **Figure 3-1**.

Well 50WW24

Perchlorate is the only COC detected in this well above the cleanup levels in 2016. The only time perchlorate was observed above the MCL since June 2014 (110 µg/L) was in May 2016 at 36.8 µg/L.

The Mann-Kendall trend analysis was conducted for perchlorate. The results indicate no significant trend. The coefficient of variation indicates perchlorate concentrations are not stable. Although a trend was not observed, perchlorate concentrations were below the MCL during the last sampling event in November 2016. The perchlorate concentration trend is shown on **Figure 3-1**.

3.1.1 Plume Stability

COC plume maps completed for each sampling event in the shallow zone are presented on **Figures 2-3** and **2-4**. TCE and perchlorate are the most widespread COCs in the shallow groundwater and fall within the same general footprint. With the groundwater flowing east-northeast, the general central flow path of the TCE and perchlorate within the plume boundary is from 50WW08/09, 50WW13/14, 50WW11, 50WW12, and the central portion of the plume is similar to the prior year. The TCE plume is slightly larger than the perchlorate plume and extends to 50WW05 on the north side. The November 2016 COC data for the 3rd Year RA-O monitoring period (2016) suggests that the plumes are showing overall stable conditions and are not expanding.

Even though the overall plume is relatively stable, the Mann-Kendall indicates significant increases of TCE concentrations at 50WW09 and 50WW12 along the flow path. The TCE concentrations continue to fluctuate at the downgradient well, 50WW12, with an overall increase in concentrations, which suggests migration within the current plume boundary. The baseline plume for TCE did not extend to 50WW12 (AECOM 2016c). At three wells, 50WW05, 50WW14, and 50WW15 significant decreasing trends were observed indicating that natural attenuation is occurring in portions of the plume. At wells 50WW06, 50WW08, 50WW11, and 50WW13 the TCE levels are not decreasing or increasing, however they are stable around the mean as shown on the Mann-Kendall analysis in **Appendix F**. The highest TCE concentrations continue to be at 50WW13 in the central portion of the plume. The concentrations at 50WW13 continue to fluctuate but have decreased since December 2014 when the highest concentrations were observed. At this time, the constantly non-detect values at wells outside of the plume, the significantly decreasing concentrations at three wells (50WW05, 50WW14, and 50WW15), and the stability of the data at the three wells (50WW06, 50WW08, and 50WW11) within the plume, suggest that the TCE plume is stable compared to the prior year. However, the TCE plume has expanded downgradient to 50WW12 since the baseline event.

The stability of the perchlorate plume was also evaluated using the wells outside of the plume and those inside the plume with concentrations above the PCLs. The plume boundary was stable except in May 2016 when 50WW23 had an increase in perchlorate. At 50WW24, perchlorate concentrations increased to above the PCL for the first time after June 2014 in

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May 2016 and reduced to below the PCL in November 2016. This well falls outside the central flow path. Thus, in November 2016, the eastern plume edge returned to within the baseline plume boundary not extending past 50WW12 with perchlorate concentrations below the PCL in wells outside of the plume boundary. A significantly decreasing trend in perchlorate was not observed at any well and most wells had no trend. However, at 50WW06 located in the middle of the plume, a significant increasing trend was observed for perchlorate. Downgradient of 50WW06 at 50WW12, the perchlorate levels are not decreasing or increasing, but are stable around the mean as shown on the Mann-Kendall analysis in **Appendix F**. Perchlorate concentrations within the plume at 50WW13 have increased since baseline. At this time, the constantly non-detect values at wells outside of the plume, suggest that the perchlorate plume is stable and is not expanding.

Overall, in 2016 the combined TCE and perchlorate plume is stable and is not expanding even though the TCE plume has expanded since baseline.

A review of the data in individual wells over the course of the monitoring period does not indicate any definite correlation between groundwater elevations and COC concentrations. **Figure 3-1** provides the groundwater level plotted along concentration profile over time for the shallow plume.

3.2 Second Line of Evidence: Geochemical Indicators

Table 1-1 identifies the wells that were chosen to be evaluated for MNA performance parameters. Some geochemical indicators are collected in the field, and are recorded for all sampling events for all wells. The field parameters for LHAAP-50 wells include dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, conductivity, turbidity, and temperature.

DO is the most thermodynamically favored electron acceptor used by microbes for biodegradation of organic carbon, whether natural or anthropogenic (USEPA 1998). Anaerobic bacteria generally cannot function at DO concentrations greater than about 0.5 milligrams per liter (mg/L) and hence, reductive dechlorination is not expected to occur. DO levels during the 3rd year RA-O monitoring are presented in **Table 2-2a** to **Table 2-2d** and varied between 0.27 mg/L and 2.36 mg/L. The impacted wells with COCs above the cleanup levels are 50WW05, 50WW06, 50WW08, 50WW09, 50WW11, 50WW12, 50WW13, 50WW14, 50WW15, and 50WW24. Low DO concentrations were observed in the impacted wells in the May 2016 sampling event while higher DO concentrations were observed in the impacted wells in November 2016. The DO for the impacted wells ranged from 0.27 mg/L to 0.63 mg/L in the May 2016 sampling event with the exception of 50WW06 which had a DO of 2.0 mg/L in May 2016. 50WW06 is the well that showed a significant increase in perchlorate concentration trend. The DO for the impacted wells in November 2016 sampling event ranged

from 1.91 mg/L to 2.36 mg/L. Based on the latest results from the November 2016 sampling event, conditions are not favorable for anaerobic degradation of chlorinated ethenes at the impacted wells. Data from future events will be evaluated to determine if DO continues to fluctuate seasonally and shows an increasing trend.

The ORP levels indicate how oxidative or reductive the groundwater is in the aquifer matrix and provide real-time data if conditions are conducive for anaerobic biodegradation. ORP values less than 50 millivolts (mV) are indicative that the aquifer is reaching anaerobic conditions and are favorable for the biological reductive dechlorination of chlorinated ethenes and ethanes. The ORP measurements at LHAAP-50 during the 3rd year RA-O monitoring period ranged between -8 mV to 265 mV, indicating the presence of anaerobic and aerobic zones across the site. In the May 2016 sampling event, ORP was above 50 mV at all the impacted wells except 50WW05, which had an ORP of 35 mV. In the November 2016 sampling event, ORP was above 50 mV at the impacted wells except 50WW05 and 50WW14, which had an ORP of 32 and -8 mV respectively. The general condition of the plume is aerobic, and therefore, not conducive to the biodegradation of chlorinated ethenes.

After DO has been depleted in the microbiological treatment zone, nitrate may be used as an electron acceptor for anaerobic biodegradation of chlorinated ethenes via denitrification. In order for reductive dechlorination to occur, nitrate concentrations in the contaminated portion of the aquifer must be less than 1.0 mg/L (USEPA 1998). **Table 2-3** indicates that nitrate and nitrite concentrations were generally below the laboratory reporting limits in LHAAP-50 groundwater. Nitrite was detected at concentrations slightly above 1 mg/L at two wells 50WW12 and 50WW23 Therefore, nitrate reduction is not a likely mode of microbial respiration at the site, and the lack of nitrate across the site is favorable for achieving the highly reducing conditions ideal for anaerobic reductive dechlorination.

After DO and nitrate have been depleted in the microbiological treatment zone, sulfate may be used as an electron acceptor for anaerobic biodegradation. This process is termed “sulfate reduction” and results in the production of sulfide. Concentrations of sulfate greater than 20 mg/L may cause competitive exclusion of dechlorination. However, in many plumes with high concentrations of sulfate, reductive dechlorination still occurs (USEPA 1998). **Table 2-2a** to **Table 2-2d** indicate that the sulfate concentrations were above 20 mg/L in all wells where sulfate was analyzed during the 3-year RA-O monitoring period (sulfate concentrations at the site ranged between 63.1 mg/L and 658 mg/L, which is typical of this formation). Relatively high concentrations of sulfate and corresponding sulfide below laboratory reporting limit indicates that the conditions in the aquifer are generally not conducive for reductive dechlorination.

Methanogenesis occurs in highly reducing conditions and generally occurs after oxygen, nitrate, and sulfate have been depleted. Methane levels above 500 µg/L are considered to indicate methanogenic conditions (USEPA 1998). Methane was measured in select wells for MNA evaluation and was generally found to range from non-detect levels to 17.1 µg/L.

Regardless of the electron acceptor being used, organic carbon is a required source to sustain microbial activity. TOC is utilized as a carbon and energy source to support the reductive dechlorination of the chlorinated COCs. TOC concentrations greater than 20 mg/L are considered adequate to support microbial activity (USEPA 1998). TOC concentrations were measured during this monitoring period in select wells and were found to range between 13.6 mg/L and 84.1 mg/L with the majority of values above 20 mg/L. The TOC levels indicate the concentrations are sufficient to support microbial growth. Alkalinity levels in the groundwater monitoring wells have generally remained between 200 and 500 mg/L and there is no significant difference in alkalinity levels in wells within and outside of the plume indicating any increased microbial activity.

The pH of groundwater has an effect on the presence and activity of microbial populations in groundwater. This is especially true for bacteria responsible for reductive dechlorination. Microbes capable of degrading chlorinated aliphatic hydrocarbons and petroleum hydrocarbon compounds generally prefer pH values varying from six to eight standard units (USEPA 1998). The shallow zone groundwater pH within the plume has been between 4.6 and 10.23 standard units. The highest pH values were reported in 50WW10, an intermediate well with surface casing. It is possible that the grout of the surface casing may contribute to the increase in pH level in groundwater measured in this well.

Ethane and ethene, the two end products of the reductive dechlorination pathways for chlorinated ethanes and ethenes, were below the laboratory reporting limits during the 3rd year RA-O monitoring period. These results indicate that complete dechlorination within the plume is not taking place.

The qualitative assessment of geochemical indicators in the shallow groundwater zone at LHAAP-50 indicates current geochemical conditions are not optimal to support biodegradation.

3.3 Third Line of Evidence: Predictive Modeling and Microbial Analysis

If the first two lines of evidence for MNA are deemed inadequate or inconclusive, and/or if the need for a contingency remedy is evaluated, data from field or microcosm studies will be necessary to establish the third line of evidence for MNA. Dechlorinating bacteria

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(*Dehalococcoides* ethenogenes and associated functional genes) were not analyzed at LHAAP-50. Therefore, this line of evidence cannot currently be evaluated.

Of the analyzed parameters and wells using Mann-Kendall trend analysis, only one parameter (TCE) showed a significant decrease in concentration over time in three wells (50WW05, 50WW14 and 50WW15). The first order rate constant was determined using the regression curve (**Appendix G**). The first order rate constants and the time to achieve the MCL of 5 µg/L is included in **Appendix G**. For 50WW05, the first order rate constant was estimated at 0.00004 day^{-1} and the time to achieve the MCL of 5 µg/L from the November 2016 concentration of 184 µg/L is estimated at 247 years. For 50WW14, the first order rate constant is 0.003 day^{-1} and the time to achieve MCL of 5 µg/L from the November 2016 concentration of 10.9 µg/L is estimated at 0.7 years. For 50WW15, the first order rate constant is 0.001 day^{-1} and the time to achieve MCL of 5 µg/L from the November 2016 concentration of 9.52 µg/L is estimated at 1.8 years.

Degradation of COCs in other wells is not occurring to such an extent to allow a determination of time to achieve the MCL (i.e., predictive modeling by assuming some degree of degradation and degradation half-lives is not meaningful for this plume). These determinations assume the rate of concentration decrease will continue at the same rate as calculated from recent data. However, the rate of reduction could diminish over time as the residual concentration decrease and the timeframes to achieve the MCL might be longer than estimated.

4.0 SUMMARY AND CONCLUSIONS

4.1 Summary

The VOC data and geochemical indicators were collected over the course of the monitoring period at LHAAP-50 to evaluate effectiveness of MNA as a site remedy. A tiered approach assessing the three lines of evidence was used to evaluate the occurrence of natural attenuation in site groundwater.

TCE and perchlorate are the most widespread COCs in shallow groundwater. No COCs were detected above the cleanup levels in intermediate groundwater. An assessment of the first line of evidence shows that the combined TCE and perchlorate plume is stable but not decreasing in size.

The TCE plume has expanded to 50WW12 beyond the baseline TCE plume boundary. Concentrations continue to fluctuate at this well with a statistical increasing trend in concentrations. During the three years of RA-O sampling, the highest concentrations of TCE have been observed at 50WW13. In 2016, the highest concentration of TCE at 6,050 µg/L remains at 50WW13 near the center of the plume.

The perchlorate plume appeared to have expanded in May 2016 due to detections observed above PCL at 50WW24. The May 2016 perchlorate plume is more widespread than the TCE plume. The highest concentration of perchlorate observed in May 2016 was detected at 50WW12 at a concentration of 87,800 µg/L. In November 2016, the perchlorate plume appears to be stable. The perchlorate concentration at 50WW24 reduced to below the MCL in November 2016. The November 2016 perchlorate plume reduced to its prior size and follows the general direction of groundwater to the east-northeast.

A review of the data in individual wells over the course of the monitoring period does not indicate any definitive correlations between groundwater elevations and COC concentrations.

The qualitative assessment of geochemical indicators in the shallow groundwater zone at LHAAP-50 indicates current geochemical conditions are not conducive for reductive dechlorination.

Based on the data collected thus far, MNA associated with biodegradation appears to be very limited in the shallow groundwater at LHAAP-50 and the groundwater conditions are not supportive of reductive dechlorination. TCE shows a decreasing trend at three wells 50WW05, 50WW14, and 50WW15 while no decreasing trend is observed for perchlorate at any of the wells. As of November 2016, both TCE and perchlorate plume are stable within the same footprint, but the TCE plume remains beyond the baseline plume.

Groundwater monitoring will continue to be performed at LHAAP-50 in compliance with the RAWP (AECOM 2013) until the proposed sampling optimization outlined in **Section 2.2.3** of this report is approved. It is recommended that Well 50WW02, a dry well be eliminated from the monitoring program for the Fourth Year RA-O Sampling Event. No change in land or groundwater use has occurred at the site, and the use of the site is still consistent with that mandated by the ROD.

Surface water sampling was conducted for four quarters and none of the COCs were detected above the PCLs/MCLs. Because perchlorate levels at GPW-1 in the creek have been consistently below the PCL in 2014, 2015 and 2016 (3 years post excavation), it is recommended that the surface water sampling be discontinued for LHAAP-50 at GPW-1. Additionally, the Army elected to collect additional surface water samples from GPW-1 and GPW-1A during a rain event in February 2018 (data provided in the April 2018 Monthly Manager's Meeting), and the results indicate that the detected perchlorate concentrations in surface water at GPW-1 and GPW-1A (1.2J and 6.3 µg/L, respectively) continue to be below the PCL of 17 µg/L, supporting the recommendations to discontinue the surface water sampling at GPW-1 and GPW-1A. The February 2018 data will be included in the Fourth Annual RA-O Report. Sampling of 50SW06 will continue and the need to continue sampling will be evaluated during the next Five Year Review.

A LUC compliance inspection was conducted in 2016. No change in land use has occurred.

4.2 Conclusion

The Remedial Design indicates that performance objectives will be evaluated after two years of quarterly groundwater monitoring (Shaw 2011). If MNA is found to be ineffective, a contingency remedy to enhance MNA will be implemented. Based on the review of the data from the 3rd Year of RA-O monitoring, MNA is not effective based on the 1st and 2nd Lines of Evidence as follows:

- **1st Line of Evidence: Change in COC Concentrations.** Concentrations of COCs have fluctuated with significantly decreasing and increasing trends. The TCE plume has expanded from its baseline size as shown by increasing concentrations from below the detection limit to 109 µg/L in the downgradient well 50WW12.
- **2nd Line of Evidence: Geochemical Indicators.** Based on the evaluation of the 2016 data, the shallow groundwater does not have geochemical parameters to support dechlorination.

Thus, it is recommended that the contingency remedy be implemented to enhance MNA to ensure plume migration will not extend beyond the current footprint by creating conditions in the shallow groundwater that are conducive for reductive dechlorination.

5.0 REFERENCES

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Tables

Table 1-1
Wells and Analytes

Monitoring Well ID [a]	VOCs	Perchlorate	Field Parameters [b]	MNA Parameters [c]
Upper Shallow				
50WW01	X	X	X	
50WW02	DRY			
50WW03				
50WW04				
50WW05	X	X	X	
50WW07 [d]	X	X	X	
50WW08	X	X	X	X
50WW11	X	X	X	X
50WW12	X	X	X	X
50WW13	X	X	X	X
50WW15	X	X	X	
50WW16	X	X	X	X
50WW18 [e]	X	X	X	X
50WW21	X	X	X	
50WW22	X	X	X	X
50WW23	X	X	X	X
50WW24 [e]	X	X	X	X
Lower Shallow				
50WW06	X	X	X	X
50WW09	X	X	X	
50WW14	X	X	X	X
50WW25	X	X	X	X
50WW26 [d]	X	X	X	
50WW27	X	X	X	
Fully-Screened Shallow				
50WW17	X	X	X	
50WW19	X	X	X	
50WW20 [d]	X	X	X	
Intermediate				
50WW10	X	X	X	

Notes:

[a] The number of monitoring wells included in the network and the sampling frequency may be adjusted based on results of the initial data collection activities.

[b] Field parameters to be monitored for all wells: pH, temperature, conductivity, turbidity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and ferric iron.

[c] MNA parameters include alkalinity, sulfate, sulfide, chloride, TOC, dissolved iron and manganese, total phosphorus, carbon dioxide, dissolved gases (methane, ethane, ethene) and total iron.

[d] 50WW07, 50WW20, and 50WW26 were sampled in May 2016 but eliminated from the sampling list later and therefore not sampled in Nov 2016.

[e] MNA sampling discontinued at 50WW18 and 50WW24 and therefore not sampled for MNA parameters in November 2016.

ID - identification

MNA - monitored natural attenuation

TOC - total organic carbon

VOCs - volatile organic compounds

X - well will be analyzed for that parameter

Table 2-1
Groundwater Elevation Data, LHAAP-50

Well ID	Aquifer	Sampling Date	Top of Casing Elevation	Depth to Water	Screen Interval (ft from TOC)		Screen Interval (ft from TOC)		Groundwater Elevation (ft msl)
					Top	Bottom	Top	Bottom	
50WW01	Upper Shallow	5/11/2016	198.5	19.02	13.21	23.21	185.29	175.29	179.48
		11/4/2016	198.5	20.85	13.21	23.21	185.29	175.29	177.65
50WW02	Upper Shallow	3/28/2016	200.74	Dry	12.34	22.24	188.4	178.5	dry
		11/2/2016	200.74	Dry	12.34	22.24	188.4	178.5	dry
50WW03	Upper Shallow	3/28/2016	202.94	Dry	13.06	23.06	189.88	179.88	dry
		11/4/2016	202.94	Dry	13.06	23.06	189.88	179.88	dry
50WW04	Upper Shallow	3/28/2016	204.51	Dry	12.87	22.87	191.64	181.64	dry
		11/4/2016	204.51	Dry	12.87	22.87	191.64	181.64	dry
50WW05	Upper Shallow	5/11/2016	197.6758	18.86	17.24	27.24	180.44	170.44	178.82
		11/3/2016	197.6758	20.69	17.24	27.24	180.44	170.44	176.99
50WW06	Lower Shallow	5/10/2016	195.3462	16.92	47.75	57.75	147.60	137.60	178.43
		11/1/2016	195.3462	18.49	47.75	57.75	147.60	137.60	176.86
50WW07	Upper Shallow	5/11/2016	202.55	24.8	21.67	31.67	180.88	170.88	177.75
		11/4/2016	202.55	Dry	21.67	31.67	180.88	170.88	dry
50WW08	Upper Shallow	5/3/2016	199.67	20.97	17.11	31.71	182.56	167.96	178.70
		11/2/2016	199.67	22.51	17.11	31.71	182.56	167.96	177.16
50WW09	Lower Shallow	5/12/2016	199.41	20.68	46.75	61.25	152.66	138.16	178.73
		11/3/2016	199.41	22.25	46.75	61.25	152.66	138.16	177.16
50WW10	Intermediate	5/12/2016	199.25	22.8	101.43	110.93	97.82	88.32	176.45
		11/3/2016	199.25	23.57	101.43	110.93	97.82	88.32	175.68
50WW11	Upper Shallow	5/10/2016	197.07	18.44	22.55	37.05	174.52	160.02	178.63
		11/1/2016	197.07	20.06	22.55	37.05	174.52	160.02	177.01
50WW12	Upper Shallow	5/10/2016	195.66	17.42	22.5	37	173.16	158.66	178.24
		11/1/2016	195.66	18.85	22.5	37	173.16	158.66	176.81
50WW13	Upper Shallow	5/3/2016	197.45	18.91	22.44	36.94	175.01	160.51	178.54
		11/1/2016	197.45	20.31	22.44	36.94	175.01	160.51	177.14
50WW14	Lower Shallow	5/3/2016	197.52	19	45.78	60.28	151.74	137.24	178.52
		11/1/2016	197.52	20.55	45.78	60.28	151.74	137.24	176.97
50WW15	Upper Shallow	5/12/2016	196.3	18.68	22.25	36.75	174.05	159.55	177.62
		11/2/2016	196.3	19.17	22.25	36.75	174.05	159.55	177.13
50WW16	Upper Shallow	5/11/2016	196.66	18.05	22.66	37.16	174	159.5	178.61
		11/2/2016	196.66	19.96	22.66	37.16	174	159.5	176.70
50WW17	Fully Screened Shallow	5/11/2016	195.13	17.61	22.3	66.8	172.83	128.33	177.52
		11/4/2016	195.13	19.04	22.3	66.8	172.83	128.33	176.09
50WW18	Upper Shallow	5/3/2016	194.84	17.55	22.37	36.87	172.47	157.97	177.29
		11/3/2016	194.84	18.7	22.37	36.87	172.47	157.97	176.14
50WW19	Fully Screened Shallow	5/11/2016	195.96	18.27	21.35	65.85	174.61	130.11	177.69
		11/4/2016	195.96	19.66	21.35	65.85	174.61	130.11	176.30
50WW20	Fully Screened Shallow	5/11/2016	202.54	24.24	20.54	55.04	182	147.5	178.30
		11/4/2016	202.54	25.33	20.54	55.04	182	147.5	177.21
50WW21	Upper Shallow	5/12/2016	200.14	21.97	22.36	36.86	177.78	163.28	178.17
		11/3/2016	200.14	23.15	22.36	36.86	177.78	163.28	176.99
50WW22	Upper Shallow	5/10/2016	202.1	23.47	21.97	36.57	180.13	165.53	178.63
		11/2/2016	202.1	24.87	21.97	36.57	180.13	165.53	177.23
50WW23	Upper Shallow	5/10/2016	200.75	22.6	22.42	36.92	178.33	163.83	178.15
		11/1/2016	200.75	23.7	22.42	36.92	178.33	163.83	177.05
50WW24	Upper Shallow	5/10/2016	201.63	23.5	22.66	37.16	178.97	164.47	178.13
		11/3/2016	201.63	24.71	22.66	37.16	178.97	164.47	176.92
50WW25	Lower Shallow	5/3/2016	196	17.65	NA	NA	NA	NA	178.33
		11/4/2016	196	18.23	NA	NA	NA	NA	177.75
50WW26	Lower Shallow	5/12/2016	200.07	21.81	47.49	61.99	152.58	138.08	178.26
		11/4/2016	200.07	23.14	47.49	61.99	152.58	138.08	176.93

Table 2-1
Groundwater Elevation Data, LHAAP-50

Well ID	Aquifer	Sampling Date	Top of Casing Elevation	Depth to Water	Screen Interval (ft from TOC)		Screen Interval (ft from TOC)		Groundwater Elevation (ft msl)
					Top	Bottom	Top	Bottom	
50WW27	Lower Shallow	5/12/2016	196.22	17.47	45.28	59.78	150.94	136.44	178.75
		11/2/2016	196.22	19.15	45.28	59.78	150.94	136.44	177.07
50WW28	Upper Shallow	5/11/2016	194.71	16.45	16.57	26.57	178.14	168.14	178.26
		11/4/2016	194.71	18.23	16.57	26.57	178.14	168.14	176.48

Notes:

ft - feet

ID - identification

msl - mean sea level

NA - not analyzed

TOC - top of casing

Table 2-2a
2016 Groundwater Results for Upper Shallow Zone Wells

Well Completion Zone:			Upper Shallow																			
Sample ID:			50WW01		50WW05		50WW05		50WW05		50WW07		50WW08		50WW08		50WW08		50WW08		50WW11	
Sample Date:	Units	MCL / PCL/ UTL	50WW01-051216 5/12/2016 Result	Qual	50WW05-051116 5/11/2016 Result	Qual	50WW05FD-051116 5/11/2016 Result	Qual	50WW05-110316 11/3/2016 Result	Qual	50WW07-051116 5/11/2016 Result	Qual	50WW08-050316 5/3/2016 Result	Qual	50WW08FF-050316 5/3/2016 Result	Qual	50WW08-110216 11/2/2016 Result	Qual	50WW08FF-110216 11/2/2016 Result	Qual	50WW11-051016 5/10/2016 Result	Qual
Water Quality Parameters																						
Temperature	°C	NA	19.77		22.1		22.1		20.09		19.95		19.75		19.75		19.32		19.32		19.92	
pH	pH Units	NA	6.03		6.81		6.81		6.09		5.52		5.9		5.9		5.91		5.91		5.51	
Conductivity	mS/cm	NA	0.906		1.52		1.52		1.65		1.31		2.39		2.39		2.43		2.43		1.72	
Dissolved Oxygen	mg/L	NA	Bailed 2 gal, ran dry on 5/11 at 15:47. Sample taken on 5/12.		0.43		0.43		2.08		0.81		0.63		0.63		2.36		2.36		0.3	
Turbidity	NTU	NA	4.4		0		0		0		0		8		8		0		0		91.2	
Oxidation Reduction Potential	mV	NA	Bailed 2 gal, ran dry on 5/11 at 15:47. Sample taken on 5/12.		35		35		32		175		161		161		213		213		215	
Alkalinity (310.2)																						
Alkalinity, Total	mg/L	NA											416				419				274	
Phosphorus (365.4)																						
Phosphorus	mg/L	NA											0.172	J			0.135	J			1.9	
Sulfide (SM4500-S-(-2)-F-2000)																						
Sulfide	mg/L	NA											1	U			1	U			1	U
Total Organic Carbon (415.1)																						
Total Organic Carbon (TOC)	mg/L	NA											28.6				13.6				34.6	
Metals (6010C)																						
Iron	mg/L	NA													0.1	U			0.1	U		
Metals (6020A)																						
Manganese	mg/L	7.8													0.0268				0.0392			
Perchlorate (6850)																						
Perchlorate	µg/L	17	0.2	U	0.134	J	0.276	J	0.2	U	1.08		146				126				1300	
Volatile Organic Compounds (8260B)																						
1,1-Dichloroethene	µg/L	7	1	U	1.67	J	1.59	J	1.78	J	1	U	0.812	J			2.5	U			1.5	J
1,2-Dichloroethane	µg/L	5	0.5	U	1.33		1.3		1.56		0.5	U	3.23				2.41	J			1.84	
cis-1,2-Dichloroethene	µg/L	70	0.67	J	27.2		27.3		66.7		0.5	U	48.1				38				5.35	
Tetrachloroethene	µg/L	5	0.5	U	0.565	J	0.555	J	0.637	J	0.5	U	1.66				1.11	J			0.417	J
trans-1,2-Dichloroethene	µg/L	100	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U			1.25	U			0.5	U
Trichloroethene	µg/L	5	0.81	J	129		128		184		0.5	U	383				379				254	
Vinyl Chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.374	J			1.25	U			0.5	U
Anions (9056)																						
Chloride	mg/L												352				349				267	
Nitrate	mg/L	10											0.6	U			0.4	U			0.6	U
Nitrite	mg/L	1											0.414	J			0.35	J			0.6	U
Sulfate	mg/L												342				300				272	
Dissolved Gases (RSK-175)																						
Carbon Dioxide	µg/L												427000				529000				592000	
Ethane	µg/L												2	U			2	U			2	U
Ethene	µg/L												2	U			2	U			2	U
Methane	µg/L												2.07	J			6.61				4.98	J

Notes:

Shaded **bold** values indicate analyte detected above MCL / MSC / PCL

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

MSC - medium-specific concentrations

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2a
2016 Groundwater Results for Upper Shallow Zone Wells

Well Completion Zone:			Upper Shallow																			
Sample ID:			50WW11		50WW11		50WW11		50WW12		50WW12		50WW12		50WW12		50WW13		50WW13		50WW13	
			50WW11FF-051016		50WW11-110116		50WW11FF-110116		50WW12-051016		50WW12FF-051016		50WW12-110116		50WW12FF-110116		50WW13-110116		50WW13FF-110116		50WW13B-051316	
Sample Date:			5/10/2016		11/1/2016		11/1/2016		5/10/2016		5/10/2016		11/1/2016		11/1/2016		11/1/2016		11/1/2016		5/13/2016	
	Units	MCL / PCL/ UTL	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water Quality Parameters																						
Temperature	°C	NA	19.92		19.25		19.25		20.2		20.2		20.24		20.24		18.69		18.69		no record in database	
pH	pH Units	NA	5.51		5.66		5.66		5.5		5.5		5.67		5.67		5.67		5.67			
Conductivity	mS/cm	NA	1.72		2.26		2.26		4.28		4.28		4.44		4.44		2.19		2.19			
Dissolved Oxygen	mg/L	NA	0.3		1.91		1.91		0.38		0.38		2.22		2.22		2.12		2.12			
Turbidity	NTU	NA	91.2		5.7		5.7		19.7		19.7		69.3		69.3		17.5		17.5			
Oxidation Reduction Potential	mV	NA	215		128		128		167		167		171		171		146		146			
Alkalinity (310.2)																						
Alkalinity, Total	mg/L	NA			333				202				338				363					
Phosphorus (365.4)																						
Phosphorus	mg/L	NA			0.136	J			0.2	U			2.07				0.2	U				
Sulfide (SM4500-S-(-2)-F-2000)																						
Sulfide	mg/L	NA			1	U			1	U			1	U			1	U				
Total Organic Carbon (415.1)																						
Total Organic Carbon (TOC)	mg/L	NA			31.4				28.5				21.6				37.9					
Metals (6010C)																						
Iron	mg/L	NA	0.0563	J			0.456				0.0788	J			0.1	U			0.155			
Metals (6020A)																						
Manganese	mg/L	7.8	0.103				0.104				0.0743				0.0536				0.0997			
Perchlorate (6850)																						
Perchlorate	µg/L	17			13400				87800				25300				8650				256	
Volatile Organic Compounds (8260B)																						
1,1-Dichloroethene	µg/L	7			21.4				7.35				1.57	J			50	U			0.74	J
1,2-Dichloroethane	µg/L	5			26.1				3.93				0.952	J			36.7	J			2.24	
cis-1,2-Dichloroethene	µg/L	70			67.4				0.78	J			0.5	U			228				15.8	
Tetrachloroethene	µg/L	5			4.91				0.5	U			0.5	U			25	U			0.555	J
trans-1,2-Dichloroethene	µg/L	100			1.35				0.5	U			0.5	U			25	U			0.5	U
Trichloroethene	µg/L	5			2880				417				109				6050				322	
Vinyl Chloride	µg/L	2			1.9				0.5	U			0.5	U			25	U			0.5	U
Anions (9056)																						
Chloride	mg/L				319				1160				986				306					
Nitrate	mg/L	10			0.4	U			2	U			1	U			0.4	U				
Nitrite	mg/L	1			0.4	U			1.02	J			1	U			0.4	U				
Sulfate	mg/L				379				592				496				347					
Dissolved Gases (RSK-175)																						
Carbon Dioxide	µg/L				651000				398000				663000				464000					
Ethane	µg/L				2	U			2	U			2	U			2	U				
Ethene	µg/L				2	U			2	U			2	U			2	U				
Methane	µg/L				9.71				5.81				2.26	J			17.9					

Notes:

Shaded **bold** values indicate analyte detected above MCL / MSC / PCL

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

MSC - medium-specific concentrations

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2a
2016 Groundwater Results for Upper Shallow Zone Wells

Well Completion Zone:			Upper Shallow																			
Sample ID:			50WW13		50WW15		50WW15		50WW15		50WW16		50WW16		50WW16		50WW18		50WW18		50WW18	
			50WW13T-051316		50WW15-051216		50WW15-110216		50WW15FD-110216		50WW16-051116		50WW16-110216		50WW16FF-110216		50WW18-050316		50WW18FF-050316		50WW18-110316	
Sample Date:			5/13/2016		5/12/2016		11/2/2016		11/2/2016		5/11/2016		11/2/2016		11/2/2016		5/3/2016		5/3/2016		11/3/2016	
	Units	MCL / PCL/ UTL	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water Quality Parameters																						
Temperature	°C	NA	no record in database		19.95		20.87		20.87		21.4		18.9		18.9		18.17		18.17		19.75	
pH	pH Units	NA			5.55		5.82		5.82		5.81		5.25		5.25		5.84		5.84		5.71	
Conductivity	mS/cm	NA			1.94		2.01		2.01		0.254		0.323		0.323		3.11		3.11		3.37	
Dissolved Oxygen	mg/L	NA			0.33		1.96		1.96		0.45		2.02		2.02		0.69		0.69		1.5	
Turbidity	NTU	NA			42		71.2		71.2		3.6		462		462		44.9		44.9		395	
Oxidation Reduction Potential	mV	NA			173		111		111		136		200		200		181		181		125	
Alkalinity (310.2)																						
Alkalinity, Total	mg/L	NA											108				356					
Phosphorus (365.4)																						
Phosphorus	mg/L	NA											0.909				0.2	U				
Sulfide (SM4500-S-(-2)-F-2000)																						
Sulfide	mg/L	NA											1	U			1	U				
Total Organic Carbon (415.1)																						
Total Organic Carbon (TOC)	mg/L	NA											10.3				20.6					
Metals (6010C)																						
Iron	mg/L	NA													4.45				0.1	U		
Metals (6020A)																						
Manganese	mg/L	7.8													0.0557				0.0117			
Perchlorate (6850)																						
Perchlorate	µg/L	17	493		0.2	U	0.2	U	0.2	U	0.101	J	0.846				0.2	U			0.2	U
Volatile Organic Compounds (8260B)																						
1,1-Dichloroethene	µg/L	7	1.23	J	1	U	1	U	1	U	1	U	1	U			1	U			1	U
1,2-Dichloroethane	µg/L	5	4.31		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U
cis-1,2-Dichloroethene	µg/L	70	25		6.31		6.63		5.37		0.5	U	0.5	U			0.5	U			0.5	U
Tetrachloroethene	µg/L	5	0.846	J	1.86		1.89		0.917	J	0.5	U	0.5	U			0.5	U			0.5	U
trans-1,2-Dichloroethene	µg/L	100	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U
Trichloroethene	µg/L	5	529		5.32		9.52		7.1		0.287	J	2.72				0.5	U			0.5	U
Vinyl Chloride	µg/L	2	0.259	J	0.5	U	1.18		0.927	J	0.5	U	0.5	U			0.5	U			0.5	U
Anions (9056)																						
Chloride	mg/L												6.59				738					
Nitrate	mg/L	10											0.2	U			1	U				
Nitrite	mg/L	1											0.2	U			0.985	J				
Sulfate	mg/L												38				150					
Dissolved Gases (RSK-175)																						
Carbon Dioxide	µg/L												599000				465000					
Ethane	µg/L												2	U			2	U				
Ethene	µg/L												2	U			2	U				
Methane	µg/L												15.3				2	U				

Notes:

Shaded **bold** values indicate analyte detected above MCL / MSC / PCL

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

MSC - medium-specific concentrations

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2a
2016 Groundwater Results for Upper Shallow Zone Wells

Well Completion Zone:			Upper Shallow																			
Sample ID:			50WW21		50WW21		50WW21		50WW22		50WW22		50WW22		50WW22		50WW23		50WW23		50WW23	
			50WW21-051216		50WW21FD-051216		50WW21-110316		50WW22-051016		50WW22FF-051016		50WW22-110216		50WW22FF-110216		50WW23-051016		50WW23FF-051016		50WW23-110116	
Sample Date:			5/12/2016		5/12/2016		11/3/2016		5/10/2016		5/10/2016		11/2/2016		11/2/2016		5/10/2016		5/10/2016		11/1/2016	
	Units	MCL / PCL/ UTL	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water Quality Parameters																						
Temperature	°C	NA	21.37		21.37		20.05		19.47		19.47		19.12		19.12		22.6		22.6		21.02	
pH	pH Units	NA	5.81		5.81		6.19		5.53		5.53		5.67		5.67		5.45		5.45		6.04	
Conductivity	mS/cm	NA	8.17		8.17		8.27		4.04		4.04		4.53		4.53		4.75		4.75		5.54	
Dissolved Oxygen	mg/L	NA	1.56		1.56		2.13		0.78		0.78		2.19		2.19		0.58		0.58		2.14	
Turbidity	NTU	NA	2		2		0		2.2		2.2		2.4		2.4		45.8		45.8		0	
Oxidation Reduction Potential	mV	NA	172		172		118		230		230		225		225		207		207		178	
Alkalinity (310.2)																						
Alkalinity, Total	mg/L	NA							359				407				219				253	
Phosphorus (365.4)																						
Phosphorus	mg/L	NA							0.163	J			0.2	U			0.2	U			0.2	U
Sulfide (SM4500-S-(-2)-F-2000)																						
Sulfide	mg/L	NA							1	U			1	U			1	U			1	U
Total Organic Carbon (415.1)																						
Total Organic Carbon (TOC)	mg/L	NA							65.9				26				68.3				15.6	
Metals (6010C)																						
Iron	mg/L	NA									0.122	J			0.1	U			0.157	J		
Metals (6020A)																						
Manganese	mg/L	7.8									0.0259				0.0039	J			0.0872			
Perchlorate (6850)																						
Perchlorate	µg/L	17	0.398	J	0.418		0.581		1.46				1.02				2.15				4.76	
Volatile Organic Compounds (8260B)																						
1,1-Dichloroethene	µg/L	7	1	U	1	U	1	U	1	U			1	U			1	U			1	U
1,2-Dichloroethane	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U			0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U			0.5	U
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U			0.5	U
trans-1,2-Dichloroethene	µg/L	100	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U			0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U			0.5	U
Vinyl Chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U			0.5	U			0.5	U			0.5	U
Anions (9056)																						
Chloride	mg/L								956				856				1670				1740	
Nitrate	mg/L	10							0.6	U			2	U			2	U			2	U
Nitrite	mg/L	1							0.6	U			2	U			1.44	J			2	U
Sulfate	mg/L								577				658				126				99.9	
Dissolved Gases (RSK-175)																						
Carbon Dioxide	µg/L								549000				828000				471000				274000	
Ethane	µg/L								2	U			2	U			2	U			2	U
Ethene	µg/L								2	U			2	U			2	U			2	U
Methane	µg/L								2	U			2	U			2	U			2	U

Notes:

Shaded **bold** values indicate analyte detected above MCL / MSC / PCL

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

MSC - medium-specific concentrations

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2a
2016 Groundwater Results for Upper Shallow Zone Wells

Well Completion Zone:			Upper Shallow											
Sample ID:			50WW23		50WW24		50WW24		50WW24		50WW28			
Sample Date:	Units	MCL / PCL/ UTL	50WW23FF-110116 11/1/2016 Result	Qual	50WW24-051016 5/10/2016 Result	Qual	50WW24FF-051016 5/10/2016 Result	Qual	50WW24-110316 11/3/2016 Result	Qual	50WW28-051116 5/11/2016 Result	Qual		
Water Quality Parameters														
Temperature	°C	NA	21.02		21.94		21.94		20.95		20.07			
pH	pH Units	NA	6.04		5.37		5.37		5.66		4.6			
Conductivity	mS/cm	NA	5.54		1.67		1.67		2.07		0.119			
Dissolved Oxygen	mg/L	NA	2.14		0.51		0.51		1.98		0.56			
Turbidity	NTU	NA	0		31.2		31.2		139		9			
Oxidation Reduction Potential	mV	NA	178		207		207		161		265			
Alkalinity (310.2)														
Alkalinity, Total	mg/L	NA			263									
Phosphorus (365.4)														
Phosphorus	mg/L	NA			0.27	J								
Sulfide (SM4500-S-(-2)-F-2000)														
Sulfide	mg/L	NA			1	U								
Total Organic Carbon (415.1)														
Total Organic Carbon (TOC)	mg/L	NA			84.1									
Metals (6010C)														
Iron	mg/L	NA	0.1	U			0.1	U						
Metals (6020A)														
Manganese	mg/L	7.8	0.0288				0.0116							
Perchlorate (6850)														
Perchlorate	µg/L	17			36.8				0.2	U	1.12			
Volatile Organic Compounds (8260B)														
1,1-Dichloroethene	µg/L	7			1	U			1	U	1	U		
1,2-Dichloroethane	µg/L	5			0.5	U			0.5	U	0.5	U		
cis-1,2-Dichloroethene	µg/L	70			0.5	U			0.5	U	0.5	U		
Tetrachloroethene	µg/L	5			0.5	U			0.5	U	0.5	U		
trans-1,2-Dichloroethene	µg/L	100			0.5	U			0.5	U	0.5	U		
Trichloroethene	µg/L	5			0.5	U			0.5	U	0.5	U		
Vinyl Chloride	µg/L	2			0.5	U			0.5	U	0.5	U		
Anions (9056)														
Chloride	mg/L				392									
Nitrate	mg/L	10			0.4	U								
Nitrite	mg/L	1			0.4	U								
Sulfate	mg/L				103									
Dissolved Gases (RSK-175)														
Carbon Dioxide	µg/L				729000									
Ethane	µg/L				2	U								
Ethene	µg/L				2	U								
Methane	µg/L				2	U								

Notes:

Shaded **bold** values indicate analyte detected above MCL / MSC / PCL

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

MSC - medium-specific concentrations

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2b
2016 Groundwater Results for Lower Shallow Zone Wells

Well Completion Zone:			Lower Shallow																	
Sample ID:			50WW06		50WW06		50WW06		50WW06		50WW09		50WW09		50WW14		50WW14	
			50WW06-051016		50WW06-110116		50WW06FF-051016		50WW06FF-110116		50WW09-051216		50WW09-110316		50WW14-050316		50WW14-110116	
Sample Date:		MCL/	5/10/2016		11/1/2016		5/10/2016		11/1/2016		5/12/2016		11/3/2016		5/3/2016		11/1/2016	
	Units	PCL/ UTL	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water Quality Parameters																		
Temperature	°C	NA	19.75		19.35		19.75		19.35		19.56		19.1		18.13		18.72	
pH	pH Units	NA	5.58		5.97		5.58		5.97		5.67		5.73		5.37		5.81	
Conductivity	mS/CM	NA	1.55		1.47		1.55		1.47		2.37		2.58		2.25		2.23	
Dissolved Oxygen	mg/L	NA	2		2.28		2		2.28		0.65		2.24		0.27		2.07	
Turbidity	NTU	NA	13		0		13		0		220		445		406		60	
Oxidation Reduction Potential	mV	NA	223		155		223		155		94		20		70		-8	
Alkalinity (310.2)																		
Alkalinity, Total	mg/L	NA	246		345										249		257	
Phosphorus (365.4)																		
Phosphorus	mg/L	NA	0.45		0.59										1.84		0.488	
Sulfide (SM4500-S-(-2)-F-2000)																		
Sulfide	mg/L	NA	1	U	1	U									1	U	1	U
Total Organic Carbon (415.1)																		
Total Organic Carbon (TOC)	mg/L	NA	32.1		34.6										71.3		19.5	
Metals (6010C)																		
Iron	mg/L	NA					0.11	J	0.1	U								
Metals (6020A)																		
Manganese	mg/L	7.8					0.0557		0.244									
Perchlorate (6850)																		
Perchlorate	µg/L	17	2140		5240						0.2	U	0.2	U	0.47		0.2	U
1,1-Dichloroethene	µg/L	7	1	U	1	U					1	U	1	U	1	U	1	U
1,2-Dichloroethane	µg/L	5	0.5	U	0.5	U					0.688	J	0.519	J	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.388	J	2.37						15.1		10.8		1.41		2.76	
Tetrachloroethene	µg/L	5	0.5	U	0.5	U					0.452	J	0.344	J	0.5	U	0.5	U
trans-1,2-Dichloroethene	µg/L	100	0.5	U	0.5	U					0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	29.5		54.2						154		126		1.75		10.9	
Vinyl Chloride	µg/L	2	0.5	U	0.5	U					0.5	U	0.5	U	0.5	U	0.5	U
Anions (9056)																		
Chloride	mg/L		246		205										377		370	
Nitrate	mg/L	10	0.4	U	0.2	U									0.6	U	0.4	U
Nitrite	mg/L	1	0.4	U	0.2	U									0.378	J	0.4	U
Sulfate	mg/L		199		114										339		339	
Dissolved Gases (RSK-175)																		
Carbon Dioxide	µg/L		670000		353000										990000		309000	
Ethane	µg/L		2	U	2	U									2	U	2	U
Ethene	µg/L		2	U	2	U									2	U	2	U
Methane	µg/L		1.3	J	2	U									2.83	J	9.64	

Notes:

Shaded bold values indicate analyte detected above MCL / MSC / PCL

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

MSC - medium-specific concentrations

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2b
2016 Groundwater Results for Lower Shallow Zone Wells

Well Completion Zone:			Lower Shallow															
Sample ID:			50WW14		50WW14		50WW25		50WW25		50WW26		50WW27		50WW27			
			50WW14FF-050316		50WW14FF-110116		50WW25-050316		50WW25FF-050316		50WW26-051216		50WW27-05126		50WW27-110216			
Sample Date:		MCL/	5/3/2016		11/1/2016		5/3/2016		5/3/2016		5/12/2016		5/12/2016		11/2/2016			
	Units	PCL/ UTL	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual		
Water Quality Parameters																		
Temperature	°C	NA	18.13		18.72		18.74		18.74		22.61		22.46		20.51			
pH	pH Units	NA	5.37		5.81		5.37		5.37		5.28		5.41		5.53			
Conductivity	mS/CM	NA	2.25		2.23		0.786		0.786		4.61		1.59		1.66			
Dissolved Oxygen	mg/L	NA	0.27		2.07		0.27		0.27		0.65		0.38		1.97			
Turbidity	NTU	NA	406		60		84		84		210		132		427			
Oxidation Reduction Potential	mV	NA	70		-8		130		130		185		107		65			
Alkalinity (310.2)																		
Alkalinity, Total	mg/L	NA					483											
Phosphorus (365.4)																		
Phosphorus	mg/L	NA					0.2	U										
Sulfide (SM4500-S-(-2)-F-2000)																		
Sulfide	mg/L	NA					1	U										
Total Organic Carbon (415.1)																		
Total Organic Carbon (TOC)	mg/L	NA					60.3											
Metals (6010C)																		
Iron	mg/L	NA	9.56		6.93				0.539									
Metals (6020A)																		
Manganese	mg/L	7.8	0.436		0.468				0.0541									
Perchlorate (6850)																		
Perchlorate	µg/L	17					96.6				0.2	U	0.2	U	0.124	J		
1,1-Dichloroethene	µg/L	7					1	U			1	U	1	U	1	U		
1,2-Dichloroethane	µg/L	5					0.5	U			0.5	U	0.5	U	0.5	U		
cis-1,2-Dichloroethene	µg/L	70					0.5	U			0.5	U	0.515	J	0.498	J		
Tetrachloroethene	µg/L	5					0.5	U			0.5	U	0.5	U	0.5	U		
trans-1,2-Dichloroethene	µg/L	100					0.5	U			0.5	U	0.5	U	0.5	U		
Trichloroethene	µg/L	5					0.5	U			0.5	U	0.5	U	0.5	U		
Vinyl Chloride	µg/L	2					0.5	U			0.5	U	0.5	U	0.5	U		
Anions (9056)																		
Chloride	mg/L						20.3											
Nitrate	mg/L	10					0.4	U										
Nitrite	mg/L	1					0.4	U										
Sulfate	mg/L						63.1											
Dissolved Gases (RSK-175)																		
Carbon Dioxide	µg/L						1360000											
Ethane	µg/L						2	U										
Ethene	µg/L						2	U										
Methane	µg/L						3.41	J										

Notes:

Shaded bold values indicate analyte detected above MCL / MSC / PCL

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

MSC - medium-specific concentrations

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2c
2016 Groundwater Results for Fully Screened Shallow Zone Wells

Well Completion Zone:			Fully Screened Shallow																	
Sample ID:			50WW17		50WW17		50WW17		50WW17		50WW19		50WW19		50WW19		50WW19		50WW20	
			50WW17-110416		50WW17B-051316		50WW17M-051316		50WW17T-051316		50WW19-110416		50WW19B-051316		50WW19M-051316		50WW19T-051316		50WW20-051116	
Sample Date:			11/4/2016		5/13/2016		5/13/2016		5/13/2016		11/4/2016		5/13/2016		5/13/2016		5/13/2016		5/11/2016	
	Units	MCL/ PCL/ UTL	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water Quality Parameters																				
Temperature	°C	NA	19.57								19.4									
pH	pH Units	NA	5.13								5.41									
Conductivity	mS/CM	NA	2.39								1.14									
Dissolved Oxygen	mg/L	NA	78								3									
Turbidity	NTU	NA	1.43								3.32									
Oxidation Reduction Potential	mV	NA	740								127									
Perchlorate (6850)																				
Perchlorate	µg/L	17	0.2	U	0.2	U	0.119	J	0.149	J	0.2	U	0.2	U	0.2	U	0.338	J	0.2	U
Volatile Organic Compounds (8260B)																				
1,1-Dichloroethene	µg/L	7	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
trans-1,2-Dichloroethene	µg/L	100	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl Chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Notes:

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-2d
2016 Groundwater Results for Intermediate Zone Wells

Well Completion Zone:			Intermediate							
Sample ID:			50WW10		50WW10		50WW10		50WW10	
			50WW10-051216		50WW10FD-051216		50WW10-110316		50WW10FD-110316	
Sample Date:			5/12/2016		5/12/2016		11/3/2016		11/3/2016	
	Units	MCL / PCL/ UTL	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water Quality Parameters										
Temperature	°C	NA	19.87		19.87		19.27		19.27	
pH	pH Units	NA	9.41		9.41		10.23		10.23	
Conductivity	mS/cm	NA	1.3		1.3		1.39		1.39	
Dissolved Oxygen	mg/L	NA	0.84		0.84		3.13		3.13	
Turbidity	NTU	NA	31.5		31.5		19		19	
Oxidation Reduction Potential	mV	NA	-190		-190		-171		-171	
Perchlorate (6850)										
Perchlorate	µg/L	17	0.2	U	0.2	U	0.2	U	0.2	U
Volatile Organic Compounds (8260B)										
1,1-Dichloroethene	µg/L	7	1	U	1	U	1	U	1	U
1,2-Dichloroethane	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U
trans-1,2-Dichloroethene	µg/L	100	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.293	J	0.5	U	0.5	U
Vinyl Chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U

Notes:

°C - degrees Celsius

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

MCL - maximum contaminant level

mg/L - milligrams per Liter

mS/cm - microsiemens per centimeter

mV - millivolts

NA - not analyzed

NTU - nephelometric turbidity unit

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

UTL - upper tolerance limit

Table 2-3

Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	47WW38-100901 9/1/2010	47WW38-100901-FD 9/1/2010	47WW38-110613 11/6/2013	47WW38-111214 11/12/2014	47WW38-021815 2/18/2015	47WW38-052715 5/27/2015	47WW38-111315 11/13/2015	50SW06-021715 2/17/2015	50SW06-052215 5/22/2015	50SW06-111315 11/13/2015	50WW01-031314 3/13/2014	50WW01-052715 5/27/2015	50WW01-082015 8/20/2015	50WW02-980930 9/30/1998
Well Completion Zone:			Lower Shallow							Surface Water			Upper Shallow			Upper Shallow
Perchlorate	µg/L	17	4110	4520	1160 J	860	1500	18	579 J	0.684	0.218 J	1.44 J	<0.2 U	<0.2 U	<0.2 U	NA
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	50
1,2-Dichloroethane	µg/L	5	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	98
cis-1,2-Dichloroethene	µg/L	70	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.372 J	0.41 J	2100
Tetrachloroethene	µg/L	5	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	35
Trichloroethene	µg/L	5	0.565 J	0.605 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.685 J	0.543 J	2900
Vinyl Chloride	µg/L	2	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	100

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW02-981022 10/22/1998	50WW02-000524 5/24/2000	50WW02-001003 10/3/2000	50WW02-010209 2/9/2001	50WW02-020311 3/11/2002	50WW02-020921 9/21/2002	50WW02-040830 8/30/2004	50WW02-050511 5/11/2005	50WW02-FEB2007 2/23/2007	50WW02-040309 4/3/2009	50WW03-980930 9/30/1998	50WW03-000522 5/22/2000	50WW03-001002 10/2/2000	50WW03-010209 2/9/2001
Well Completion Zone:			Upper Shallow										Upper Shallow			
Perchlorate	µg/L	17	18000	4190	9950	10000	6840	7600	2500	1630	532	110	NA	810	<8 U	<1.4 U
1,1-Dichloroethene	µg/L	7	NA	<350 U	<200 U	NA	NA	NA	20	4.81	6.5	<50 U	<1 U	NA	NA	NA
1,2-Dichloroethane	µg/L	5	NA	<350 U	79	NA	NA	NA	58	20.2	18.8	18 J	<1 U	NA	NA	NA
cis-1,2-Dichloroethene	µg/L	70	NA	3100	4060	NA	NA	NA	1800 J	954	855	978	<1 U	NA	NA	NA
Tetrachloroethene	µg/L	5	NA	<350 U	<200 U	NA	NA	NA	28	6.87	9.3	<50 U	<1 U	NA	NA	NA
Trichloroethene	µg/L	5	NA	18000	16100	NA	NA	NA	9200 J	4840	5420	8050	0.57	NA	NA	NA
Vinyl Chloride	µg/L	2	NA	<350 U	<200 U	NA	NA	NA	36	8.56	15.2	<50 U	<1 U	NA	NA	NA

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW03-020312 3/12/2002	50WW03-020921 9/21/2002	50WW03-040830 8/30/2004	50WW03-050511 5/11/2005	50WW03-FEB2007 2/24/2007	50WW04-980930 9/30/1998	50WW04-981022 10/22/1998	50WW04-000522 5/22/2000	50WW04-001002 10/2/2000	50WW04-020312 3/12/2002	50WW04-020921 9/21/2002	50WW04-040831 8/31/2004	50WW04-050510 5/10/2005	50WW05-020921 9/21/2002
Well Completion Zone:			Upper Shallow					Upper Shallow								Upper Shallow
Perchlorate	µg/L	17	<4 U	<4 U	<1 U	<4 U	<10 U	NA	<1 U	<1 U	<16 U	<4 U	<4 U	<1 U	<5 U	5850
1,1-Dichloroethene	µg/L	7	NA	NA	<5 U	<1 U	<2 U	<1 U	NA	NA	NA	NA	NA	<5 U	<1 U	NA
1,2-Dichloroethane	µg/L	5	NA	NA	<5 U	<1 U	<2 U	<1 U	NA	NA	NA	NA	NA	<5 U	<1 U	NA
cis-1,2-Dichloroethene	µg/L	70	NA	NA	<5 U	<1 U	<2 U	0.64	NA	NA	NA	NA	NA	<5 U	<1 U	NA
Tetrachloroethene	µg/L	5	NA	NA	<5 U	<1 U	<2 U	<1 U	NA	NA	NA	NA	NA	<5 U	<1 U	NA
Trichloroethene	µg/L	5	NA	NA	8	<1 U	<2 U	9.4	NA	NA	NA	NA	NA	2 J	<1 U	NA
Vinyl Chloride	µg/L	2	NA	NA	<5 U	<1 U	<2 U	<1 U	NA	NA	NA	NA	NA	<5 U	<1 U	NA

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter
J - estimated value; analyte concentration was less than the limit of quantification
COC - contaminants of concern
MCL - maximum contaminant level
MSC - medium-specific concentrations
NA - not analyzed
PCL - Texas residential groundwater protective concentration level
U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW05-050511 5/11/2005	50WW05-FEB2007 2/23/2007	50WW05-040409 4/4/2009	50WW05-100805 8/5/2010	50WW05-110613 11/6/2013	50WW05-031714 3/17/2014	50WW05-062014 6/20/2014	50WW05-111114 11/11/2014	50WW05-021315 2/13/2015	50WW05FD-021315 2/13/2015	50WW05-052615 5/26/2015	50WW05-081915 8/19/2015	50WW05FD-081915 8/19/2015	50WW05-111315 11/13/2015
Well Completion Zone:			Upper Shallow													
Perchlorate	µg/L	17	719	27.8	<4 U	0.189 J	0.397 J	<0.2 U	20.5	<0.2 U	<0.2 U	<0.2 U	<0.2 U	1.69	1.64	0.7 J
1,1-Dichloroethene	µg/L	7	21.6	12.9	4.61 J	5.73	2.57	2.12	2.67	2.68	1.76 J	1.91 J	1.77 J	2.02	2.08	1.42 J
1,2-Dichloroethane	µg/L	5	24.1	13.5	7.39	7.91	2.81	2.54	2.82	2.97	1.58	1.62	1.9	1.6	1.66	1.93
cis-1,2-Dichloroethene	µg/L	70	66.3	48.2	29	30.1	12.4	10.5	12.6	15.7	11.7	12.6	9.81	29.1	28.1	17.2
Tetrachloroethene	µg/L	5	6.76	5.1	1.61 J	2.64 J	1.54	1.01	1.48	1.6	0.963 J	0.888 J	0.86 J	0.787 J	0.651 J	0.848 J
Trichloroethene	µg/L	5	3130	1460	601	788	280	204	270	329	193	196	197	200	200	210
Vinyl Chloride	µg/L	2	3.69	2.5	<5 U	1.48 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter
J - estimated value; analyte concentration was less than the limit of quantification
COC - contaminants of concern
MCL - maximum contaminant level
MSC - medium-specific concentrations
NA - not analyzed
PCL - Texas residential groundwater protective concentration level
U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW06-040830 8/30/2004	50WW06-050511 5/11/2005	50WW06-FEB2007 2/22/2007	50WW06-100807 8/7/2010	50WW06-100807-FD 8/7/2010	50WW06-102813 10/28/2013	50WW06-031114 3/11/2014	50WW06-062514 6/25/2014	50WW06-110414 11/4/2014	50WW06-021715 2/17/2015	50WW06-052015 5/20/2015	50WW06-081815 8/18/2015	50WW06-111215 11/12/2015	50WW07-021908 2/19/2008
Well Completion Zone:			Lower Shallow													Upper Shallow
Perchlorate	µg/L	17	6.7	24.8	<10 U	113	131	670	2090	700	1510	2490	3000	2050	5860	NA
1,1-Dichloroethene	µg/L	7	<5 U	<1 U	<2 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<5 U	<1 U	<2 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.25 J	<1 U
cis-1,2-Dichloroethene	µg/L	70	<5 U	0.332 J	<2 U	<1 U	<1 U	0.994 J	0.39 J	0.299 J	1.61	0.572 J	0.637 J	0.874 J	1.04	<1 U
Tetrachloroethene	µg/L	5	<5 U	<1 U	<2 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U
Trichloroethene	µg/L	5	15	4.7	2	3.33	3.28	20.9	36.5	27.4	36.1	53.9	49.1	34.7	59.4	<1 U
Vinyl Chloride	µg/L	2	<5 U	<1 U	<2 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW07-040409 4/4/2009	50WW07-100807 8/7/2010	50WW07-110513 11/5/2013	50WW07-032514 3/25/2014	50WW07-062014 6/20/2014	50WW07-110714 11/7/2014	50WW07-021315 2/13/2015	50WW07-052615 5/26/2015	50WW07-082115 8/21/2015	50WW07-110915 11/9/2015	50WW08-103013 [a] 10/30/2013	50WW08-031114 3/11/2014	50WW08-062414 6/24/2014	50WW08-110614 11/6/2014
Well Completion Zone:			Upper Shallow										Upper Shallow			
Perchlorate	µg/L	17	<4 U	0.262	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	6404	91.5	132	56.3
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<5 U	1.71 J	<5 U	<2.5 U
1,2-Dichloroethane	µg/L	5	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	5.73	4.36 J	2.12 J
cis-1,2-Dichloroethene	µg/L	70	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	30.6	103	86	48.5
Tetrachloroethene	µg/L	5	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	2.15	2.03 J	1.9 J
Trichloroethene	µg/L	5	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.42 J	<0.5 U	<0.5 U	247	845	814	685
Vinyl Chloride	µg/L	2	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<2 U	0.517 J	<2.5 U	<1.25 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3

Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW08-021715 2/17/2015	50WW08-052115 5/21/2015	50WW08-081715 8/17/2015	50WW08-111615 11/16/2015	50WW09-110113 11/1/2013	50WW09-031414 3/14/2014	50WW09-061914 6/19/2014	50WW09-111214 11/12/2014	50WW09-021315 2/13/2015	50WW09-052315 5/23/2015	50WW09-082115 8/21/2015	50WW09FD- 082115 8/21/2015	50WW09-111115 11/11/2015	50WW09FD- 111115 11/11/2015
Well Completion Zone:			Upper Shallow				Lower Shallow									
Perchlorate	µg/L	17	99	200	157	32.4 J	<0.2 U	<0.2 U	<0.2 U	0.593	<0.2 U	0.196 J	<0.2 U	<0.2 U	<1 U	<1 U
1,1-Dichloroethene	µg/L	7	<2.5 U	<2.5 U	<2.5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	3.59	3.6	2.63	1.26	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.11	1.66	1.83	1.09	1.05
cis-1,2-Dichloroethene	µg/L	70	70.5	62.1	45.4	17.7	<0.5 U	0.579 J	1.16	0.36 J	1.04	19.7	29.4	29.5	16.3	16
Tetrachloroethene	µg/L	5	2.55	2 J	1.2 J	1.21	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.353 J	0.423 J	0.536 J	0.34 J	0.404 J	0.393 J
Trichloroethene	µg/L	5	852	712	375	288	0.26 J	20.2	36.3	19.8	57 J	202	235	228	173	170
Vinyl Chloride	µg/L	2	<1.25 U	<1.25 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW10-110513 11/5/2013	50WW10FD-110513 11/5/2013	50WW10-031414 3/14/2014	50WW10-061914 6/19/2014	50WW10FD-061914 6/19/2014	50WW10-111214 11/12/2014	50WW10-021315 2/13/2015	50WW10-052315 5/23/2015	50WW10-082115 8/21/2015	50WW10-111115 11/11/2015	50WW11-102813 10/28/2013	50WW11-031314 3/13/2014	50WW11-062514 6/25/2014	50WW11-110514 11/5/2014
Well Completion Zone:			Intermediate										Upper Shallow			
Perchlorate	µg/L	17	0.906	0.924	0.272 J	0.499	1.46	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	21700	2570	8910	22300
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	17.4	1.88 J	7.35	27.9
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	15.2	2.28 J	6.01	24.3
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	43.9	4.46	12.6	70.8
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.76	<1.25 U	0.678 J	5.03
Trichloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.549 J	0.494 J	0.766 J	2750	362	831	3550
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.95	<1.25 U	0.516 J	3.53 J

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter
J - estimated value; analyte concentration was less than the limit of quantification
COC - contaminants of concern
MCL - maximum contaminant level
MSC - medium-specific concentrations
NA - not analyzed
PCL - Texas residential groundwater protective concentration level
U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW11-021715 2/17/2015	50WW11-052015 5/20/2015	50WW11-081815 8/18/2015	50WW11-111215 11/12/2015	50WW12-102313 10/23/2013	50WW12-031114 3/11/2014	50WW12-062614 6/26/2014	50WW12-110414 11/4/2014	50WW12-021815 2/18/2015	50WW12-052015 5/20/2015	50WW12-081815 8/18/2015	50WW12-111215 11/12/2015	50WW13-103013 [1] 10/30/2013	50WW13-031214 3/12/2014
Well Completion Zone:			Upper Shallow				Upper Shallow								Upper Shallow	
Perchlorate	µg/L	17	2690	1140	17600	22800	23600	35700	35500	14300	30600	59200	17300	37900	14.7	510
1,1-Dichloroethene	µg/L	7	2.47 J	1.03 J	13.1	17.5 J	<1 U	<1 U	<1 U	<1 U	<1 U	0.878 J	<1 U	<1 U	16.6	2.54
1,2-Dichloroethane	µg/L	5	2.42	1.2	16.7	22.9	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.389 J	<0.5 U	<0.5 U	42	4.45
cis-1,2-Dichloroethene	µg/L	70	6.86	2.4	36.3	54.1	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	205	25
Tetrachloroethene	µg/L	5	0.951 J	0.275 J	2.48	<10 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	7.2	1.06
Trichloroethene	µg/L	5	512	230	1550	2670	<0.5 U	0.257 J	0.411 J	<0.5 U	<0.5 U	33.9	5.59	17.6	3000	823
Vinyl Chloride	µg/L	2	<1 U	<0.5 U	1.29	<10 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<2 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter
J - estimated value; analyte concentration was less than the limit of quantification
COC - contaminants of concern
MCL - maximum contaminant level
MSC - medium-specific concentrations
NA - not analyzed
PCL - Texas residential groundwater protective concentration level
U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW13-062514 6/25/2014	50WW13-110514 11/5/2014	50WW13-021715 2/17/2015	50WW13-052015 5/20/2015	50WW13-081915 8/19/2015	50WW13-111215 11/12/2015	50WW14-102813 10/28/2013	50WW14-031214 3/12/2014	50WW14-062514 6/25/2014	50WW14-110514 11/5/2014	50WW14-021715 2/17/2015	50WW14-052015 5/20/2015	50WW14-081915 8/19/2015	50WW14-111215 11/12/2015
Well Completion Zone:			Upper Shallow						Lower Shallow							
Perchlorate	µg/L	17	3110	11700	648	126	9300	11400	5.45	0.256 J	0.121 J	5.37	0.381 J	2.06	2.19	7.5
1,1-Dichloroethene	µg/L	7	4.95 J	20.6	<5 U	0.978 J	13.5	<50 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	10.6	42.4	4.99 J	1.78	31.5	43.4 J	1.16	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	56.3	239	32.1	10.7	184	231	6.52	1.33	0.826 J	2.39	13.5	5.66	7.56	14.2
Tetrachloroethene	µg/L	5	1.39 J	7.05 J	1.89 J	0.554 J	6.19	<25 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	1840	9150	1080	433	5700	7710 J	93.8	37.4	21.9	26.7	9.14	6.05	12	5.78
Vinyl Chloride	µg/L	2	<2.5 U	3.36 J	<2.5 U	<0.5 U	2.31 J	<25 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

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PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW15-102513 10/25/2013	50WW15-031714 3/17/2014	50WW15-061914 6/19/2014	50WW15-110714 11/7/2014	50WW15-021215 2/12/2015	50WW15FD-021215 2/12/2015	50WW15-052315 5/23/2015	50WW15-082015 8/20/2015	50WW15FD-082015 8/20/2015	50WW15-111115 11/11/2015	50WW15FD-111115 11/11/2015	50WW16-102513 10/25/2013	50WW16-032514 3/25/2014	50WW16-062614 6/26/2014
Well Completion Zone:			Upper Shallow											Upper Shallow		
Perchlorate	µg/L	17	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.942 J	1.34 J	<0.2 U	0.237 J	0.155 J	<1 U	<1 U	0.284 J	<0.2 U	0.725
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.258 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	11.9	13.8	12.9	14.3	14.3	14.2	10.8	10.1	10.4	7.16	6.89	0.656 J	0.548 J	0.471 J
Tetrachloroethene	µg/L	5	3.25	3.33	3.05	3.34	3.31	3.24	2.96	1.92	2.01	1.83	1.76	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	17.3	23.5	18.9	35.4	48.3	46.9	13	15.2	15.1	8.2	8.05	18.1	11.4	12
Vinyl Chloride	µg/L	2	3.24	3.09	2.76	2.69	2.2	2.27	1.91	1.25	1.38	0.966 J	0.923 J	<0.5 U	<0.5 U	<0.5 U

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Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW16FD-062614 6/26/2014	50WW16-111214 11/12/2014	50WW16-021315 2/13/2015	50WW16-052215 5/22/2015	50WW16-082015 8/20/2015	50WW16-111315 11/13/2015	50WW17-102513 10/25/2013	50WW17-032514 3/25/2014	50WW17-062014 6/20/2014	50WW17-111114 11/11/2014	50WW17-021315 2/13/2015	50WW17-052215 5/22/2015	50WW17-081915 8/19/2015	50WW17-110915 11/9/2015
Well Completion Zone:			Upper Shallow						Fully-Screened Shallow							
Perchlorate	µg/L	17	0.682	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.51	<0.2 U	1.76	<0.2 U	<0.2 U	<0.2 U	0.193 J	<0.4 U
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	0.456 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	11.6	1.05	0.391 J	<0.5 U	1.5	0.986 J	<0.5 U	<0.5 U	0.516 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

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PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW18-102313 10/23/2013	50WW18-032614 3/26/2014	50WW18-062414 6/24/2014	50WW18-110414 11/4/2014	50WW18-021815 2/18/2015	50WW18-052815 5/28/2015	50WW18-081715 8/17/2015	50WW18-111615 11/16/2015	50WW19-011414 1/14/2014	50WW19-032514 3/25/2014	50WW19-062014 6/20/2014	50WW19-111114 11/11/2014	50WW19-021315 2/13/2015	50WW19-052215 5/22/2015
Well Completion Zone:			Upper Shallow								Fully-Screened Shallow					
Perchlorate	µg/L	17	<0.2 U	<0.2 U	0.172 J	<0.2 U	0.258 J	<0.2 U	0.144 J	<1 U	<0.2 U	<0.2 U	0.48	<0.2 U	<0.2 U	0.305 J
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW19FD-052215 5/22/2015	50WW19-082115 8/21/2015	50WW19-110915 11/9/2015	50WW20-110713 11/7/2013	50WW20-031314 3/13/2014	50WW20FD-031314 3/13/2014	50WW20-061914 6/19/2014	50WW20-111114 11/11/2014	50WW20FD-111114 11/11/2014	50WW20-021215 2/12/2015	50WW20-052615 5/26/2015	50WW20-082115 8/21/2015	50WW20-111015 11/10/2015	50WW21-102513 10/25/2013
Well Completion Zone:			Fully-Screened Shallow			Fully-Screened Shallow										Upper Shallow
Perchlorate	µg/L	17	0.198 J	<0.2 U	<0.2 U	<0.2 U	0.697	0.673	<0.2 U	<0.2 U	<0.2 U	0.168 J	<0.2 U	<0.2 U	<0.2 U	0.731
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW21FD-102513 10/25/2013	50WW21-032514 3/25/2014	50WW21-062014 6/20/2014	50WW21FD-062014 6/20/2014	50WW21-111314 11/13/2014	50WW21FD-111314 11/13/2014	50WW21-021215 2/12/2015	50WW21-052315 5/23/2015	50WW21FD-052315 5/23/2015	50WW21-082015 8/20/2015	50WW21-111015 11/10/2015	50WW22-102313 10/23/2013	50WW22-031214 3/12/2014	50WW22-062414 6/24/2014
Well Completion Zone:			Upper Shallow											Upper Shallow		
Perchlorate	µg/L	17	0.818	0.606	0.964	0.934	0.779	0.779	0.878	0.502	0.516	0.67	1.21 J	6.97	1.54	2.29
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.447 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW22-110614 11/6/2014	50WW22-021715 2/17/2015	50WW22-052115 5/21/2015	50WW22-081815 8/18/2015	50WW22-111615 11/16/2015	50WW23-102913 10/29/2013	50WW23-031314 3/13/2014	50WW23-062614 6/26/2014	50WW23-110414 11/4/2014	50WW23-021815 2/18/2015	50WW23-052015 5/20/2015	50WW23-081715 8/17/2015	50WW23-111615 11/16/2015	50WW24-102913 10/29/2013
Well Completion Zone:			Upper Shallow					Upper Shallow								Upper Shallow
Perchlorate	µg/L	17	1.06	1.51	2.92	3.62	0.642 J	0.336 J	0.227 J	0.182 J	<0.2 U	<0.2 U	23.3	0.527	<1 U	0.479
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	0.339 J	<0.5 U	<0.5 U	<0.5 U	0.454 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW24-032614 3/26/2014	50WW24-062614 6/26/2014	50WW24-110414 11/4/2014	50WW24-021815 2/18/2015	50WW24-052815 5/28/2015	50WW24-081715 8/17/2015	50WW24-111615 11/16/2015	50WW26-110613 11/6/2013	50WW26FD-110613 11/6/2013	50WW26-032614 3/26/2014	50WW26FD-032614 3/26/2014	50WW26-062014 6/20/2014	50WW26-111314 11/13/2014	50WW26-021315 2/13/2015
Well Completion Zone:			Upper Shallow							Lower Shallow						
Perchlorate	µg/L	17	<0.2 U	110	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.268 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW26-052315 5/23/2015	50WW26-082015 8/20/2015	50WW26-111015 11/10/2015	50WW26FD-111015 11/10/2015	50WW27-110613 11/6/2013	50WW27-031714 3/17/2014	50WW27FD-031714 3/17/2014	50WW27-061914 6/19/2014	50WW27-110714 11/7/2014	50WW27FD-110714 11/7/2014	50WW27-021215 2/12/2015	50WW27-052315 5/23/2015	50WW27-082015 8/20/2015	50WW27-111115 11/11/2015
Well Completion Zone:			Lower Shallow				Lower Shallow									
Perchlorate	µg/L	17	<0.2 U	<0.2 U	<1 U	<1 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.611 J	0.518 J	0.871 J	0.529 J	0.493 J	0.691 J	0.709 J	0.33 J	0.581 J
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.251 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	50WW28-070914 7/9/2014	50WW28-111214 11/12/2014	50WW28-021715 2/17/2015	50WW28FD-021715 2/17/2015	50WW28-052615 5/26/2015	50WW28FD-052615 5/26/2015	50WW28-082015 8/20/2015	50WW28-111315 11/13/2015	GPW1-021715 2/17/2015	GPW1-050815 5/8/2015	GPW1-052215 5/22/2015	GPW1-111315 11/13/2015	GPW1A-021715 2/17/2015	GPW1A-050815 5/8/2015
Well Completion Zone:			Upper Shallow								Surface Water				Surface Water	
Perchlorate	µg/L	17	2.57	2.01 J	1.44	1.44	1.04	1.05	0.688	1.64	0.737	0.156 J	0.213 J	0.139 J	38.2	16
1,1-Dichloroethene	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-3
Historical COC Concentrations, LHAAP-50

Sample ID Sample Date	Units	MCL / MSC / PCL	LHSMW54-941209 12/9/1994	LHSMW54-960212 2/12/1996	LHSMW54-960821 8/21/1996	LHSMW54-980520 5/20/1998	LHSMW54-000521 5/21/2000	LHSMW54-020309 3/9/2002	LHSMW54-020921 9/21/2002	LHSMW54-100806 8/6/2010	LHSMW54-101707 10/17/2007	LHSMW54-110713 11/7/2013	LHSMW54-021815 2/18/2015	LHSMW54-052715 5/27/2015	LHSMW54-111315 11/13/2015
Well Completion Zone:			Upper Shallow												
Perchlorate	µg/L	17	NA	NA	NA	NA	<1 U	<4 U	<4 U	<0.2 U	<1 U	<0.2 U	0.271 J	<0.2 U	<1 UJ
1,1-Dichloroethene	µg/L	7	<5 U	NA	<0.2 U	<1 U	NA	NA	NA	<2.5 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	<5 U	NA	<0.31 U	<1 U	NA	NA	NA	<2.5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-Dichloroethene	µg/L	70	NA	NA	<0.2 U	0.7	NA	NA	NA	0.657 J	1.59	0.392 J	0.316 J	0.261 J	0.323 J
Tetrachloroethene	µg/L	5	<5 U	NA	<0.25 U	<1 U	NA	NA	NA	<2.5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene	µg/L	5	12	11	15.7	210	NA	NA	NA	369	601	112	93.8	95.9	88.3
Vinyl Chloride	µg/L	2	NA	NA	<0.24 U	<1 U	NA	NA	NA	<2.5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL/MSC/PCL

[a] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification

COC - contaminants of concern

MCL - maximum contaminant level

MSC - medium-specific concentrations

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

U - analyte was not detected

Table 2-4
Proposed RA(O) Monitoring Network

Well ID	Groundwater Zone	P Conc [a] (mg/L)	TCE Conc [a] (mg/L)	DP	Recommendation for 4th RAO Monitoring Monitoring Event	Initial Monitoring Parameters
50WW05	Upper Shallow	< 0.20	184	Yes	No change	VOCs, P
50WW06	Lower Shallow	5240	54.2	Yes	Continue MNA monitoring. High P, low VOC, some DPs.	VOCs, P, MNA
50WW08	Upper Shallow	126	379	Yes	Continue MNA monitoring. Well with moderate concentrations of both P and TCE, some DPs.	VOCs, P, MNA
50WW09	Lower Shallow	0.2	126	Yes	No change	VOCs, P
50WW10	Intermediate	< 0.20	< 0.50	No	Intermediate zone well - no changes.	VOCs, P
50WW11	Upper Shallow	13,400	2,880	Yes	Continue MNA monitoring. High P, high VOCs.	VOCs, P, MNA
50WW12	Upper Shallow	25,300	109	No	Continue MNA monitoring. High P, high VOCs, some DPs.	VOCs, P, MNA
50WW13	Upper Shallow	8,650	6.05	Yes	Continue MNA. High P and VOCs.	VOCs, P, MNA
50WW14	Lower Shallow	0.2	10.9	Yes	Continue MNA – as a lower shallow analog to upper shallow 50WW 06 with mixed contaminants.	VOCs, P, MNA
50WW15	Upper Shallow	< 0.20	9.52	Yes	No change	VOCs, P
50WW16	Upper Shallow	< 0.20	1.05	No	Begin MNA - as a well with low TCE / no P.	VOCs, P
50WW17	Shallow	< 0.20	< 0.50	No	No change. Continue contaminant monitoring.	VOCs, P
50WW18	Upper Shallow	< 0.20	< 0.50	No	No change. Continue contaminant monitoring.	VOCs, P
50WW21	Upper Shallow	0.581	< 0.50	No	No change. Continue contaminant monitoring.	VOCs, P
50WW22	Upper Shallow	1.02	0.5	No	Stop MNA Monitoring since COC concentrations have been below the MCL. Outside plume. Unimpacted side gradient well. Continue contaminant monitoring.	VOCs, P, MNA
50WW23	Upper Shallow	4.76	0.5	No	Stop MNA monitoring since COC concentrations have been below the MCL. Outside the plume. Unimpacted side gradient well. Continue contaminant monitoring.	VOCs, P, MNA
50WW24	Upper Shallow	< 0.20	< 0.50	No	No change. Continue contaminant monitoring.	VOCs, P
50WW25	Lower Shallow	96.6	< 0.50	No	No change. Continue contaminant monitoring.	VOCs, P
50WW27	Lower Shallow	< 0.20	< 0.50	No	No change	VOCs, P

Table 2-4
Proposed RA(O) Monitoring Network

Notes:

[a] As of November 2016 sampling event.

COC - contaminant of concern
Conc - concentration
DP - daughter product
ID - identification
MCL - maximum contaminant level
MNA - monitored natural attenuation
P - perchlorate
RA(O) - remedial action operation
TCE - trichloroethene
VOC - volatile organic compound

Table 2-5
Surface Water Sample Results, LHAAP-50

Date of Sampling	Concentration (µg/L)	
	GPW-1	GPW-1A
Feb-16	0.447	Dry
May-16	6.59	Dry
Aug-16	0.162 J	Dry
Nov-16	0.301 J	Dry

Notes:

µg/L - microgram per liter

J - estimated value

NS - not sampled

Table 2-6
Groundwater Elevation vs. Bottom of Drainage Channel Elevation

Surface Water Sample Location	Bottom of Drainage Channel (ft amsl)	Nearest Well	Groundwater Elevation during Surface Water Sampling (ft amsl)	Groundwater Elevation Measurement Date
50SW06	182.902	50WW16	178.61	5/11/2016
50SW06	182.902	50WW16	176.7	11/2/2016
GPW-1	185.25	50WW15	178.97	5/27/2016

Notes:

GW elevations are not available are not available from all the sampling events.

No upgradient well is identified for surface water sampling location GPW-1A located at LHAAP-47

Groundwater elevations from other sampling events are not available.

ft amsl - feet above mean sea level

Table 3-1
Mann-Kendall Trend Summary, LHAAP-50

Monitoring Well	Perchlorate	TCE	cis-1,2-DCE	1,1-DCE	1,2-DCA
50WW05	–	Significant Decrease	–	–	–
50WW06	Significant Increase	No trend Data is stable	–	–	–
50WW08	No trend Data is not stable	No trend Data is stable	–	–	–
50WW09	–	Significant Increase	–	–	–
50WW11	No trend Data is stable	No trend Data is stable	No trend Data is stable	No trend Data is stable	No trend Data is stable
50WW12	No trend Data is stable	Significant Increase	–	–	–
50WW13	No trend Data is not stable	No trend Data is stable	No trend Data is stable	--	No trend Data is stable
50WW14	–	Significant Decrease	–	–	–
50WW15	–	Significant Decrease	–	–	–
50WW24	No trend Data is not stable	–	–	–	–

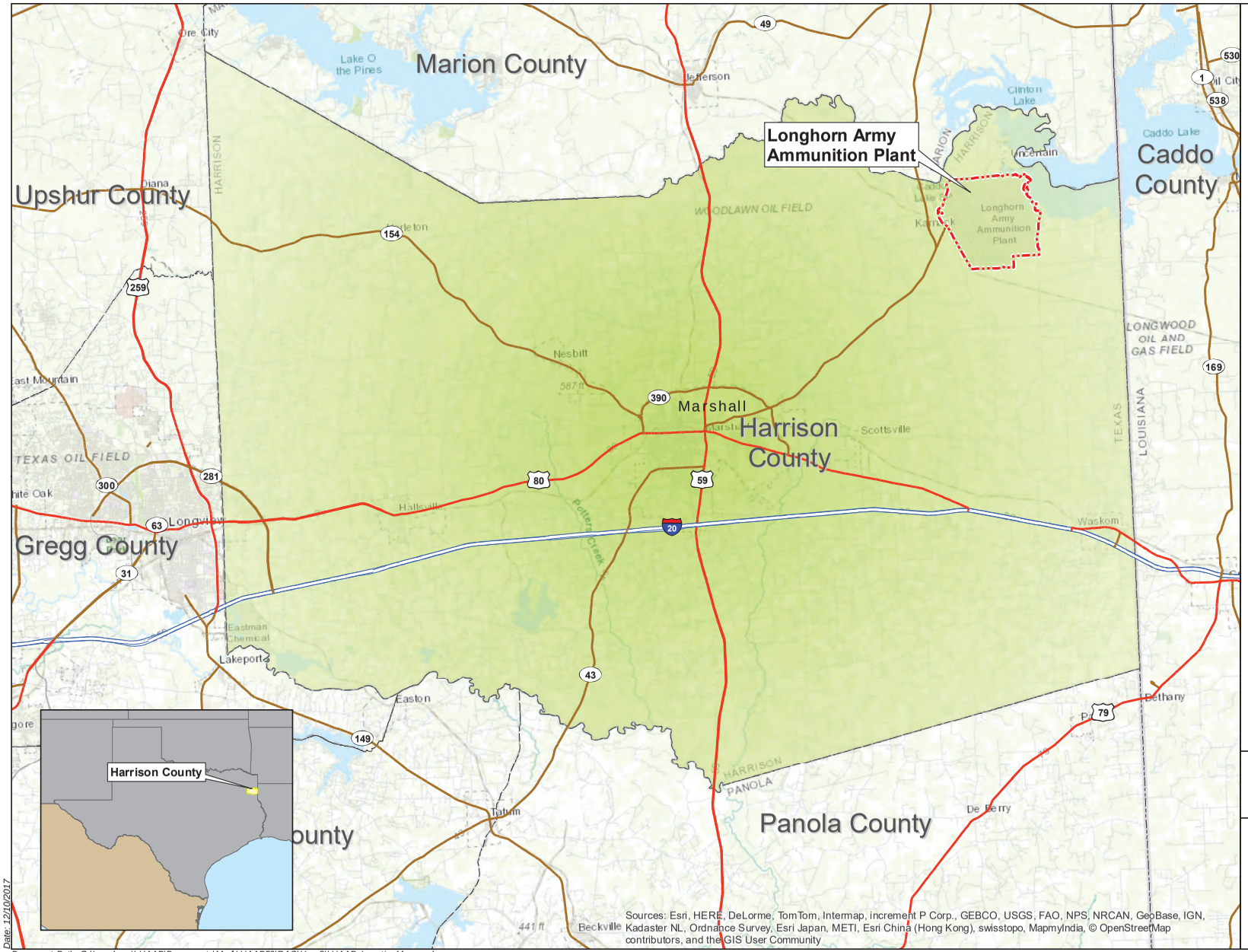
Notes:

DCA - dichloroethane

DCE - dichloroethene

TCE - trichloroethene

Figures



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TULSA, OKLAHOMA

Figure 1-1

LHAAP Site Area Map
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/10/2017

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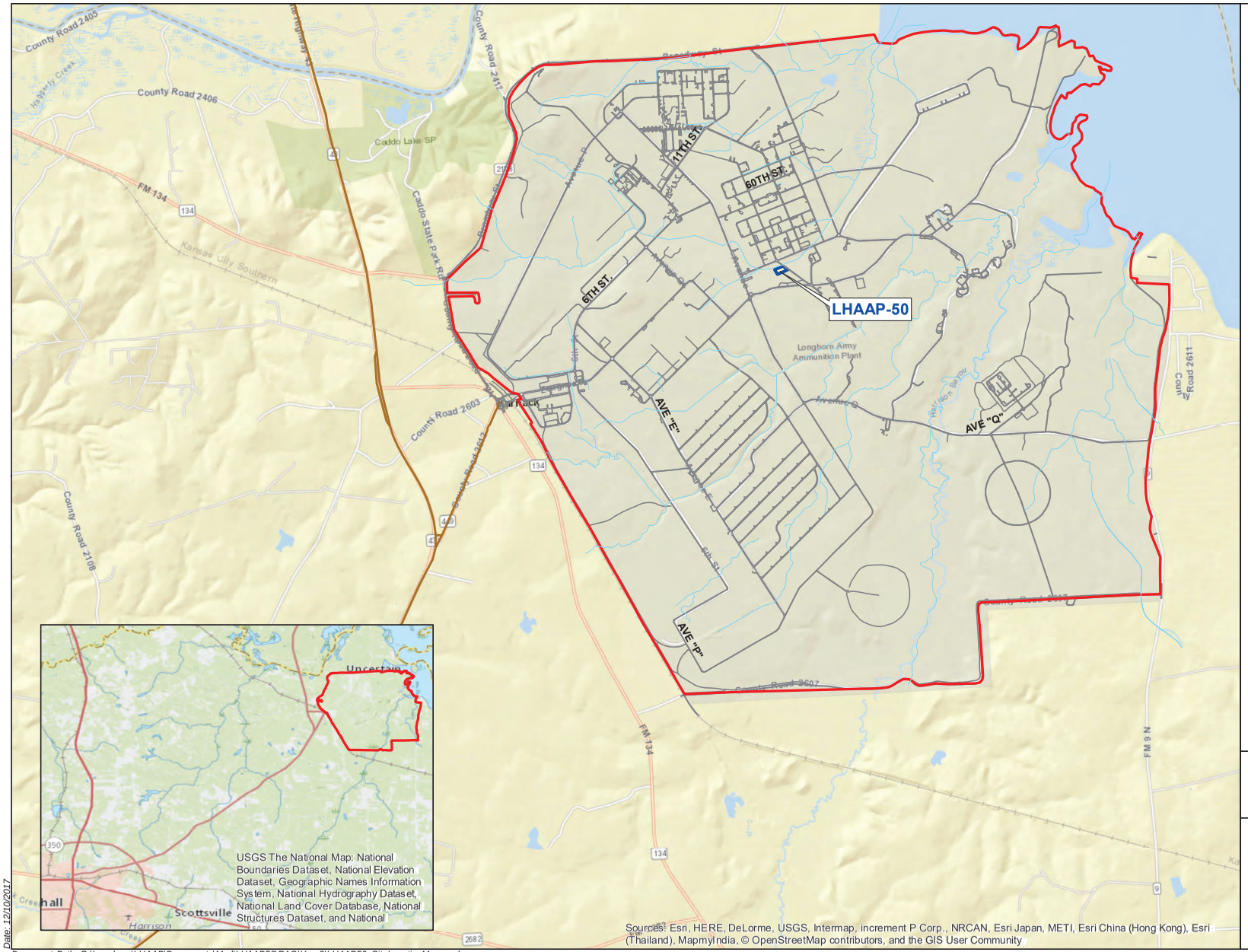

Stream
Road
LHAAP Boundary
LHAAP-16 Site Boundary

N

0 1,500 3,000
Feet

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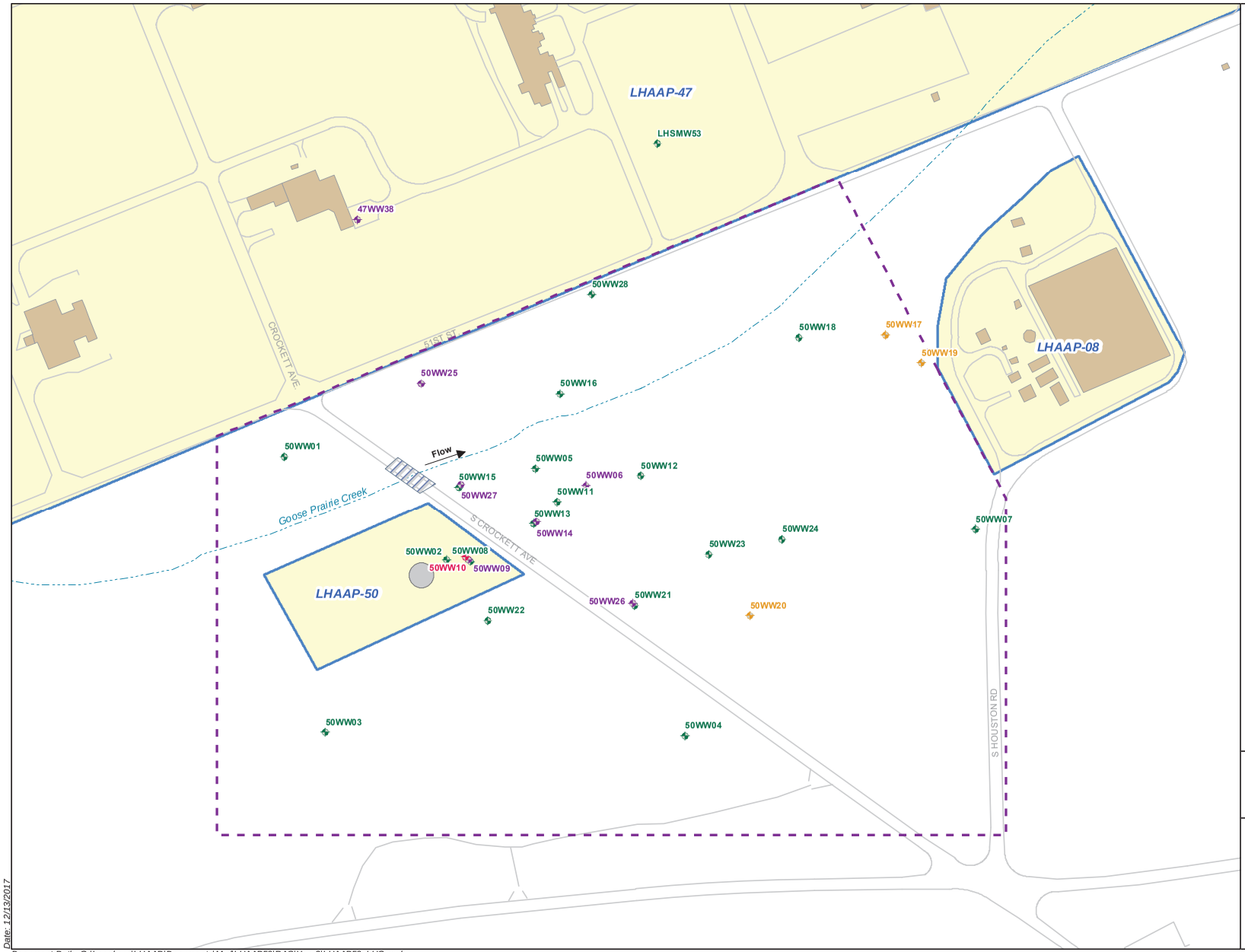
Figure 1-2

LHAAP Site Vicinity Map
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/10/2017

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_SiteLocationMap.mxd



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TULSA, OKLAHOMA

Figure 1-3

Land Use Control Boundary
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/13/2017

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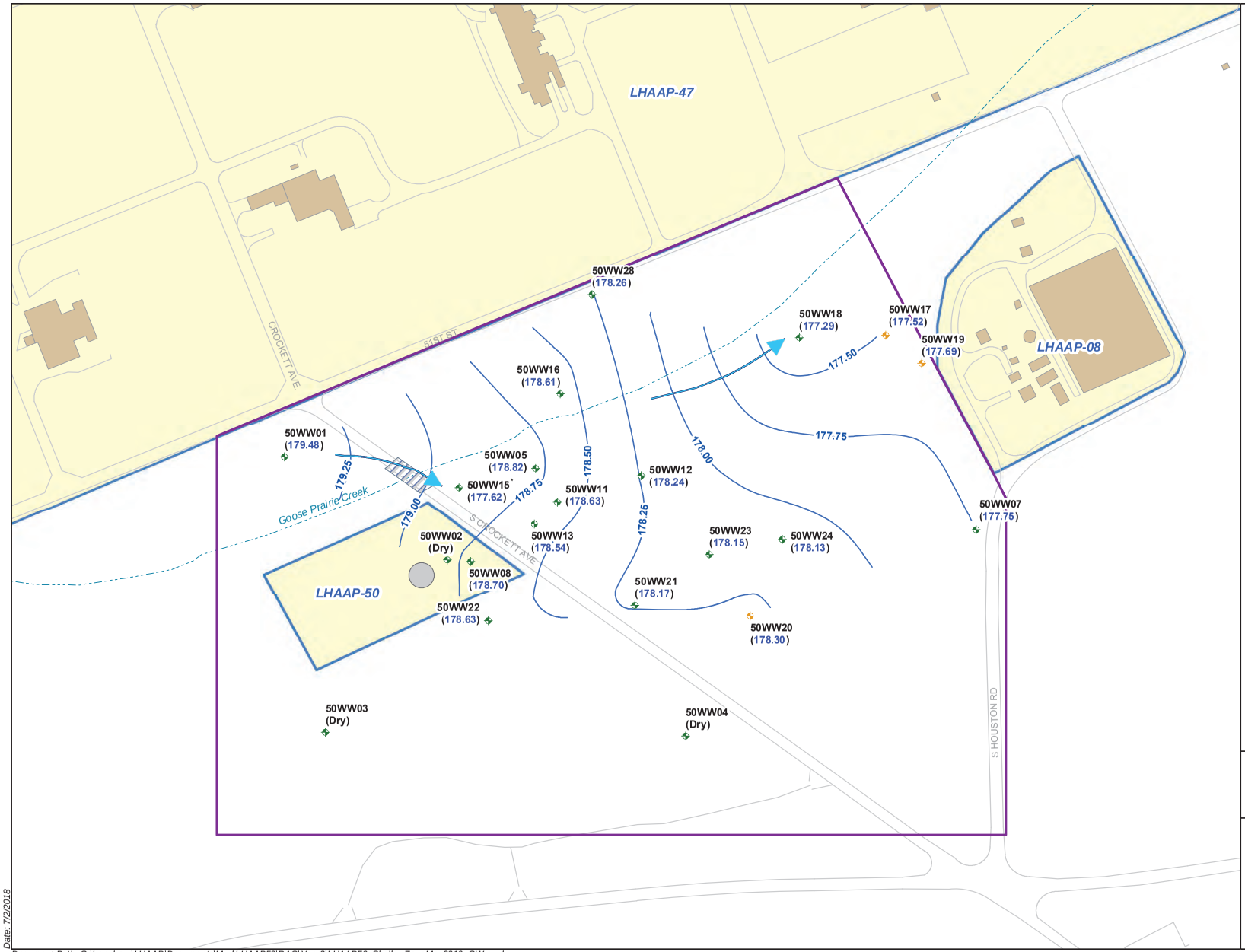

- Upper Shallow Monitor Well
- Fully Screened Shallow Monitor Well
- Groundwater Flow Direction
- Groundwater Contour
- Goose Prairie Creek
- Roads
- Land Use Control Boundary
- Bridges
- Former Storage Tank Location
- Buildings
- Site Boundaries

Note:
1. Monitor wells 50WW02, 50WW03, and 50WW04 were dry during May 2016 sampling.
2. * - 50WW15 was not used to create the groundwater contours due to anomalous value relative to surrounding wells.

N

0 75 150 Feet

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TULSA, OKLAHOMA

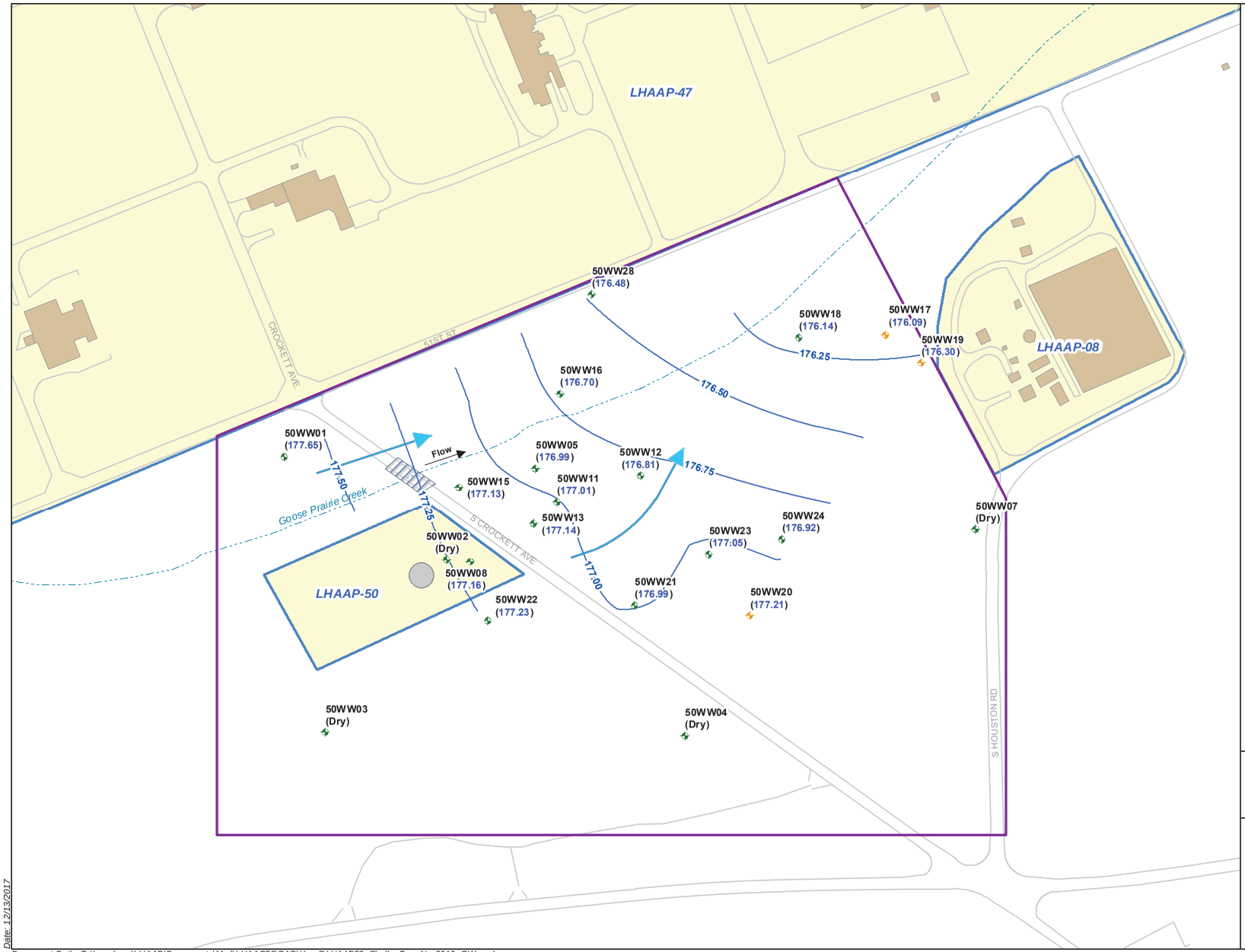
Figure 2-1

Potentiometric Surface map for the Shallow Zone, May 2016
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 7/2/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_ShallowZoneMay2016_GW.mxd



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TULSA, OKLAHOMA

Figure 2-2

Potentiometric Surface map for the Shallow Zone, November 2016
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/13/2017

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_ShallowZoneNov2016_GW.mxd

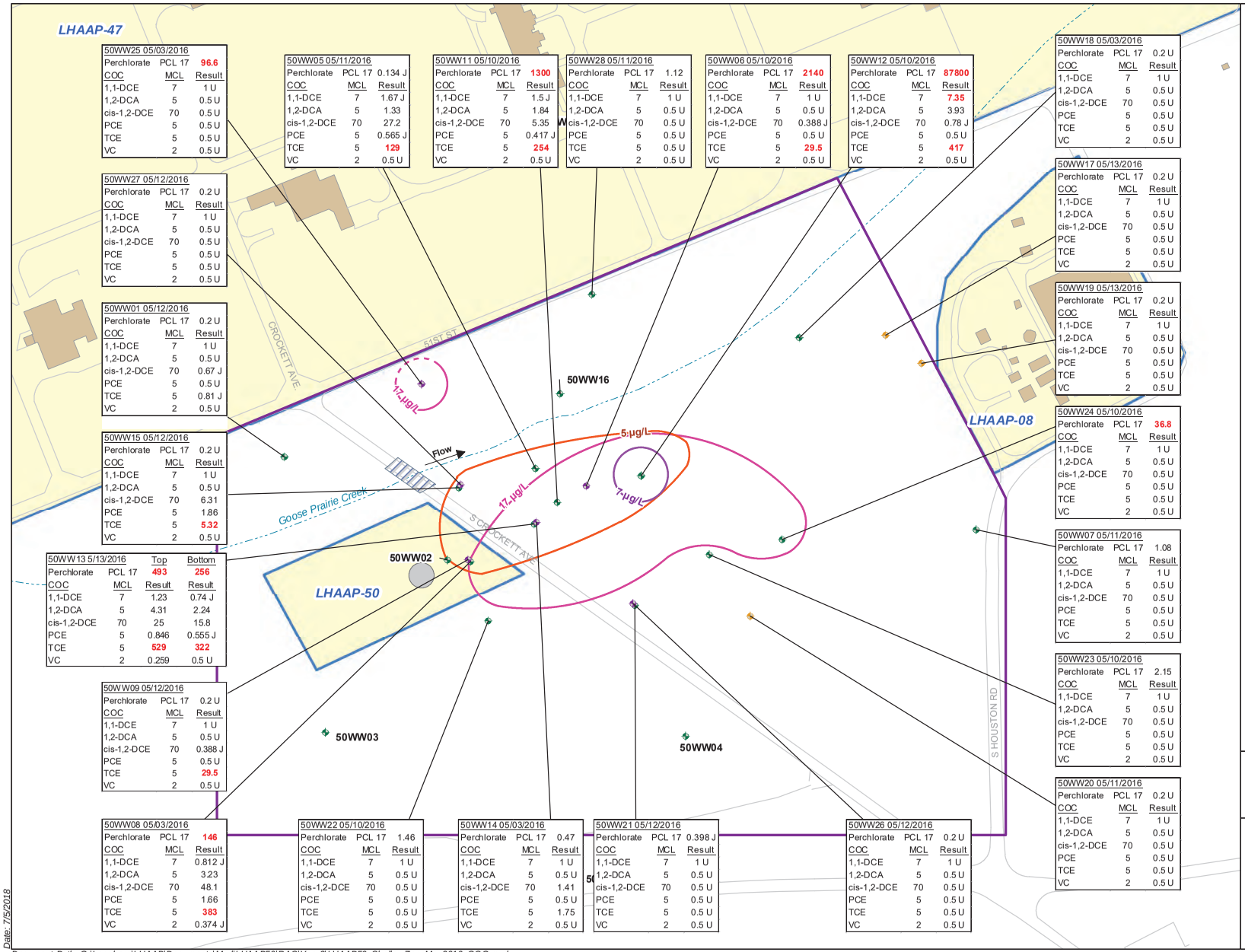


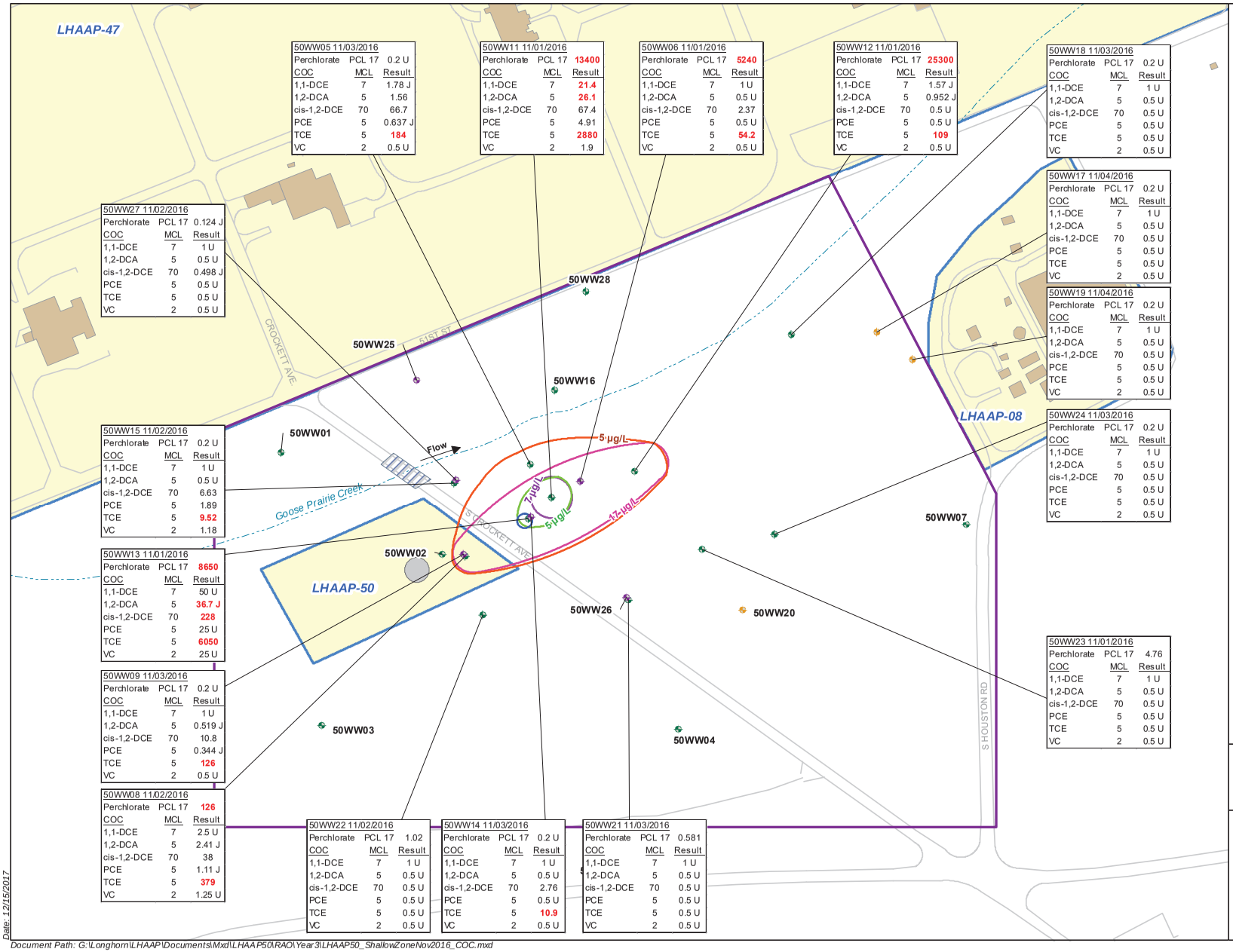
Figure 2-3

COC Concentrations in
Shallow Zone, May 2016
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 7/5/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_ShallowZoneMay2016_COC.mxd



Date: 12/15/2017

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_ShallowZoneNov2016_COC.mxd

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TULSA, OKLAHOMA

Figure 2-4

COC Concentrations in
Shallow Zone, Nov 2016
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00884461

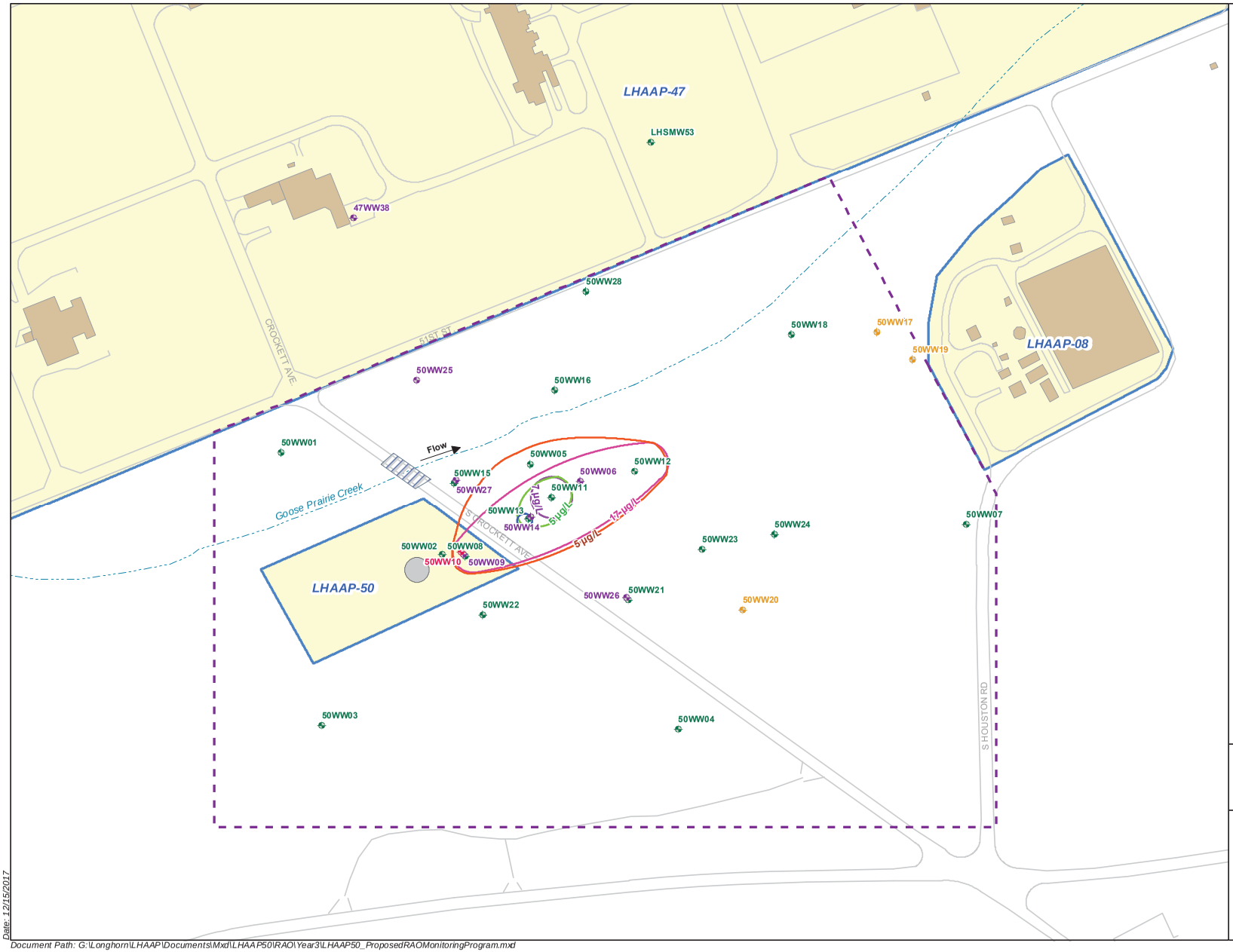

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Figure 2-5

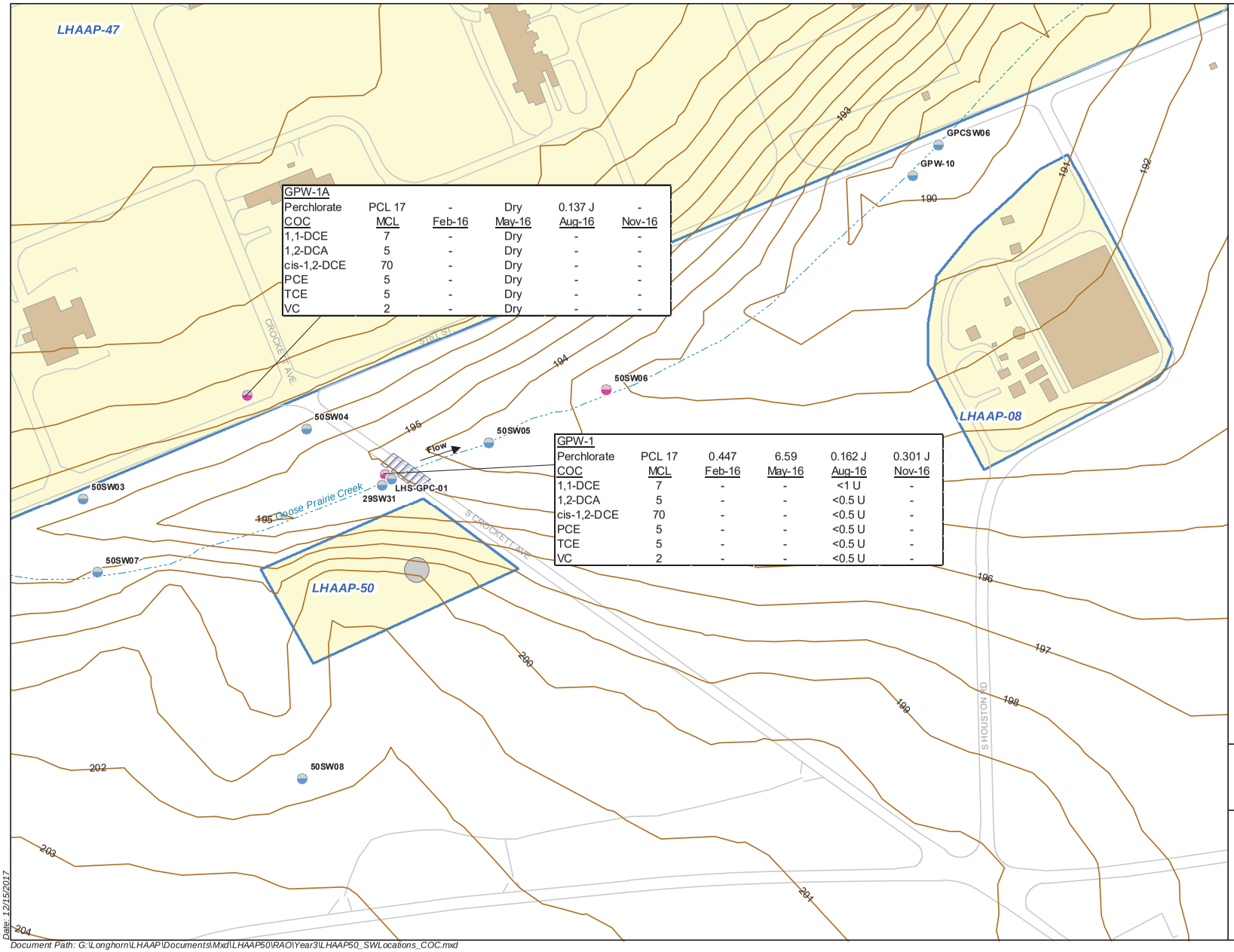
Proposed RAO Monitoring Program
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/15/2017

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_ProposedRAOMonitoringProgram.mxd

00884462



GPW-1A					
Perchlorate	PCL 17	-	Dry	0.137 J	-
COC	MCL	Feb-16	May-16	Aug-16	Nov-16
1,1-DCE	7	-	Dry	-	-
1,2-DCA	5	-	Dry	-	-
cis-1,2-DCE	70	-	Dry	-	-
PCE	5	-	Dry	-	-
TCE	5	-	Dry	-	-
VC	2	-	Dry	-	-

GPW-1					
Perchlorate	PCL 17	0.447	6.59	0.162 J	0.301 J
COC	MCL	Feb-16	May-16	Aug-16	Nov-16
1,1-DCE	7	-	-	<1 U	-
1,2-DCA	5	-	-	<0.5 U	-
cis-1,2-DCE	70	-	-	<0.5 U	-
PCE	5	-	-	<0.5 U	-
TCE	5	-	-	<0.5 U	-
VC	2	-	-	<0.5 U	-

Surface Water Sampling Location
LHAAP-50 Surface Water Sampling Location
Elevation Contour (ft)
Goose Prairie Creek
Roads
Bridges
Former Storage Tank Location
Buildings
Site Boundaries

Notes:
1. All concentrations are shown in micrograms per liter (µg/L).
2. 50SW06 was not sampled
3. "-" indicates parameters not sampled during event
4. 1,1-DCE = 1,1-dichlorothene
   1,2-DCA = 1,2-dichlorethane
   cis-1,2-DCE = cis-1,2-dichloroethene
   PCE = tetrachloroethene
   TCE = trichloroethene
   VC = vinyl chloride

N
0 75 150 Feet

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TULSA, OKLAHOMA

Figure 2-6

Surface Water Sampling Results 2016
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/15/2017

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_SWLocations_COC.mxd

Figure 3-1a: 50WW05 (upper shallow)

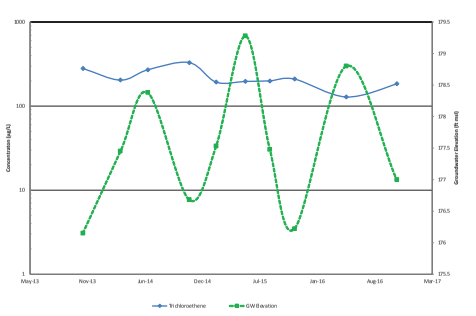


Figure 3-1b: 50WW06 (lower shallow)

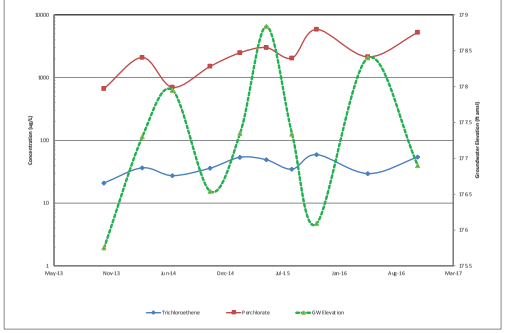


Figure 3-1c: 50WW08 (upper shallow)

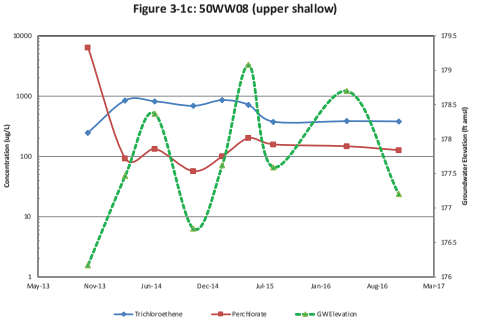


Figure 3-1d: 50WW09 (lower shallow)

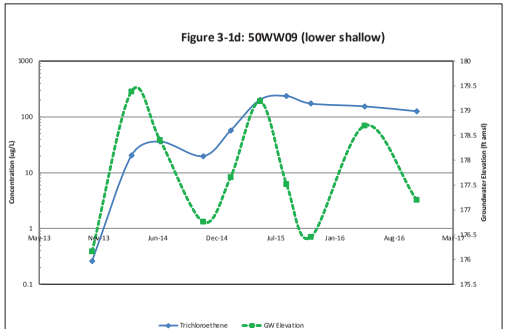


Figure 3-1e: 50WW11 (upper shallow)

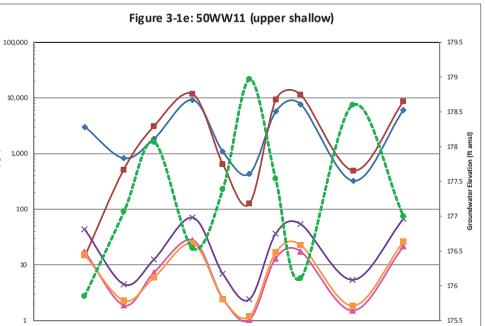
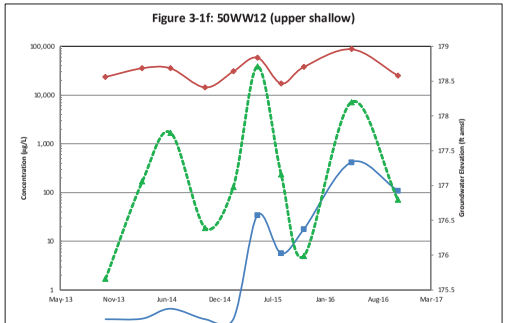


Figure 3-1f: 50WW12 (upper shallow)



Cleanup Levels:
Perchlorate = 17 µg/L
1,1-Dichlorothene = 7 µg/L
1,2-Dichlorethane = 5 µg/L
cis-1,2-Dichloroethene = 70 µg/L
Tetrachloroethene = 5 µg/L
Trichloroethene = 5 µg/L
Vinyl Chloride = 2 µg/L

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TULSA, OKLAHOMA

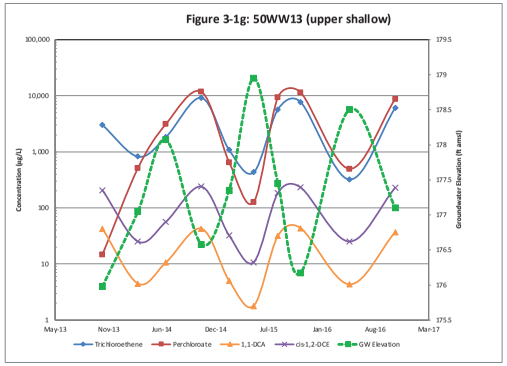
Figure 3-1

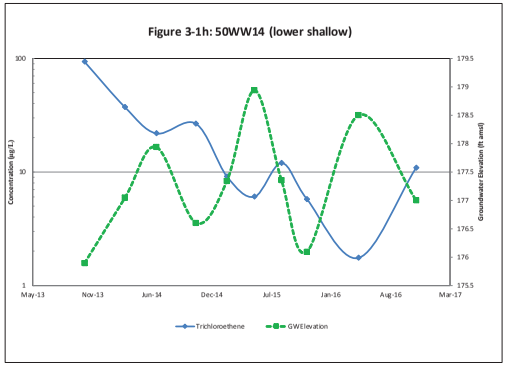
COC Concentrations
LHAAP-50 RAO Year 3 Report

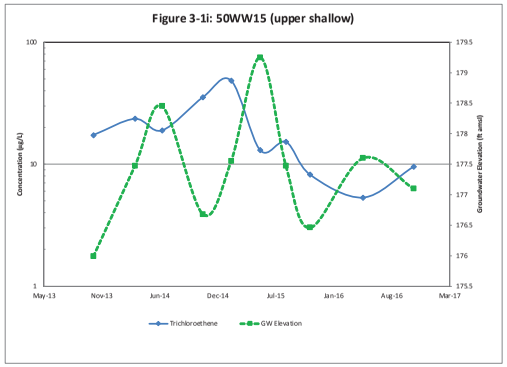
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

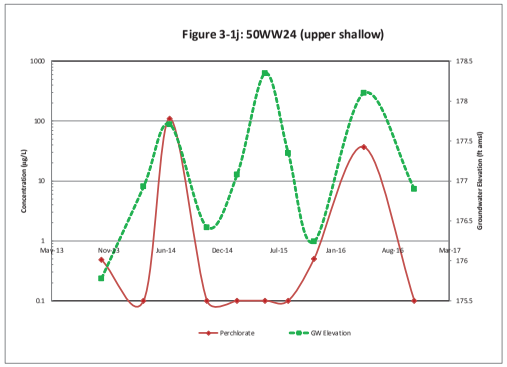
Date: 7/18/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_COC_Concentrations_rev2.mxd









Cleanup Levels:
Perchlorate = 17 µg/L
1,1-Dichlorothene = 7 µg/L
1,2-Dichlorethane = 5 µg/L
cis-1,2-Dichloroethene = 70 µg/L
Tetrachloroethene = 5 µg/L
Trichloroethene = 5 µg/L
Vinyl Chloride = 2 µg/L

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TULSA, OKLAHOMA

Figure 3-1

COC Concentrations
LHAAP-50 RAO Year 3 Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 7/18/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year3\LHAAP50_COC_Concentrations_2_rev2.mxd

Appendix A

Annual Land Use Control Compliance Certification and Documentation

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011, for LHAAP-50 a certification of site was conducted by AECOM Technical Services, Inc. on 8/1/16.

A summary of land use control mechanism is as follows:

- Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met.

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-50.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief

Date: 8/1/16

Name/Title: Scott Beesinger / Senior Technician

Signature: Scott Beesinger

Appendix B

Photographic Log

PHOTO LOG

Photo No.	Date	Task and Description
1	11-4-16	Well Inspection, 50WW01
2	11-2-16	Well Inspection, 50WW02
3	11-4-16	Well Inspection, 50WW03
4	11-4-16	Well Inspection, 50WW04
5	11-3-16	Well Inspection, 50WW05
6	11-1-16	Well Inspection, 50WW06
7	11-4-16	Well Inspection, 50WW07
8	11-2-16	Well Inspection, 50WW08
9	11-3-16	Well Inspection, 50WW09
10	11-3-16	Well Inspection, 50WW10
11	11-1-16	Well Inspection, 50WW11
12	11-1-16	Well Inspection, 50WW12
13	11-1-16	Well Inspection, 50WW13
14	11-1-16	Well Inspection, 50WW14
15	11-2-16	Well Inspection, 50WW15
16	11-2-16	Well Inspection, 50WW16
17	11-4-16	Well Inspection, 50WW17
18	11-3-16	Well Inspection, 50WW18
19	11-4-16	Well Inspection, 50WW19
20	11-4-16	Well Inspection, 50WW20
21	11-3-16	Well Inspection, 50WW21
22	11-2-16	Well Inspection, 50WW22
23	11-1-16	Well Inspection, 50WW23
24	11-3-16	Well Inspection, 50WW24
25	11-4-16	Well Inspection, 50WW25
26	11-4-16	Well Inspection, 50WW26
27	11-2-16	Well Inspection, 50WW27
28	11-4-16	Well Inspection, 50WW28



PHOTO 1: Well Inspection, 50WW01
DATE: 11-4-16



PHOTO 2: Well Inspection, 50WW02
DATE: 11-2-16



PHOTO 3: Well Inspection, 50WW03
DATE: 11-4-16



PHOTO 4: Well Inspection, 50WW04
DATE: 11-4-16



PHOTO 5: Well Inspection, 50WW05
DATE: 11-3-16



PHOTO 6: Well Inspection, 50WW06
DATE: 11-1-16



PHOTO 7: Well Inspection, 50WW07
DATE: 11-4-16



PHOTO 8: Well Inspection, 50WW08
DATE: 11-2-16



PHOTO 9: Well Inspection, 50WW09
DATE: 11-3-16



PHOTO 10: Well Inspection, 50WW10
DATE: 11-3-16



PHOTO 11: Well Inspection, 50WW11
DATE: 11-1-16



PHOTO 12: Well Inspection, 50WW12
DATE: 11-1-16



PHOTO 13: Well Inspection, 50WW13
DATE: 11-1-16



PHOTO 14: Well Inspection, 50WW14
DATE: 11-1-16



PHOTO 15: Well Inspection, 50WW15
DATE: 11-2-16



PHOTO 16: Well Inspection, 50WW16
DATE: 11-2-16



PHOTO 17: Well Inspection, 50WW17
DATE: 11-4-16



PHOTO 18: Well Inspection, 50WW18
DATE: 11-3-16



PHOTO 19: Well Inspection, 50WW19
DATE: 11-4-16



PHOTO 20: Well Inspection, 50WW20
DATE: 11-4-16



PHOTO 21: Well Inspection, 50WW21
DATE: 11-3-16



PHOTO 22: Well Inspection, 50WW22
DATE: 11-2-16



PHOTO 23: Well Inspection, 50WW23
DATE: 11-1-16



PHOTO 24: Well Inspection, 50WW24
DATE: 11-3-16



PHOTO 25: Well Inspection, 50WW25
DATE: 11-4-16



PHOTO 26: Well Inspection, 50WW26
DATE: 11-4-16



PHOTO 27: Well Inspection, 50WW27
DATE: 11-2-16



PHOTO 28: Well Inspection, 50WW28
DATE: 11-4-16

Appendix C

Groundwater Sampling Forms

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: SD	LocID: SDWW02	Date: 3/28/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Scott Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: ~~Bladder Pump~~ Bailer ID#:	
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: DRY	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 22.34	Screen Intverval (ft) from TOC: 12.34 - 22.34	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: N/A	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)

Dry well

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

00884485
Page 1 of ___

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW03	Date: 3/28/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Scott Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: ~~Bladder Pump~~ Bailer ID#:	
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: DRY	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 23.06	Screen Interval (ft) from TOC: 13.06 - 23.06	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: N/A	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)

Dry Well

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

00884486
Page 1 of ___

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW04	Date: 3/28/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Scott Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: ~~Bladder Pump~~ Bailer ID#:	
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: DRY	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 23.23	Screen Intverval (ft) from TOC: 12.87 - 22.87	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: NA	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)

DRY WELL

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

00884487

LOCATION	Site: 50	LocID: 50ww01		Date: 5/11/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: ~~Bladder Pump~~ Bailer	ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 19.02		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 23.30	Screen Intverval (ft) from TOC: 13.25 - 23.25		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: NA			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	1543	19.02	NA										Bailing well
5/11/16	1547	23.22	NA										Baited 2 gallons Ran Dry
5/12/16	0720	19.02	NA	19.77	6.03	0.906	NA	4.7	NA				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50ww01-051216 TIME: 0720

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO No

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3 - 40 ml glass	HCL	N	Pump	VOC
1 - 250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW02		Date: 5/10/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: ~~Bladder Pump~~ Bailer	ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: DRY		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 22.28	Screen Intverval (ft) from TOC: 12.34 - 22.34		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC:			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

DRY WELL

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:

DUPLICATE (D): YES/NO

MATRIX SPIKE (MS): YES/NO

MATRIX DUPLICATE (MD): YES/NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: SDMW03		Date: 5/10/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 4 4	Static Water Level Reading (ft) from TOC: DRY		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 23.06	Screen Intverval (ft) from TOC: 13.06 - 23.06		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC:			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

DRY Well

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

00884490

LOCATION	Site: 50	LocID: 50WW04		Date: 5/10/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: DRY		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: ~~22.24~~ 23.24	Screen Intverval (ft) from TOC: 12.87 - 22.87		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC:			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

DRY WELL

Pump Rate: <=0 5 L/min Drawdown: <0 33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

ALCOM

MONITORING WELL SAMPLE COLLECTION FORM

 00884491

LOCATION	Site: 50	LocID: 50WW05	Date: 5/11/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 18.86	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 25.38	Screen Intverval (ft) from TOC: 15.24 - 25.24	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 20.24	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	1355	18.88	100	22.30	6.62	1.51	0.78	0.0	24				
	1400	18.95	100	21.92	6.74	1.51	0.55	0.0	25				
	1405	19.01	100	21.84	6.80	1.52	0.48	0.0	30				
	1410	19.05	100	21.93	6.79	1.52	0.45	0.0	32				
	1415	19.08	100	22.00	6.80	1.52	0.43	0.0	33				
	1420	19.10	100	22.05	6.82	1.53	0.43	0.0	34				
	1425	19.11	100	22.10	6.81	1.52	0.43	0.0	35				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW05-051116 TIME: 1425

DUPLICATE (D): YES/NO yes

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
6-40ml glass	HCL	N	Pump	VOC
2-250ml plastic	NA	Y	Pump	perchlorate

MONITORING WELL SAMPLE COLLECTION FORM

ALCOM

LOCATION	Site: 50	LocID: 50WW06		Date: 5/10/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 16.92		Weather Conditions: CLOUDY	
	Total Well Depth (ft) from TOC: 58.54	Screen Intverval (ft) from TOC: 47.85 - 57.75		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 52.80			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/10/16	0935	16.93	100	20.20	6.42	1.75	2.41	8.7	202				
	0940	16.97	100	19.81	6.14	1.84	1.35	7.1	203				
	0945	17.02	100	19.70	5.87	1.77	1.58	7.3	206				
	0950	17.05	100	19.71	5.72	1.60	1.83	9.7	217				
	0955	17.08	100	19.71	5.62	1.57	1.97	12.2	218				
	1000	17.10	100	19.68	5.60	1.56	1.95	12.4	219				
	1005	17.12	100	19.72	5.58	1.55	1.98	12.7	221				
	1010	17.12	100	19.75	5.58	1.55	2.00	13.0	223				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW06-051016 TIME: 1010

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		Gases / CO2
1-500 ml plastic	ZnAcNaOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC / TOTAL Phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NA	N		ALKALINITY

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW07		Date: 5/11/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 24.80		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 31.92	Screen Intverval (ft) from TOC: 21.67-31.67		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 26.70			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	0715	24.82	100	21.03	5.94	1.31	2.64	0.0	213				
	0720	24.88	100	20.21	5.87	1.29	1.52	0.0	211				
	0725	24.95	100	20.07	5.73	1.29	1.19	0.0	210				
	0730	24.99	100	20.03	5.55	1.29	1.06	0.0	183				
	0735	25.02	100	20.02	5.54	1.29	0.84	0.0	180				
	0740	25.04	100	19.98	5.54	1.30	0.83	0.0	178				
	0745	25.06	100	19.96	5.52	1.30	0.82	0.0	176				
	0750	25.07	100	19.95	5.52	1.31	0.81	0.0	175				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW07-05116 TIME: 0750

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO Yes

MATRIX DUPLICATE (MD): YES/NO Yes

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
9 - 40 ml glass	HCl	N	Pump	VOC
3 - 250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW08		Date: 5/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 20.97		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 32.70	Screen Intverval (ft) from TOC: 17.11 - 31.71		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 24.41			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/3/16	1010	20.94	100	19.26	6.23	2.39	1.98	128	75				
	1015	21.00	100	19.35	6.06	2.39	1.52	37.4	110				
	1020	21.07	100	19.46	5.95	2.39	0.92	23.8	133				
	1025	21.11	100	19.33	5.91	2.39	0.77	15.5	152				
	1030	21.15	100	19.60	5.85	2.39	0.65	9.6	161				
	1035	21.17	100	19.70	5.87	2.39	0.64	9.4	161				
	1040	21.19	100	19.74	5.89	2.39	0.63	9.1	160				
	1045	21.20	100	19.75	5.90	2.39	0.63	8.0	161				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW08-050316 TIME: 1045

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		Gases/CO2
1-500 ml plastic	ZnAcNaOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC/TOTAL phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		ANIONS
1-250 ml plastic	NA	N		ALKALINITY

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW09		Date: 5/12/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2 11	Static Water Level Reading (ft) from TOC: 20.68		Weather Conditions: Cloudy / Rain	
	Total Well Depth (ft) from TOC: 62.50	Screen Intverval (ft) from TOC: 46.75-61.25		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 54.00			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/12/16	0750	20.65	100	19.81	6.19	2.10	2.50	22.4	97				
	0755	20.72	100	19.58	5.91	2.42	1.03	215	73				
	0800	20.77	100	19.56	5.85	2.45	0.81	210	78				
	0805	20.81	100	19.52	5.77	2.42	0.69	208	88				
	0810	20.85	100	19.46	5.70	2.39	0.65	227	89				
	0815	20.87	100	19.54	5.69	2.38	0.64	223	91				
	0820	20.89	100	19.51	5.67	2.37	0.64	221	93				
	0825	20.90	100	19.56	5.67	2.37	0.65	220	94				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WW09-05126 TIME: 0825

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50ww10		Date: 5/12/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 22.80		Weather Conditions: Cloudy	
	Total Well Depth (ft) from TOC: 110.98	Screen Intverval (ft) from TOC: 101.43 - 110.93		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 106.20			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/12/16	0850	22.80	100	21.03	5.85	1.33	2.34	219	-74				
	0855	22.84	100	21.20	6.18	1.40	2.11	150	-99				
	0900	22.88	100	19.87	9.65	1.35	2.21	40.3	-155				
	0905	22.91	100	19.76	9.57	1.33	1.85	32.4	-166				
	0910	22.93	100	19.79	9.41	1.32	0.89	33.0	-184				
	0915	22.95	100	19.82	9.42	1.31	0.87	32.1	-186				
	0920	22.95	100	19.85	9.42	1.30	0.85	31.7	-188				
	0925	22.95	100	19.87	9.41	1.30	0.84	31.5	-190				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW10-051216 TIME: 0925

DUPLICATE (D): YES/NO Yes

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
6 - 40 ml glass	HCL	N	Pump	VOC
2 - 250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW11		Date: 5/10/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.44		Weather Conditions: Cloudy	
	Total Well Depth (ft) from TOC: 37.89	Screen Intverval (ft) from TOC: 22.55 - 37.05		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 29.80			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/10/16	0825	18.41	100	20.53	5.44	1.80	1.31	104	225				
	0830	18.49	100	20.33	5.66	1.74	0.70	70.3	230				
	0835	18.55	100	20.17	5.55	1.72	0.40	99.6	229				
	0840	18.60	100	19.95	5.50	1.72	0.29	93.7	225				
	0845	18.63	100	19.93	5.52	1.72	0.32	92.9	219				
	0850	18.65	100	19.93	5.53	1.72	0.31	92.4	217				
	0855	18.66	100	19.92	5.52	1.72	0.30	91.7	216				
	0900	18.67	100	19.92	5.51	1.72	0.30	91.2	215				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WW11-051016 TIME: 0900

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		Gases/CO2
1-500 ml plastic	ZnAc/NaOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC/TOTAL phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NA	N		Alkalinity

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

00884498

LOCATION	Site: 50	LocID: 50WW12	Date: 5/10/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 17.42	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.99	Screen Intverval (ft) from TOC: 22.50 - 37.00	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.75	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/10/16	1045	17.40	100	20.96	5.89	4.22	1.16	64.6	224				
	1050	17.49	100	20.36	5.69	4.27	0.76	38.4	221				
	1055	17.57	100	20.19	5.63	4.27	0.60	27.7	218				
	1100	17.61	100	20.19	5.56	4.28	0.50	26.5	197				
	1105	17.64	100	20.24	5.54	4.28	0.38	20.2	168				
	1110	17.66	100	20.22	5.51	4.27	0.37	20.7	166				
	1115	17.67	100	20.16	5.51	4.28	0.37	20.1	166				
	1120	17.68	100	20.20	5.50	4.28	0.38	19.7	167				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW12-051016 TIME: 1120

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		Gases/CO2
1-500 ml plastic	2NaOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC/TOTAL phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NA	N		Alkalinity

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW13		Date: 5/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.91		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 37.78	Screen Intverval (ft) from TOC: 22.44-36.94		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 29.70			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/3/16	0730	18.89	100	17.50	5.54	2.27	1.84	857	240				
	0735	18.96	100	17.84	5.50	2.27	0.91	687	236				
	0740	19.02	100	17.78	5.48	2.29	0.75	471	227				
	0745	19.09	100	17.89	5.46	2.27	0.49	389	175				
	0750	19.12	100	18.09	5.45	2.27	0.48	390	144				
	0755	19.14	100	18.10	5.44	2.27	0.46	391	142				
	0800	19.15	100	18.08	5.45	2.27	0.45	392	141				
	0805	19.15	100	18.07	5.44	2.27	0.45	392	141				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WW13-050316 TIME: 0805

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCl	N	Pump	VOC
3-20 ml glass	NA	N		Dissolved GASES & CO2
1-500 ml plastic	ZnAc,NaOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC & TOTAL phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NA	N		ALKALINITY

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW13B	Date: 5/13/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135	Recorded By: Scott Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 19.00	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.78	Screen Intverval (ft) from TOC: 22.44-36.94	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 33.33	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	1550	19.03	100	22.45	5.45	2.25	0.50	77.1	175	
	1555	19.05	100	22.20	5.30	2.27	0.29	61.2	171	
	1600	19.07	100	22.17	5.29	2.27	0.29	60.8	170	
	1605	19.09	100	22.15	5.28	2.27	0.28	60.2	169	
	1610	19.10	100	22.18	5.28	2.28	0.28	60.5	169	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW13B-051316 TIME: 1610

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50		LocID: 50WW13T		Date: 5/13/16
	Project: Longhorn Army Ammunition Plant		Project No. 60256135		Recorded By: Scott Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52		Water Interface Probe: Water Level Indicator: Solinst ID#: 101		Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099		Sampling Equipment: Bladder Pump ID#:		
WELL INFO	Casing I.D. (in): 2"		Static Water Level Reading (ft) from TOC: 18.90		Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.78		Screen Intverval (ft) from TOC: 22.44 - 36.94		Condition of Well/Remarks: GOOD
			Pump Placement (ft) from TOC: 26.07		

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	1510	18.87	100	23.68	5.77	2.23	1.07	198	113	
	1515	18.95	100	23.05	5.66	2.23	0.48	90.3	153	
	1520	18.99	100	23.03	5.61	2.22	0.43	61.2	174	
	1525	19.03	100	22.95	5.54	2.22	0.35	39.0	185	
	1530	19.05	100	22.90	5.53	2.21	0.35	38.5	186	
	1535	19.06	100	22.87	5.52	2.21	0.34	38.0	187	
	1540	19.07	100	22.85	5.52	2.21	0.34	38.3	187	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW13T-051316 TIME: 1540

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3- 40 ml glass	HCL	N	Pump	VOC
1- 250 ml glass	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

00884502

LOCATION	Site: 50	LocID: 50WW14	Date: 5/3/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 19.00	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 60.78	Screen Interval (ft) from TOC: 45.78 - 60.28	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 53.00	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/3/16	0840	18.97	100	17.17	5.64	2.27	1.57	364	41				
	0845	19.08	100	17.58	5.52	2.28	1.00	404	52				
	0850	19.15	100	17.81	5.46	2.29	0.60	400	56				
	0855	19.20	100	17.92	5.41	2.29	0.42	421	61				
	0900	19.23	100	17.99	5.37	2.28	0.32	455	69				
	0905	19.25	100	18.02	5.39	2.26	0.27	480	63				
	0910	19.26	100	17.99	5.34	2.27	0.24	410	72				
	0915	19.26	100	18.09	5.36	2.26	0.26	408	72				
	0920	19.26	100	18.11	5.37	2.25	0.27	407	70				
	0925	19.26	100	18.13	5.37	2.25	0.27	406	70				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW14-050316 TIME: 0925

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		GASES / CO2
1-500 ml plastic	ZnAcetNaOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC/TOTAL phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NA	N		ALKALINITY

ALCOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW15		Date: 5/12/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.68		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 37.90	Screen Intverval (ft) from TOC: 22.25 - 36.75		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 29.50			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/12/16	1000	18.65	100	21.79	6.30	1.87	1.21	98.2	84				
	1005	18.73	100	21.14	5.71	1.88	0.75	99.2	127				
	1010	18.80	100	20.63	5.59	1.91	0.52	71.6	150				
	1015	18.85	100	20.12	5.56	1.92	0.35	43.9	170				
	1020	18.89	100	20.08	5.56	1.93	0.34	43.1	171				
	1025	18.91	100	20.02	5.55	1.93	0.33	42.4	172				
↓	1030	18.92	100	19.95	5.55	1.94	0.33	42.0	173				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW15-05/215 TIME: 1030

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40ml glass	HCL	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

ALCOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW16	Date: 5/11/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.05	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 38.11	Screen Intverval (ft) from TOC: 22.66-37.16	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.90	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	1455	18.03	100	24.80	6.98	0.255	1.17	77.6	103				
	1500	18.10	100	23.14	6.39	0.251	0.68	33.8	106				
	1505	18.17	100	22.41	6.08	0.251	0.55	17.5	116				
	1510	18.22	100	21.40	5.85	0.252	0.47	9.7	132				
	1515	18.25	100	21.37	5.83	0.253	0.46	9.0	134				
	1520	18.27	100	21.39	5.81	0.253	0.46	5.5	135				
	1525	18.29	100	21.40	5.81	0.254	0.45	3.6	136				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW16-051116 TIME: 1525

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCl	N	Pump	VOC
1-250 ml Plastic	NA	Y	Pump	perchlorate

MONITORING WELL SAMPLE COLLECTION FORM

00884505

LOCATION	Site: 50	LocID: 50WW17		Date: 5/11/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 17.61		Weather Conditions: Cloudy	
	Total Well Depth (ft) from TOC: 67.00	Screen Intverval (ft) from TOC: 22.30-66.80		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 49.55			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	0945	17.60	100	19.25	5.99	2.21	1.09	188	10				
	0950	17.66	100	19.09	5.78	2.19	0.90	135	44				
	0955	17.72	100	19.12	5.63	2.17	0.68	1090	77				
	1000	17.76	100	19.08	5.45	2.15	0.50	111	89				
	1005	17.79	100	19.12	5.43	2.13	0.48	110	90				
	1010	17.80	100	19.15	5.42	2.13	0.51	111	91				
	1015	17.81	100	19.12	5.42	2.12	0.50	112	92				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW17-051116 TIME: 1015

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml/glass	HCl	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW17B		Date: 5/13/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135		Recorded By: Scott Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 17.88		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 67.00	Screen Intverval (ft) from TOC: 22.30 - 66.80		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 55.67			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	1415	17.85	100	21.23	5.27	1.99	0.64	596	95	
	1420	17.87	100	20.44	5.14	2.03	0.30	465	115	
	1425	17.89	100	20.38	5.13	2.02	0.29	463	117	
	1430	17.91	100	20.45	5.13	2.01	0.29	463	118	
	1435	17.93	100	20.40	5.11	2.00	0.28	462	119	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WW17B-051316 TIME: 1435

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3 - 40 ml glass	HCl	N	Pump	VOC
1 - 250 ml plastic	NA	Y	Pump	perchlorate

LOCATION	Site: 50	LocID: 50WW17M		Date: 5/13/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135		Recorded By: Scott Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 17.85		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 67.00	Screen Intverval (ft) from TOC: 22.30 - 66.80		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 44.55			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	1340	17.85	100	22.17	5.37	2.00	0.49	527	96	
	1345	17.88	100	21.63	5.21	1.95	0.33	500	111	
	1350	17.90	100	21.00	5.07	1.93	0.26	471	127	
	1355	17.91	100	20.96	5.09	1.92	0.26	469	125	
	1400	17.91	100	21.03	5.10	1.91	0.26	468	124	
	1405	17.91	100	20.99	5.09	1.91	0.25	467	124	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW17M-051316 TIME: 1405

DUPLICATE (D): YES/NO NO
MATRIX SPIKE (MS): YES/NO NO
MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

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LOCATION	Site: 50	LocID: 50WW17T	Date: 5/13/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135	Recorded By: Scott Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 17.72	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 67.00	Screen Interval (ft) from TOC: 22.30-66.80	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 33.43	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	1300	17.70	100	26.17	5.31	2.10	0.85	495	113	
	1305	17.76	100	22.97	5.14	2.21	0.51	409	136	
	1310	17.81	100	21.88	5.16	2.25	0.37	377	131	
	1315	17.85	100	21.59	5.16	2.25	0.29	349	131	
	1320	17.87	100	21.54	5.16	2.24	0.28	347	130	
	1325	17.88	100	21.50	5.15	2.27	0.28	346	129	
	1330	17.89	100	21.45	5.15	2.27	0.27	345	129	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WWITT-051316 TIME: 1330

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW18		Date: 5/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 17.55		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 37.60	Screen Intverval (ft) from TOC: 22.37 - 36.87		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 29.60			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/3/16	1240	17.52	100	18.89	6.33	3.12	1.87	158	193				
	1245	17.60	100	18.35	6.08	3.12	0.94	62.9	199				
	1250	17.68	100	18.18	5.99	3.12	0.81	44.3	197				
	1255	17.72	100	18.18	5.87	3.12	0.72	45.1	186				
	1300	17.75	100	18.18	5.85	3.11	0.70	45.8	184				
	1305	17.77	100	18.14	5.86	3.11	0.70	45.0	182				
	1310	17.78	100	18.17	5.84	3.11	0.69	44.9	181				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW18-050316 TIME: 1310

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		GASES / CO2
1-500 ml plastic	ZnAcetNaOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TDL / TOTAL PHOSPHOROUS
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NA	N		ALKALINITY

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW19		Date: 5/11/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.27		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 65.36	Screen Intverval (ft) from TOC: 21.35 - 65.85		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 43.60			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	0830	18.25	100	19.28	5.39	1.12	1.00	482	39				
	0835	18.31	100	19.15	5.32	1.11	0.61	513	48				
	0840	18.35	100	19.09	5.21	1.10	0.42	596	54				
	0845	18.38	100	19.16	5.04	1.06	0.45	632	68				
	0850	18.41	100	19.07	5.08	1.05	0.40	627	69				
	0855	18.43	100	19.06	5.07	1.10	0.27	615	[illegible]66				
	0900	18.45	100	19.05	5.11	1.09	0.24	610	65				
↓	0905	18.45	100	18.98	5.11	1.09	0.27	611	65				
	0910	18.45	100	18.99	5.11	1.09	0.27	612	66				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW19-051116 TIME: 0910

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3 - 40 ml glass	HCL	N	Pump	VOC
1 - 250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW19B	Date: 5/13/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135	Recorded By: Scott Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.53	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 65.34	Screen Intverval (ft) from TOC: 21.35-65.85	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 54.72	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	1035	18.53	100	21.69	5.24	1.11	3.25	277	54	
	1040	18.58	100	20.43	5.31	1.11	3.12	400	46	
	1045	18.57	100	20.49	5.26	1.11	1.87	291	54	
	1050	18.59	100	20.82	5.20	1.11	1.00	277	59	
	1055	18.60	100	20.92	5.14	1.11	0.64	289	64	
	1100	18.60	100	20.95	5.13	1.11	0.63	291	64	
	1105	18.60	100	20.98	5.12	1.12	0.62	290	65	
	1110	18.60	100	21.04	5.12	1.12	0.61	292	66	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WW19B-051316 TIME: 1110

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

ACCOM

MONITORING WELL SAMPLE COLLECTION FORM

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LOCATION	Site: 50	LocID: 50WW19M		Date: 5/13/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135		Recorded By: Scott Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.50		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 65.34	Screen Intverval (ft) from TOC: 21.35 - 65.85		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 43.60			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	0955	18.50	100	20.15	5.27	1.15	0.70	315	66	
	1000	18.53	100	19.94	5.32	1.13	0.35	112	61	
	1005	18.56	100	20.01	5.29	1.12	0.36	96.5	58	
	1010	18.58	100	20.16	5.27	1.12	0.29	127	61	
	1015	18.58	100	20.20	5.27	1.11	0.30	128	60	
	1020	18.58	100	20.25	5.26	1.10	0.29	129	58	
↓	1025	18.58	100	20.29	5.26	1.10	0.30	129	57	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WW19M-051316 TIME: 1025

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40ml glass	HCl	N	Pump	VOC
1-[redacted]250 ml plastic	NA	Y	Pump	perchlorate

ACCOM

MONITORING WELL SAMPLE COLLECTION FORM

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LOCATION	Site: 50	LocID: 50 MW 19T		Date: 5/13/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135		Recorded By: Scott Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: Solinst ID#: 101	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.45		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 65.34	Screen Intverval (ft) from TOC: 21.35 - 65.85		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 32.48			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Remarks (odor, clarity, etc.)
5/13/16	0910	18.43	100	19.85	5.32	1.17	1.27	682	48	
	0915	18.49	100	19.82	5.19	1.15	0.75	653	64	
	0920	18.53	100	19.80	5.14	1.14	0.47	645	69	
	0925	18.55	100	19.85	5.14	1.15	0.39	639	68	
	0930	18.56	100	19.78	5.15	1.15	0.35	593	65	
	0935	18.57	100	19.84	5.17	1.16	0.36	591	64	
	0940	18.57	100	19.85	5.18	1.16	0.35	590	63	
	0945	18.57	100	19.87	5.18	1.15	0.35	590	62	

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50MW19T-051316 TIME: 0945

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3 - 40 ml glass	HCl	N	Pump	VOC
1 - 250 ml plastic	NA	Y	Pump	perchlorate

ALCOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW20		Date: 5/11/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 24.24		Weather Conditions: CLOUDY	
	Total Well Depth (ft) from TOC: 55.96	Screen Intverval (ft) from TOC: 20.54 - 55.04		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 37.74			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	1255	24.22	100	21.80	5.31	1.49	0.77	195					
	1300	24.29	100	21.13	5.17	1.51	0.55	171					
	1305	24.35	100	21.03	5.11	1.52	0.65	163					
	1310	24.39	100	21.09	5.08	1.53	0.80	152					
	1315	24.41	100	20.97	5.09	1.54	0.82	151					
	1320	24.43	100	20.94	5.09	1.55	0.83	150					
	1325	24.44	100	20.92	5.08	1.55	0.83	152					

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW20-057116 TIME: 1325

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
1-250ml plast.	NA	Y	Pump	perchlorate

ALCOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW21		Date: 5/12/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 21.97		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 37.70	Screen Intverval (ft) from TOC: 22.36 - 36.86		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 29.60			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/12/16	1410	21.95	100	24.88	6.05	7.52	1.59	9.0	125				
	1415	22.06	100	22.23	5.94	8.13	1.41	6.1	143				
	1420	22.12	100	21.81	5.82	8.16	1.52	4.3	157				
	1425	22.18	100	21.49	5.82	8.16	1.58	3.9	169				
	1430	22.21	100	21.45	5.81	8.17	1.58	2.7	170				
	1435	22.23	100	21.40	5.82	8.17	1.57	2.2	171				
	1440	22.24	100	21.37	5.81	8.17	1.56	2.0	172				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW21-051216 TIME: 1440

DUPLICATE (D): YES/NO Yes

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
6 - 40 ml glass	HCl	N	Pump	VOC
2 - 250 ml plastic	NA	Y	Pump	Perchlorate

ALCOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW22	Date: 5/10/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 23.47	Weather Conditions: Cloudy
	Total Well Depth (ft) from TOC: 37.89	Screen Intverval (ft) from TOC: 21.97-36.57	Condition of Well/Remarks: Good
		Pump Placement (ft) from TOC: 29.30	

CASING INFO												
	Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
	Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/10/16	0720	23.44	100	20.66	6.08	4.01	2.34	3.3	214				
	0725	23.51	100	19.95	5.74	4.02	1.32	0.7	224				
	0730	23.58	100	19.81	5.55	4.03	0.85	0.2	228				
	0735	23.62	100	19.42	5.49	4.03	0.77	0.6	233				
	0740	23.65	100	19.40	5.51	4.04	0.78	1.9	233				
	0745	23.67	100	19.45	5.52	4.04	0.77	1.2	231				
	0750	23.69	100	19.47	5.53	4.04	0.78	2.2	230				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW22-051016 TIME: 0750

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40ml glass	HCL	N	Pump	VOC
3-20ml glass	NA	N		Gases/CO2
1-500ml plastic	2d ACCNAOH	N		Sulfide
1-250ml plastic	HNO3	Y		Dissolved metals
1-250ml plastic	H2SO4	N		TOC/TOTAL phosphorous
1-250ml plastic	NA	Y		Perchlorate
1-250ml plastic	NA	N		Anions
1-250ml plastic	NA	N		Alkalinity

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50ww23		Date: 5/10/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 22.60		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 37.89	Screen Intverval (ft) from TOC: 22.42 - 36.92		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 29.65			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/10/16	1400	22.60	100	24.84	5.71	4.63	1.31	63.7	220				
	1405	22.67	100	23.59	5.57	4.70	1.06	65.2	219				
	1410	22.75	100	23.11	5.53	4.72	0.85	66.1	218				
	1415	22.81	100	22.53	5.49	4.75	0.61	55.9	216				
	1420	22.85	100	22.43	5.47	4.77	0.59	47.7	212				
	1425	22.87	100	22.50	5.45	4.76	0.58	46.9	210				
	1430	22.88	100	22.55	5.45	4.76	0.57	46.1	208				
	1435	22.88	100	22.60	5.45	4.75	0.58	45.8	207				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50ww23-051016 TIME: 1435

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		Gases/CO2
1-500 ml plast.ic	2NaOH	N		Sulfide
1-250 ml plast.ic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC/ TOT Al phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NA	N		ALKALINITY

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW24	Date: 5/10/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 23.59	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 38.09	Screen Intverval (ft) from TOC: 22.66-37.16	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.90	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/10/16	1245	23.57	100	24.66	5.73	1.74	1.70	77.8	213				
	1250	23.67	100	23.45	5.50	1.68	0.95	70.4	215				
	1255	23.75	100	22.74	5.42	1.67	0.80	41.5	216				
	1300	23.80	100	22.52	5.40	1.67	0.77	33.2	214				
	1305	23.82	100	22.21	5.38	1.67	0.51	32.1	211				
	1310	23.84	100	21.95	5.36	1.68	0.52	32.0	209				
	1315	23.85	100	21.90	5.38	1.67	0.50	31.5	208				
	1320	23.85	100	21.94	5.37	1.67	0.51	31.2	207				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW24-051016 TIME: 1320

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40ml glass	HCL	N	Pump	VOC
3-20ml glass	NA	N		Gases/CO2
1-500ml plastic	2NAcNAOH	N		Sulfide
1-250ml plastic	HNO3	Y		Dissolved metals
1-250ml plastic	H2SO4	N		TOC/TOTAL phosphorous
1-250ml plastic	NA	Y		Perchlorate
1-250ml plastic	NA	N		Anions
1-250ml plastic	NA	N		Alkalinity

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

00884519

LOCATION	Site: 50	LocID: 50WW25		Date: 5/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2	Static Water Level Reading (ft) from TOC: 17.65		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 58.00	Screen Intverval (ft) from TOC: 47.50 - 56.90		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 52.20			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/3/16	1355	17.62	100	19.37	5.43	0.603	2.33	166	181				
	1400	17.70	100	18.87	5.27	0.607	1.15	188	171				
	1405	17.78	100	18.87	5.24	0.640	0.67	173	162				
	1410	17.85	100	19.06	5.28	0.676	0.50	120	147				
	1415	17.87	100	19.04	5.28	0.710	0.41	102	147				
	1420	17.89	100	18.84	5.32	0.762	0.35	90.2	142				
	1425	17.90	100	18.77	5.32	0.783	0.30	85.6	136				
	1430	17.90	100	18.73	5.35	0.785	0.29	85.0	134				
	1435	17.90	100	18.70	5.36	0.785	0.28	84.7	132				
	1440	17.90	100	18.74	5.37	0.786	0.27	84.0	130				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW25-050316 TIME: 1440

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40ml glass	HCL	N	Pump	VOC
3-20ml glass	NA	N		Gases / CO2
1-500ml plastic	ZNACENAOH	N		Sulfide
1-250 ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	H2SO4	N		TOC / TOTAL Phosphorous
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	NA	N		Anions
1-250 ml plastic	NO	N		ALKALINITY

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50ww26		Date: 5/12/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 21.81		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 62.83	Screen Intverval (ft) from TOC: 47.49 - 61.99		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 54.75			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/12/16	1505	21.80	100	24.95	5.67	4.54	1.76	188	159				
	1510	21.87	100	24.06	5.41	4.54	0.87	207	178				
	1515	21.95	100	22.87	5.34	4.60	0.73	200	190				
	1520	22.00	100	22.70	5.31	4.60	0.68	209	187				
	1525	22.03	100	22.67	5.30	4.61	0.67	210	186				
	1530	22.05	100	22.63	5.29	4.61	0.66	211	185				
	1535	22.07	100	22.61	5.28	4.61	0.65	210	185				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50ww26-05122016 TIME: 1535

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	Perchlorate

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50 WW27	Date: 5/12/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21099	Sampling Equipment: Bladder Pump ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 17.47	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 59.97	Screen Intverval (ft) from TOC: 45.28 - 59.78	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 52.50	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/12/16	1310	17.47	100	24.70	6.60	1.49	2.86	103	107				
	1315	17.45	100	23.87	5.58	1.68	1.22	139	87				
	1320	17.53	100	22.77	5.40	1.66	0.59	137	110				
	1325	17.60	100	22.55	5.40	1.61	0.39	134	109				
	1330	17.65	100	22.52	5.40	1.60	0.38	133	108				
	1335	17.68	100	22.48	5.41	1.59	0.38	132	107				
	1340	17.70	100	22.46	5.41	1.59	0.38	132	107				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU Ideal), for 4 consecutive readings

SAMPLE ID: 50WW27-051216 TIME: 1340

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO Yes

MATRIX DUPLICATE (MD): YES/NO Yes

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
9 - 40 ml glass	HCl	N	Pump	VOC
3 - 250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW28		Date: 5/11/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21099	Sampling Equipment: Bladder Pump	ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 16.45		Weather Conditions: CLOUDY / RAIN	
	Total Well Depth (ft) from TOC: 27.13	Screen Intverval (ft) from TOC: 17.00 - 27.00		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 22.00			

CASING INFO											
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
5/11/16	1050	16.47	100	20.52	5.21	0.139	1.90	7.7	177				
	1055	16.53	100	20.22	4.84	0.127	1.04	3.9	219				
	1100	16.58	100	20.05	4.70	0.123	0.75	6.5	260				
	1105	16.62	100	19.96	4.63	0.120	0.59	8.8	267				
	1110	16.64	100	20.02	4.63	0.120	0.58	8.3	266				
	1115	16.65	100	20.05	4.61	0.119	0.57	8.7	265				
	1120	16.66	100	20.07	4.60	0.119	0.56	9.0	265				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW28-051116 TIME: 1120

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40ml glass	HCl	N	Pump	VOC
1-250 ml plastic	NA	Y	Pump	perchlorate

AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50 WW01		Date: 11/4/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # NA	Sampling Equipment:	Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 4 11	Static Water Level Reading (ft) from TOC: 20.85		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 23.36	Screen Interval (ft) from TOC: 18.00 - 23.00		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: NA			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

WATER Level ONLY

NO Sample Collected

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW02		Date: 11/2/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment:	Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: DRY		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 22.34	Screen Interval (ft) from TOC: 12.34 - 22.34		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 17.34			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

DRY WELL

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50		LocID: 50WW03		Date: 11/4/16
	Project: Longhorn Army Ammunition Plant		Project No. 60256135.0002GA		Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52		Water Interface Probe: Water Level Indicator: ID#:		Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # NA		Sampling Equipment: Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 4"		Static Water Level Reading (ft) from TOC: DRY		Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 23.07		Screen Intverval (ft) from TOC: 13.06-23.06		Condition of Well/Remarks: GOOD
			Pump Placement (ft) from TOC: NA		

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
					DRY WELL								
					WATER LEVEL ONLY								
					NO SAMPLE REQUIRED								

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50			LocID: 50WW04				Date: 11/7/16					
	Project: Longhorn Army Ammunition Plant			Project No. 60256135.0002GA				Recorded By: Beesinger Checked By:					
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52			Water Interface Probe: Water Level Indicator: ID#:				Min Recharge Level = (TD-DTW(0.80)) - TD					
	Unit # NA			Sampling Equipment: Peristaltic/Bladder/Bailer ID#:									
WELL INFO	Casing I.D. (in): 4"			Static Water Level Reading (ft) from TOC: DRY				Weather Conditions: CLEAR					
	Total Well Depth (ft) from TOC: 23.23			Screen Intverval (ft) from TOC: 12.87 - 22.87				Condition of Well/Remarks: GOOD					
				Pump Placement (ft) from TOC: NA									
CASING INFO	Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	
	Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
					DRY WELL								
					WATER Level only								
					NO SAMPLE REQUIRED								

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW05		Date: 11/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment:	Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 20.69		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 25.38	Screen Intverval (ft) from TOC: 15.74 - 25.74		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 22.50			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/3/16	0950	20.70	100	20.41	7.19	1.66	2.98	0.0	-8				
	0955	20.75	100	20.19	6.47	1.66	2.41	0.0	19				
	1000	20.80	100	20.12	6.27	1.66	2.19	0.0	31				
	1005	20.82	100	20.13	6.13	1.66	2.15	0.0	32				
	1010	20.83	100	20.12	6.10	1.66	2.13	0.0	30				
	1015	20.83	100	20.10	6.08	1.65	2.10	0.0	31				
	1020	20.83	100	20.09	6.09	1.65	2.08	0.0	32				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW05-110316 TIME: 1020

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO Yes

MATRIX DUPLICATE (MD): YES/NO Yes

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
9 - 40 mL GLASS	HCL	N	PUMP	VOC
3 - 250 mL GLASS	NA	Y	PUMP	PERCHLORATE

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW06	Date: 11/1/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~ ID#:	
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 18.49	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 58.48	Screen Intverval (ft) from TOC: 47.85 - 57.75	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 52.80	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/1/16	1050	18.49	100	19.59	6.51	1.38	3.12	18.0	159				
	1055	18.56	100	19.36	6.17	1.46	2.50	7.7	156				
	1100	18.61	100	19.21	6.00	1.46	2.40	2.1	155				
	1105	18.64	100	19.28	5.99	1.47	2.33	0.0	154				
	1110	18.65	100	19.33	5.98	1.47	2.31	0.0	155				
	1115	18.65	100	19.34	5.97	1.47	2.29	0.0	156				
	1120	18.65	100	19.35	5.97	1.47	2.28	0.0	155				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW06-110116 TIME:

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml GLASS	HCL	N	Pump	VOC
3-20 mL GLASS	NA	N		GASES/CO2
1-500 mL PLASTIC	2N ACENAOH	N		SULFIDE
1-250 mL PLASTIC	HNO3	Y		DISSOLVED METALS
1-250 mL PLASTIC	NA	Y		PERCHLORATE
1-250 mL PLASTIC	H2SO4	N		TOC/TOTAL PHOSPHOROUS
1-250 mL PLASTIC	NA	N		ANIONS
1-250 mL PLASTIC	NA	N		ALKALINITY

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW07	Date: 11/4/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # NA	Sampling Equipment: Peristaltic/Bladder/Bailer ID#:	
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 25.91	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 31.90	Screen Interval (ft) from TOC: 21.67-31.67	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: NA	

CASING INFO												
	Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
	Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

WATER LEVEL ONLY

NO SAMPLES REQUIRED

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW08		Date: 11/2/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 22.51		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 32.80	Screen Intverval (ft) from TOC: 17.11 - 31.71		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 24.41			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/2/16	0745	22.48	100	19.49	6.24	2.50	3.63	19.4	231				
	0750	22.57	100	19.50	5.96	2.45	2.81	23.6	225				
	0755	22.63	100	19.41	5.91	2.44	2.67	13.6	220				
	0800	22.67	100	19.36	5.90	2.44	2.41	8.0	219				
	0805	22.69	100	19.33	5.91	2.43	2.39	2.3	217				
	0810	22.70	100	19.31	5.92	2.43	2.37	0.0	215				
	0815	22.70	100	19.32	5.91	2.43	2.36	0.0	213				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW08-110216 TIME: 0815

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40ml GLASS	HCL	N	Pump	VOC
3-20 mL GLASS	NA	N		GASES/CO2
1-500 mL PLASTIC	ZNACETATE	N		SULFIDE
1-250 mL PLASTIC	HNO3	Y		DISSOLVED METALS
1-250 mL PLASTIC	NA	Y		PERCHLORATE
1-250 mL PLASTIC	H2SO4	N		TOC/TOTAL PHOSPHOROUS
1-250 mL PLASTIC	NA	N		ANIONS
1-250 mL PLASTIC	NA	N		ALKALINITY

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW09		Date: 11/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment: Peristaltic/Bladder/Bailer	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 22.25		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 62.50	Screen Intverval (ft) from TOC: 46.75 - 61.25		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 54.00			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/3/16	0740	22.23	100	19.76	5.87	2.22	4.27	414	48				
	0745	22.29	100	19.40	5.78	2.56	3.08	573	41				
	0750	22.35	100	19.33	5.77	2.60	2.77	482	33				
	0755	22.38	100	19.19	5.79	2.60	2.49	453	26				
	0800	22.40	100	19.18	5.74	2.60	2.30	449	21				
	0805	22.42	100	19.16	5.74	2.59	2.27	448	20				
	0810	22.43	100	19.11	5.72	2.58	2.25	446	21				
	0815	22.43	100	19.10	5.73	2.58	2.24	445	20				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW09-110316 TIME: 0815	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
	3 - 40 ml GLASS	HCL	N	Pump	VOC
	1 - 250 ml PLASTIC	NA	Y	Pump	PERCHLORATE
DUPLICATE (D): YES/NO Yes					
MATRIX SPIKE (MS): YES/NO NO					
MATRIX DUPLICATE (MD): YES/NO NO					
CO= LEL= OXY= H2S=					

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW10		Date: 11/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 23.57		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 111.40	Screen Intverval (ft) from TOC: 101.43 - 110.93		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 106.20			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/3/16	0840	23.52	100	19.23	7.17	1.65	4.85	125	-147				
	0845	23.59	100	19.12	10.18	1.42	3.95	46.4	-176				
	0850	23.64	100	19.14	10.28	1.42	3.44	27.2	-169				
	0855	23.67	100	19.19	10.28	1.42	3.20	20.1	-168				
	0900	23.69	100	19.23	10.25	1.40	3.16	19.7	-168				
	0905	23.70	100	19.25	10.24	1.40	3.14	19.9	-170				
↓	0910	23.70	100	19.27	10.23	1.39	3.13	19.0	-171				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW10-110316 TIME: 0910

DUPLICATE (D): YES/NO YES

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
6 - 40 mL GLASS	HCL	N	PUMP	VOC
2 - 250 mL PLASTIC	NA	Y	PUMP	PERCHLORATE

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW11	Date: 11/1/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~ ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 20.06	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: ~~@~~ 37.98	Screen Intverval (ft) from TOC: 22.55 - 37.05	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.80	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/1/16	0950	20.03	100	18.81	5.99	2.26	2.90	45.0	64				
	0955	20.09	100	18.95	5.75	2.26	2.23	27.0	96				
	1000	20.15	100	18.99	5.67	2.25	2.00	16.3	115				
	1005	20.20	100	19.16	5.67	2.25	1.97	9.8	124				
	1010	20.23	100	19.20	5.67	2.26	1.95	9.0	125				
	1015	20.25	100	19.21	5.66	2.26	1.93	8.4	126				
	1020	20.26	100	19.25	5.66	2.26	1.91	5.7	128				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW11-110116 TIME: 1020

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml GLASS	~~HCL~~	N	Pump	VOC
3-20 mL GLASS	NA	N		GASES/CO2
1-500 mL PLASTIC	ZnACETATE/NaOH	N		SULFIDE
1-250 mL PLASTIC	HNO3	Y		DISSOLVED METALS
1-250 mL PLASTIC	NA	Y		PERCHLORATE
1-250 mL PLASTIC	H2SO4	N		TOC/TOTAL PHOSPHOROUS
1-250 mL PLASTIC	NA	N		ANIONS
1-250 mL PLASTIC	NA	N		ALKALINITY

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW12		Date: 11/1/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment: Peristaltic/Bladder/Bailer	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.85		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 36.98	Screen Intverval (ft) from TOC: 22.50-37.00		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 29.75			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/1/16	1300	18.82	100	21.80	5.97	4.44	2.89	185	169				
	1305	18.90	100	20.89	5.76	4.48	2.87	101	169				
	1310	18.96	100	20.60	5.68	4.47	2.47	76.3	170				
	1315	19.01	100	20.38	5.69	4.46	2.28	71.4	171				
	1320	19.04	100	20.32	5.68	4.45	2.25	70.6	171				
	1325	19.05	100	20.28	5.69	4.44	2.23	69.9	170				
	1330	19.06	100	20.24	5.67	4.44	2.22	69.3	171				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW12-110116 TIME: 1330

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 mL GLASS	HCL	N	Pump	VOC
3-20 mL GLASS	NA	N		GASES/CO2
1-500 mL PLASTIC ZN	ACETATE NAOH	N		SULFIDE
1-250 mL PLASTIC	HNO3	Y		DISSOLVED METALS
1-250 mL PLASTIC	NA	Y		PERCHLORATE
1-250 mL PLASTIC	H2SO4	N		TOC/TOTAL PHOSPHOROU
1-250 mL PLASTIC	NA	N		ANIONS
1-250 mL PLASTIC	NA	N		ALKALINITY

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW13	Date: 11/1/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~ ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 20.31	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.69	Screen Intverval (ft) from TOC: 22.44 - 36.94	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.70	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/1/16	0740	20.28	100	18.97	5.95	2.24	3.84	39.7	202				
	0745	20.37	100	19.00	5.77	2.23	2.81	36.6	185				
	0750	20.42	100	18.90	5.74	2.22	2.21	25.1	151				
	0755	20.47	100	18.75	5.69	2.21	2.15	18.3	149				
	0800	20.50	100	18.73	5.69	2.21	2.14	18.0	148				
	0805	20.52	100	18.71	5.67	2.20	2.13	17.8	147				
	0810	20.53	100	18.69	5.67	2.19	2.12	17.5	146				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW13-110116 TIME: 0810

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		GASES/CO2
1-500 ml plastic	ZnAc&NaOH	N		Sulfide
1-~~500~~ ml plastic	HNO3	Y		Dissolved metals
1-250 ml plastic	NA	Y		Perchlorate
1-250 ml plastic	H2SO4	N		TOC/TOTAL phosphorous
1-250 ml plastic	NA	N		Anions,
1-250 ml plastic	NA	N		ALKALinity

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW14	Date: 11/1/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~ ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 20.55	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 60.73	Screen Intverval (ft) from TOC: 45.78 - 60.28	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 53.00	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/1/16	0840	20.53	100	18.38	6.03	2.25	3.27	72.8	-6				
	0845	20.60	100	18.56	6.05	2.25	2.60	70.3	-24				
	0850	20.66	100	18.59	6.01	2.25	2.33	60.4	-28				
	0855	20.70	100	18.68	5.94	2.24	2.19	67.3	-20				
	0900	20.73	100	18.68	5.85	2.23	2.12	61.2	-10				
	0905	20.75	100	18.69	5.84	2.23	2.10	61.0	-10				
	0910	20.77	100	18.70	5.82	2.22	2.08	60.5	-9				
	0915	20.78	100	18.72	5.81	2.23	2.07	60.0	-8				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW14-110116 TIME: 0915

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 ml glass	HCL	N	Pump	VOC
3-20 ml glass	NA	N		GASES/CO2
1-500 mL plastic	ZnACETAOH	N		SULFIDE
1-250 mL plastic	HNO3	Y		DISSOLED METALS
1-250 mL plastic	NA	Y		PERCHLORATE
1-250 mL plastic	H2SO4	N		TOC/TOTAL PHOSPHORUS
1-250 mL plastic	NA	N		ANIONS
1-250 mL plastic	NA	N		ALKALINITY

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW15	Date: 11/2/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: Peristaltic/Bladder/Bailer ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 19.17	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.90	Screen Intverval (ft) from TOC: 22.25-36.75	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.50	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/2/16	1340	19.15	100	22.34	6.39	1.88	3.96	137	69				
	1345	19.22	100	21.13	6.09	1.97	2.59	89.7	81				
	1350	19.30	100	21.06	5.91	1.99	2.23	88.9	97				
	1355	19.35	100	21.01	5.88	2.00	2.05	75.3	104				
	1400	19.39	100	20.80	5.85	2.01	1.99	72.5	110				
	1405	19.42	100	20.82	5.84	2.01	1.98	72.3	110				
	1410	19.44	100	20.85	5.84	2.01	1.97	72.1	111				
	1415	19.45	100	20.87	5.82	2.01	1.96	71.2	111				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW15-110216 TIME: 1415

DUPLICATE (D): YES/NO Yes

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
6-40 mL GLASS	HCL	N	Pump	VOC
2-250 mL PLASTIC	NA	Y	Pump	PERCHLORATE

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: [redacted] SDWW16	Date: 11/2/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~ ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 19.96	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 38.13	Screen Intverval (ft) from TOC: 22.66-37.16	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.90	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/2/16	1000	19.93	100	19.31	5.88	0.381	3.68	182	185				
	1005	20.00	100	19.03	5.51	0.359	2.75	304	192				
	1010	20.06	100	18.95	5.37	0.342	2.51	335	197				
	1015	20.10	100	18.87	5.34	0.332	2.33	478	202				
	1020	20.12	100	18.85	5.34	0.325	2.17	480	200				
	1025	20.14	100	18.90	5.27	0.324	2.10	465	202				
	1030	20.15	100	18.92	5.28	0.324	2.07	464	200				
	1035	20.16	100	18.90	5.26	0.323	2.05	463	200				
	1040	20.16	100	18.90	5.25	0.323	2.02	462	200				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: SDWW16-110216 TIME: 1040

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40mL GLASS	HCL	N	Pump	VOC
3-20 mL GLASS	NA	N		GASES/CO2
1-500 mL PLASTIC	ZN ACE NaOH	N		SULFIDE
1-250mL PLASTIC	HNO3	Y		DISSOLVED METALS
1-250 mL PLASTIC	NA	Y		PERCHLORATE
1-250mL PLASTIC	H2SO4	N		TOC/TOTAL PHOSPHOROUS
1-250mL PLASTIC	NA	N		ANIONS
1-250mL PLASTIC	NA	N		ALKALINITY

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50 WW17		Date: 11/4/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 19.04		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 66.78	Screen Intverval (ft) from TOC: 22.30 - 66.80		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 44.55			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/4/16	0840	19.01	100	19.64	5.59	2.51	2.72	770	37				
	0845	19.09	100	19.77	5.25	2.48	2.08	750	70				
	0850	19.15	100	19.73	5.24	2.46	1.68	747	74				
	0855	19.20	100	19.68	5.21	2.44	1.50	745	75				
	0900	19.23	100	19.65	5.17	2.42	1.48	743	77				
	0905	19.25	100	19.61	5.15	2.40	1.45	742	78				
	0910	19.24	100	19.59	5.13	2.39	1.44	[illegible]	77				
	0915	19.26	100	19.57	5.13	2.39	1.43	740	78				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50 WW17-110416 TIME: 0915

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3 - 40 ml GLASS	HCL	N	PUMP	VOC
1 - 250 mL PLASTIC	NA	Y	PUMP	PERCHLORATE

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW18		Date: 11/3/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment:	Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.70		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 37.45	Screen Intverval (ft) from TOC: 22.37-36.87		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 29.60			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/3/16	1355	18.68	100	20.85	5.93	3.32	2.95	586	163				
	1400	18.75	100	20.24	5.73	3.34	2.34	574	150				
	1405	18.80	100	20.09	5.71	3.34	2.03	565	147				
	1410	18.83	100	19.93	5.70	3.35	1.90	525	141				
	1415	18.86	100	19.85	5.71	3.35	1.58	401	130				
	1420	18.88	100	19.80	5.72	3.36	1.55	399	128				
	1425	18.89	100	19.78	5.70	3.37	1.53	397	126				
	1430	18.90	100	19.75	5.71	3.37	1.50	395	125				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW18-110316 TIME: 1430

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 mL GLASS	HCL	N	PUMP	VOC
1-250 mL PLASTIC	NA	Y	PUMP	PERCHLORATE

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW19		Date: 11/4/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment: ~~Peristaltic/Bladder/Bailer~~	ID#:		
WELL INFO	Casing I.D. (in): 2.11	Static Water Level Reading (ft) from TOC: 19.66		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 66.12	Screen Intverval (ft) from TOC: 21.35-65.85		Condition of Well/Remarks: Good	
		Pump Placement (ft) from TOC: 43.60			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/4/16	0740	19.62	100	20.04	5.80	1.15	3.71	75.3	-36				
	0745	19.70	100	19.76	5.64	1.15	3.66	75.1	-27				
	0750	19.77	100	19.59	5.62	1.15	3.64	85.3	-16				
	0755	19.81	100	19.52	5.47	1.15	3.43	120	-7				
	0800	19.83	100	19.49	5.44	1.15	3.39	124	-2				
	0805	19.85	100	19.47	5.43	1.15	3.38	125	4				
	0810	19.85	100	19.43	5.41	1.14	3.35	126	3				
	0815	19.85	100	19.40	5.41	1.14	3.32	127	3				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW19-110416 TIME: 0815

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3- 40 mL GLASS	HCL	N	PUMP	VOC
1- 250 mL plastic	NA	Y	PUMP	PERCHLORATE

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50			LocID: 50WW20				Date: 11/4/16					
	Project: Longhorn Army Ammunition Plant			Project No. 60256135.0002GA				Recorded By: Beesinger Checked By:					
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52			Water Interface Probe: Water Level Indicator: ID#:				Min Recharge Level = (TD-DTW(0.80)) - TD					
	Unit # NA			Sampling Equipment: Peristaltic/Bladder/Bailer ID#:									
WELL INFO	Casing I.D. (in): 2"			Static Water Level Reading (ft) from TOC: 25.33				Weather Conditions: CLEAR					
	Total Well Depth (ft) from TOC: 56.02			Screen Intverval (ft) from TOC: 20.54 - 55.04				Condition of Well/Remarks: GOOD					
				Pump Placement (ft) from TOC: NA									
CASING INFO	Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0	
	Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6	

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

WATER LEVEL ONLY

NO SAMPLE REQUIRED

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50 WW 21	Date: 11/3/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: Peristaltic/Bladder/Bailer ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 23.15	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.70	Screen Intverval (ft) from TOC: 22.36-36.86	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.60	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/3/16	1055	23.12	100	20.56	6.32	8.22	2.96	10.4	108				
	1100	23.20	100	20.30	6.27	8.24	2.64	2.6	108				
	1105	23.26	100	20.21	6.22	8.25	2.36	0.0	111				
	1110	23.30	100	20.12	6.20	8.26	2.21	0.0	115				
	1115	23.33	100	20.10	6.20	8.26	2.17	0.0	116				
	1120	23.35	100	20.08	6.19	8.26	2.15	0.0	117				
	1125	23.36	100	20.05	6.19	8.27	2.13	0.0	118				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW21-110316 TIME: 1125

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3- 40 mL GLASS	HCL	N	PUMP	VOC
1- 250 mL PLAST.	NA	Y	PUMP	PERCHLORATE

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MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW22	Date: 11/2/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~ ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 24.87	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.88	Screen Interval (ft) from TOC: 21.97-36.57	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.70	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/2/16	0855	24.85	100	18.95	5.86	4.50	3.96	32.9	223				
	0900	24.93	100	18.98	5.74	4.50	3.23	36.9	225				
	0905	24.99	100	19.02	5.68	4.50	2.34	20.1	226				
	0910	25.04	100	19.06	5.66	4.50	2.25	9.1	226				
	0915	25.06	100	19.07	5.67	4.51	2.23	7.6	227				
	0920	25.08	100	19.09	5.67	4.52	2.21	6.2	226				
	0925	25.09	100	19.12	5.67	4.53	2.19	2.4	225				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW22-110216 TIME: 0925

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 mL GLASS	HCL	N	PUMP	VOC
3-20 mL GLASS	NA	N		GASES/CO2
1-500 mL PLASTIC	ZnAcNaOH	N		SULFIDE
1-250 mL PLASTIC	HNO3	Y		DISSOLVED METALS
1-250 mL PLASTIC	NA	Y		PERCHLORATE
1-250 mL PLASTIC	H2SO4	N		TOC/TOTAL PHOSPHOROUS
1-250 mL PLASTIC	NA	N		ANIONS
1-250 mL PLASTIC	NA	N		ALKALINITY

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW23	Date: 11/1/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: Peristaltic/Bladder/Bailer ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 23.70	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 37.88	Screen Intverval (ft) from TOC: 22.42 - 36.92	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.65	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/1/16	1405	23.67	100	21.82	6.24	5.52	2.91	3.1	180				
	1410	23.75	100	21.44	6.15	5.53	2.67	0.0	178				
	1415	23.81	100	21.12	6.08	5.54	2.43	0.0	178				
	1420	23.85	100	21.10	6.07	5.54	2.20	0.0	178				
	1425	23.88	100	21.07	6.06	5.54	2.18	0.0	178				
	1430	23.90	100	21.05	6.05	5.54	2.16	0.0	178				
	1435	23.91	100	21.02	6.04	5.54	2.14	0.0	178				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW23-110116 TIME: 1435

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 mL GLASS	HCL	N	PUMP	VOC
3-20 mL GLASS	NA	N		GASES/CO2
1-500 mL PLASTIC	2NACHAOH	N		SULFIDE
1-250 mL PLASTIC	HNO3	Y		DISSOLVED METALS
1-250 mL PLASTIC	NA	Y		PERCHLORATE
1-250 mL PLASTIC	NA	N		ANIONS
1-250 mL PLASTIC	H2SO4	N		TOC/TOTAL PHOSPHOROUS
1-250 mL PLASTIC	NA	N		ALKALINITY

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW24	Date: 11/3/16
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA	Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe: Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # 21168	Sampling Equipment: ~~Peristaltic~~/Bladder/~~Bailer~~ ID#:	
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 24.71	Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 38.05	Screen Intverval (ft) from TOC: 22.66-37.16	Condition of Well/Remarks: GOOD
		Pump Placement (ft) from TOC: 29.90	

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/3/16	1255	24.69	100	23.69	6.16	2.32	3.73	136	135				
	1300	24.77	100	22.22	5.68	2.12	2.77	137	150				
	1305	24.83	100	21.61	5.67	2.09	2.38	139	154				
	1310	24.87	100	21.08	5.63	2.09	2.08	144	159				
	1315	24.89	100	21.05	5.65	2.08	2.05	142	160				
	1320	24.90	100	20.98	5.66	2.07	2.00	140	160				
↓	1325	24.91	100	20.95	5.66	2.07	1.98	139	161				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW24-110316 TIME: 1325	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
	3-40 mL GLASS	HCl	N	PUMP	VOC
	1-250 mL PLASTIC	NA	Y	PUMP	PERCHLORATE
DUPLICATE (D): YES/NO NO					
MATRIX SPIKE (MS): YES/NO NO					
MATRIX DUPLICATE (MD): YES/NO NO					
CO= LEL= OXY= H2S=					

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW25		Date: 11/7/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # NA	Sampling Equipment:	Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 18.23		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 57.98	Screen Intverval (ft) from TOC: 47.50 - 56.90		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: NA			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

WATER LEVEL ONLY

NO SAMPLE REQUIRED

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50		LocID: 50WW26		Date: 11/4/16
	Project: Longhorn Army Ammunition Plant		Project No. 60256135.0002GA		Recorded By: Beesinger Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52		Water Interface Probe: Water Level Indicator: ID#:		Min Recharge Level = (TD-DTW(0.80)) - TD
	Unit # NA		Sampling Equipment: Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 2"		Static Water Level Reading (ft) from TOC: [redacted]23.1#		Weather Conditions: CLEAR
	Total Well Depth (ft) from TOC: 62.99		Screen Intverval (ft) from TOC: 47.49 - 61.99		Condition of Well/Remarks: GOOD
			Pump Placement (ft) from TOC: NA		

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

WATER Level only

NO SAmple Required

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

00884549

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW27		Date: 11/2/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # 21168	Sampling Equipment: ~~Peristaltic/Bladder/Bailer~~	ID#:		
WELL INFO	Casing I.D. (in): 2"	Static Water Level Reading (ft) from TOC: 19.15		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 59.90	Screen Intverval (ft) from TOC: 45.28 - 59.78		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: 52.50			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)
11/2/16	1240	19.12	100	21.90	6.17	1.72	3.88	105	29				
	1245	19.20	100	21.64	5.62	1.74	2.82	211	61				
	1250	19.25	100	20.97	5.59	1.71	2.48	373	65				
	1255	19.30	100	20.91	5.55	1.69	2.25	454	66				
	1300	19.33	100	20.71	5.52	1.68	2.15	440	67				
	1305	19.35	100	20.71	5.51	1.67	2.02	431	68				
	1310	19.36	100	20.61	5.52	1.66	2.01	429	66				
	1315	19.36	100	20.55	5.53	1.66	1.99	428	65				
	1320	19.36	100	20.51	5.53	1.66	1.97	427	65				

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: 50WW27-110216 TIME: 1320

DUPLICATE (D): YES/NO NO

MATRIX SPIKE (MS): YES/NO NO

MATRIX DUPLICATE (MD): YES/NO NO

CO= LEL= OXY= H2S=

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
3-40 mL GLASS	HCL	N	PUMP	VOC
1-250 mL PLASTIC	NA	Y	PUMP	PERCHLORATE

00884550

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AECOM

MONITORING WELL SAMPLE COLLECTION FORM

LOCATION	Site: 50	LocID: 50WW28		Date: 11/8/16	
	Project: Longhorn Army Ammunition Plant	Project No. 60256135.0002GA		Recorded By: Beesinger	Checked By:
EQUIPMENT	Water Quality Meter Type/ID #: Horiba U-52	Water Interface Probe:	Water Level Indicator: ID#:	Min Recharge Level = (TD-DTW(0.80)) - TD	
	Unit # NA	Sampling Equipment:	Peristaltic/Bladder/Bailer ID#:		
WELL INFO	Casing I.D. (in): 4"	Static Water Level Reading (ft) from TOC: 18.23		Weather Conditions: CLEAR	
	Total Well Depth (ft) from TOC: 27.33	Screen Intverval (ft) from TOC: 17.00-27.00		Condition of Well/Remarks: GOOD	
		Pump Placement (ft) from TOC: NA			

CASING INFO												
Casing I.D. (in):	0.75	1.5	2.0	2.2	3.0	4.0	4.3	5.0	6.0	7.0	8.0
Unit Casing Volume (gal/lin ft):	0.023	0.09	0.16	0.20	0.37	0.65	0.75	1.0	1.5	2.0	2.6

Date	Time (24 hr)	Water Level (FTOC)	Pumping Rate (mL/min)	Temp. (°C)	pH	Cond (µS/cm)	DO (mg/L)	Turb. (NTU)	ORP (mv)	Total Fe (mg/L)	Ferrous Fe (mg/L)	Ferric Fe (mg/L)	Remarks (odor, clarity, etc.)

WATER LEVEL ONLY

NO SAMPLES REQUIRED

Pump Rate: <=0.5 L/min Drawdown: <0.33 ft Measurements: 3-5 min Stabilization: +/-10% C, +/-0.1 pH, +/-3% Cond, +/-10% DO, +/-10%Turb(<=10 NTU ideal), for 4 consecutive readings

SAMPLE ID: TIME:	No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Pump OR Bailer	Parameter(s)
DUPLICATE (D): YES/NO					
MATRIX SPIKE (MS): YES/NO					
MATRIX DUPLICATE (MD): YES/NO					
CO= LEL= OXY= H2S=					

Appendix D

Laboratory Analytical Data Package

(Provided in separate Zip Folder on the portal and CD)

Appendix E

Surface Water Sampling Forms

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AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1		Date:	2/25/16	Time:	13:40
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA		Recorded By:	SB	Checked By:	SS

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start time 21:15 on 2/21/16. Rained 1.76 inches from Feb 21 to Feb 23. Did not rain on sampling day

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): WETTED (WET TO THE TOUCH) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 48 minutes Earliest Sampling Time (24 hour): 22:03 on 2/21/16

CREEK CONDITION INFO	FLOWING / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.: IMG-0942 GPW1 02-25-16 Upstream Photograph No.: IMG-0943 Upstream of GPW1 02-25-16

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1			185.25		YES
	Monitoring Well Location	50WW15	196.30	NA		NA	NO

SAMPLE ID: GPW1-022516 TIME: 13:40

DUPLICATE (D): YES / NO

MATRIX SPIKE (MS): YES / NO

MATRIX DUPLICATE (MD): YES / NO

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate

00884554

AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1A	Date:	2/25/16	Time:	No sample collected	
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA	Recorded By:	SB	Checked By:	SS	

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start Time: 21:15 on 2/21/16. Rained 1.76 inches from Feb 21 to Feb 23. Did not rain on sampling day

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): WETTED (WET TO THE TOUCH) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 48 minutes Earliest Sampling Time (24 hour): 22:03 on 2/21/16

CREEK CONDITION INFO	FLOWING / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.: No photo taken Upstream Photograph No.: No photo taken

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1A			183.70		YES
	Monitoring Well Location	50WW01	198.50	NA		NA	NO

SAMPLE ID: TIME:

No water therefore no sample collected

DUPLICATE (D): YES / NO

MATRIX SPIKE (MS): YES / NO

MATRIX DUPLICATE (MD): YES / NO

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate



PHOTO 1: IMG-0942 GPW1 02-25-16



PHOTO 2: IMG-0943 Upstream of GPW1 02-25-16

00884557

AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1	Date:	5/27/16	Time: 08:50
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA	Recorded By:	SB	Checked By: SS

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start Time: 06:55 on 5/27/16. Rained 0.37 inches on 5/27/16.

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): WETTED (WET TO THE TOUCH) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 48 minutes Earliest Sampling Time (24 hour): 07:43 on 5/27/16

CREEK CONDITION INFO	FLOWING / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.: GPW1 Sample point 05-27-16 Upstream Photograph No.: GPW1 Upstream 05-27-16

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1			185.25		YES
	Monitoring Well Location	50WW15	196.30	17.33		178.97	NO

SAMPLE ID: GPW1-052716 TIME: 08:50

DUPLICATE (D): YES / NO

MATRIX SPIKE (MS): YES / NO

MATRIX DUPLICATE (MD): YES / NO

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate

00884558

AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1A	Date:	5/27/16	Time:	No sample collected
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA	Recorded By:	SB	Checked By:	SS

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start time 06:55 on 5/27/16. Rained 0.37 inches on 5/27/16

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): WETTED (WET TO THE TOUCH) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 48 minutes Earliest Sampling Time (24 hour): 07:43 on 5/27/16

CREEK CONDITION INFO	FLOWING / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.:	2016 05-27 GPW1A
		Upstream Photograph No.:	No photo taken

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1A			183.70		YES
	Monitoring Well Location	50WW01	198.50	NA		NA	NO

SAMPLE ID: TIME:

No water therefore no sample collected

DUPLICATE (D): YES / NO

MATRIX SPIKE (MS): YES / NO

MATRIX DUPLICATE (MD): YES / NO

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate



PHOTO 3: GPW1 Sample point 05-27-16



PHOTO 4: GPW1 Upstream 05-27-16



PHOTO 5: 2016 05-27- GPW-1A

00884562

AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1	Date:	8/23/16	Time: 09:08
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA	Recorded By:	SB	Checked By: SS

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start time 01:35 on 8/23/16. Rained 4.43 inches from Aug 18 to Aug 22, 2016. Rained 0.01 inches on day of sampling

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): (WETTED (WET TO THE TOUCH)) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 48 minutes Earliest Sampling Time (24 hour): 02:23 on 8/23/16

CREEK CONDITION INFO		
(FLOWING) / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.:	No photo taken
	Upstream Photograph No.:	No photo taken

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1			185.25		YES
	Monitoring Well Location	50WW15	196.30	NA		NA	NO

SAMPLE ID: GPW1-082316 TIME: 09:08

DUPLICATE (D): YES / (NO)

MATRIX SPIKE (MS): YES / (NO)

MATRIX DUPLICATE (MD): YES / (NO)

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate

00884563

AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1A	Date:	8/23/16	Time:	No sample collected
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA	Recorded By:	SB	Checked By:	SS

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start time 01:35 on 8/23/16. Rained 4.43 inches from Aug 18 to Aug 22, 2016. Rained 0.01 inches on day of sampling

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): WETTED (WET TO THE TOUCH) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 48 minutes Earliest Sampling Time (24 hour): 02:23 on 8/23/16

CREEK CONDITION INFO	FLOWING / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.: No photo taken Upstream Photograph No.: No photo taken

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1A			183.70		YES
	Monitoring Well Location	50WW01	198.50	NA		NA	NO

SAMPLE ID: TIME:

No water therefore no sample collected

DUPLICATE (D): YES / NO

MATRIX SPIKE (MS): YES / NO

MATRIX DUPLICATE (MD): YES / NO

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate

00884564

AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1	Date:	11/29/16	Time: 08:58
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA	Recorded By:	SB	Checked By: SS

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start time 11:15 on 11/28/16. Rained 1.05 inches on 11/28/2016. Did not rain on day of sampling

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): WETTED (WET TO THE TOUCH) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 72 minutes Earliest Sampling Time (24 hour): 12:27 on 11/28/16

CREEK CONDITION INFO		
FLOWING / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.:	GPW1-11-29-16.JPG
	Upstream Photograph No.:	No photo taken

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1			185.25		YES
	Monitoring Well Location	50WW15	196.30	NA		NA	NO

SAMPLE ID: GPW1-112916

TIME: 08:58

DUPLICATE (D): YES / NO

MATRIX SPIKE (MS): YES / NO

MATRIX DUPLICATE (MD): YES / NO

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate

00884565

AECOM

SURFACE WATER SAMPLE COLLECTION FORM - MNA SITES

(FOR USE WITH LHAAP-50 GPW-1 and GPW-1A ONLY)

LOCATION	Site:	LHAAP-50	LocID:	GPW-1A	Date:	11/29/16	Time:	No sample collected
	Project:	Longhorn Army Ammunition Plant	Project No.:	60256135.0002GA	Recorded By:	SB	Checked By:	SS

Rainfall Event (at Stated Precipitation Rate) Start time at LHAAP (24-hour): Start time 11:15 on 11/28/16. Rained 1.05 inches on 11/28/16. Did not rain on day of sampling

Precipitation Rate (inches/hour): < 0.25 in/hour

Surface Conditions (circle one): WETTED (WET TO THE TOUCH) DRY (DRY TO THE TOUCH)

Required Minimum Wait Time To Sample - RACR Table J1 (HH:MM:SS): 72 minutes Earliest Sampling Time (24 hour): 12:27 on 11:28/16

CREEK CONDITION INFO	FLOWING / PONDED WATER / DRY CREEK CONDITION (circle one above)	Sampling Point Photograph No.: No photo taken Upstream Photograph No.: No photo taken

Groundwater Contribution Assessment		Loc ID:	TOC (MSL)	DTW (FTOC)	Sample Point Elevation (MSL)	Groundwater Elevation (MSL) (TOC - DTW = GW Elevation)	Is Sample Point Elevation <= Groundwater Elevation (CIRCLE ONE)
	Surface Water Location	GPW-1A			183.70		YES
	Monitoring Well Location	50WW01	198.50	NA		NA	NO

SAMPLE ID: TIME:

No water therefore no sample collected

DUPLICATE (D): YES / NO

MATRIX SPIKE (MS): YES / NO

MATRIX DUPLICATE (MD): YES / NO

No. Containers / Volume / Type	Preserv.	Filter (Y/N)	Type	Parameter(s)
125-ml polyethylene	4° C	Y	0.2 µm filter	6850 - Perchlorate



PHOTO 6: GPW-1 11-29-16

Appendix F

Mann-Kendall Trend Test Results

Appendix F
Mann-Kendall Analysis - 50WW05 Upper Shallow

Well: 50WW05
Chemical: Trichloroethene
MCL: 5 µg/L

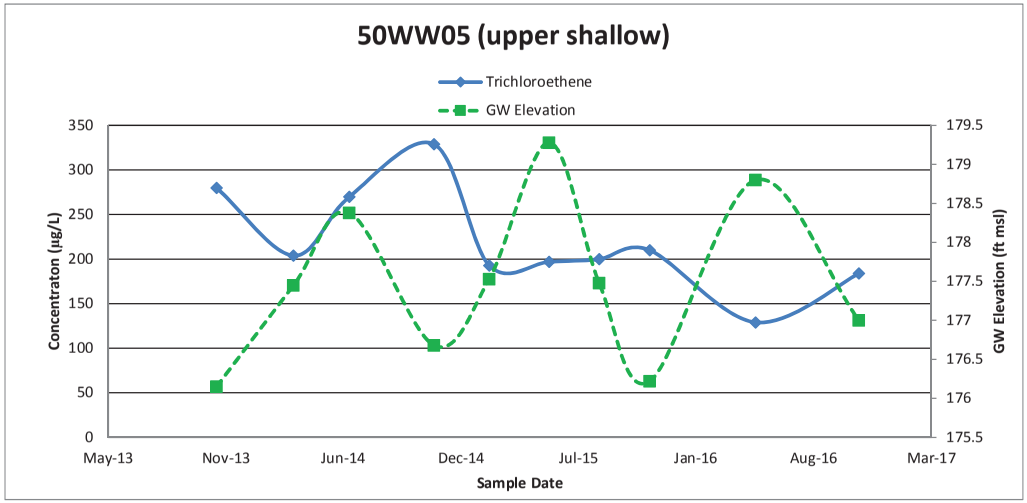
Date	Concentration (µg/L)
11/6/2013	280
3/17/2014	204
6/20/2014	270
11/11/2014	329
2/13/2015	193
5/26/2015	197
8/19/2015	200
11/13/2015	210
5/11/2016	129
11/3/2016	184

Date	11/6/2013	3/17/2014	6/20/2014	11/11/2014	2/13/2015	5/26/2015	8/19/2015	11/13/2015	5/11/2016	11/3/2016		
data	280	204	270	329	193	197	200	210	129	184	Positive	Negative
280	0	-76.00	-10.00	49.00	-87.00	-83.00	-80.00	-70.00	-151.00	-96.00	1	8
204		0.00	66.00	125.00	-11.00	-7.00	-4.00	6.00	-75.00	-20.00	3	5
270			0.00	59.00	-77.00	-73.00	-70.00	-60.00	-141.00	-86.00	1	6
329				0.00	-136.00	-132.00	-129.00	-119.00	-200.00	-145.00	0	6
193					0.00	4.00	7.00	17.00	-64.00	-9.00	3	2
197						0.00	3.00	13.00	-68.00	-13.00	2	2
200							0.00	10.00	-71.00	-16.00	1	2
210								0.00	-81.00	-26.00	0	2
129									0.00	55.00	1	0
184										0.00	0	0
											12	33

count:n	10
Average/mean	219.6
std dev	57.3
Neg - Pos: s (x on table)	21
p (cross of n and s)	0.036
a: defined significance (95 %)	0.05
Significant trend?	Yes

Date	GW Elevation
11/6/2013	176.15
3/17/2014	177.45
6/20/2014	178.38
11/11/2014	176.68
2/13/2015	177.53
5/26/2015	179.28
8/19/2015	177.48
11/13/2015	176.22
5/11/2016	178.8
11/3/2016	177

Appendix F
Mann-Kendall Analysis - 50WW05 Upper Shallow



Appendix F
Mann-Kendall Analysis - 50WW06 Lower Shallow

50WW06
Chemical: TCE
GWPS: 5 µg/L

Date	Concentration (µg/L)
10/28/2013	20.9
3/11/2014	36.5
6/25/2014	27.4
11/4/2014	36.1
2/17/2015	53.9
5/20/2015	49.1
8/18/2015	34.7
11/12/2015	59.4
5/10/2016	29.5
11/1/2016	54.2

count:n	10
Average/mean	40.2
std dev	13.1
Neg - Pos: s (x on table)	17
p (cross of n and s)	0.078
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.33
Stable?	Yes

Date	10/28/2013	3/11/2014	6/25/2014	11/4/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	20.9	36.5	27.4	36.1	53.9	49.1	34.7	59.4	29.5	54.2	Positive	Negative
20.9	0	15.60	6.50	15.20	33.00	28.20	13.80	38.50	8.60	33.30	9	0
36.5		0.00	-9.10	-0.40	17.40	12.60	-1.80	22.90	-7.00	17.70	4	4
27.4			0.00	8.70	26.50	21.70	7.30	32.00	2.10	26.80	7	0
36.1				0.00	17.80	13.00	-1.40	23.30	-6.60	18.10	4	2
53.9					0.00	-4.80	-19.20	5.50	-24.40	0.30	2	3
49.1						0.00	-14.40	10.30	-19.60	5.10	2	2
34.7							0.00	24.70	-5.20	19.50	2	1
59.4								0.00	-29.90	-5.20	0	2
29.5									0.00	24.70	1	0
54.2										0.00	0	0
											31	14

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Appendix F
Mann-Kendall Analysis - 50WW06 Lower Shallow

50WW06
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/28/2013	670
3/11/2014	2,090
6/25/2014	700
11/4/2014	1,510
2/17/2015	2,490
5/20/2015	3,000
8/18/2015	2,050
11/12/2015	5,860
5/10/2016	2,140
11/1/2016	5,240

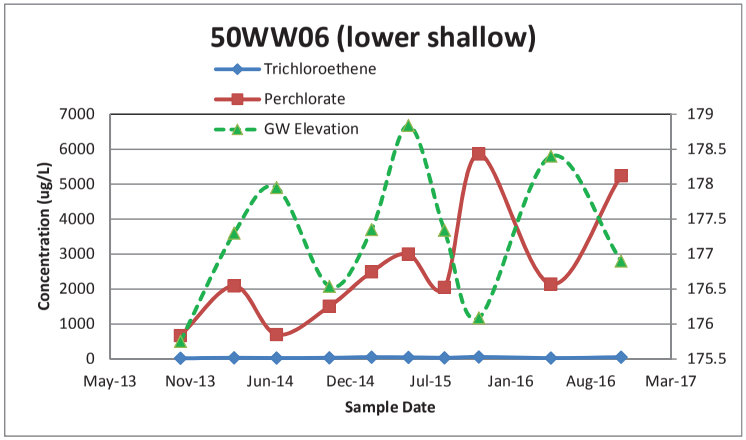
count:n	10
Average/mean	2,575
std dev	1,734
Neg - Pos: s (x on table)	27
p (cross of n and s)	0.008
a: defined significance (95 %)	0.05
Significant trend?	Yes

Date	10/28/2013	3/11/2014	6/25/2014	11/4/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	670	2,090	700	1,510	2,490	3,000	2,050	5,860	2,140	5,240	Positive	Negative
670	0	1,420	30	840	1,820	2,330	1,380	5,190	1,470	4,570	9	0
2,090		0	-1,390	-580	400	910	-40	3,770	50	3,150	5	3
700			0	810	1,790	2,300	1,350	5,160	1,440	4,540	7	0
1,510				0	980	1,490	540	4,350	630	3,730	6	0
2,490					0	510	-440	3,370	-350	2,750	3	2
3,000						0	-950	2,860	-860	2,240	2	2
2,050							0	3,810	90	3,190	3	0
5,860								0	-3,720	-620	0	2
2,140									0	3,100	1	0
5,240										0	0	0
											36	9

An increasing trend at a 95% confidence is observed and the trend is stable around the mean.

Date	GW Elevation
10/28/2013	175.75
3/11/2014	177.3
6/25/2014	177.95
11/4/2014	176.54
2/17/2015	177.35
5/20/2015	178.84
8/18/2015	177.34
11/12/2015	176.09
5/10/2016	178.4
11/1/2016	176.9

Appendix F
Mann-Kendall Analysis - 50WW06 Lower Shallow



Appendix F
Mann-Kendall Analysis - 50WW08 Upper Shallow

50WW08
Chemical: Trichloroethene
MCL: 5 µg/L

Date	Concentration (µg/L)
10/30/2013	247
3/11/2014	845
6/24/2014	814
11/6/2014	685
2/17/2015	852
5/21/2015	712
8/17/2015	375
5/3/2016	383
11/2/2016	379

Date	10/30/2013	3/11/2014	6/24/2014	11/6/2014	2/17/2015	5/21/2015	8/17/2015	5/3/2016	11/2/2016		
data	247	845	814	685	852	712	375	383	379	Positive	Negative
247	0	598.00	567.00	438.00	605.00	465.00	128.00	136.00	132.00	8	0
845		0.00	-31.00	-160.00	7.00	-133.00	-470.00	-462.00	-466.00	1	6
814			0.00	-129.00	38.00	-102.00	-439.00	-431.00	-435.00	1	5
685				0.00	167.00	27.00	-310.00	-302.00	-306.00	2	3
852					0.00	-140.00	-477.00	-469.00	-473.00	0	4
712						0.00	-337.00	-329.00	-333.00	0	3
375							0.00	8.00	4.00	2	0
383								0.00	-4.00	0	1
379									0.00	0	0
										14	22

count:n	9
Average/mean	588.0
std dev	239.5
Neg - Pos: s (x on table)	8
p (cross of n and s)	0.238
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.41
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Appendix F
Mann-Kendall Analysis - 50WW08 Upper Shallow

50WW08
Chemical: Perchlorate
PCL: 17 ug/L

Date	Concentration (µg/L)
10/30/2013	6,404
3/11/2014	91.5
6/24/2014	132
11/6/2014	56.3
2/17/2015	99
5/21/2015	200
8/17/2015	157
5/3/2016	146
11/2/2016	126

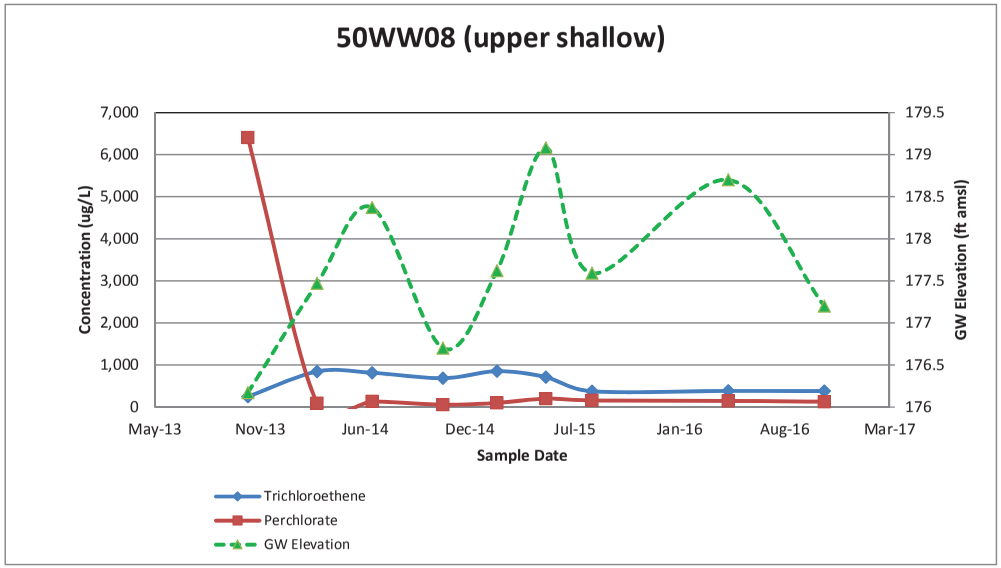
Date	10/30/2013	3/11/2014	6/24/2014	11/6/2014	2/17/2015	5/21/2015	8/17/2015	5/3/2016	11/2/2016		
data	6,404	91.5	132	56.3	99	200	157	146	126	Positive	Negative
6,404	0	-6312.50	-6272.00	-6347.70	-6305.00	-6204.00	-6247.00	-6258.00	-6278.00	0	8
91.5		0.00	40.50	-35.20	7.50	108.50	65.50	54.50	34.50	6	1
132			0.00	-75.70	-33.00	68.00	25.00	14.00	-6.00	3	3
56.3				0.00	42.70	143.70	100.70	89.70	69.70	5	0
99					0.00	101.00	58.00	47.00	27.00	4	0
200						0.00	-43.00	-54.00	-74.00	0	3
157							0.00	-11.00	-31.00	0	2
146								0.00	-20.00	0	1
126									0.00	0	0
										18	18

count:n	9
Average/mean	823.5
std dev	2093.1
Neg - Pos: s (x on table)	0
p (cross of n and s)	0.54
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	2.54
Stable?	No

There is not a trend at a 95% confidence. The concentrations are not stable around the mean.

Date	GW Elevation
10/30/2013	176.17
3/11/2014	177.47
6/24/2014	178.37
11/6/2014	176.7
2/17/2015	177.62
5/21/2015	179.08
8/17/2015	177.59
5/3/2016	178.7
11/2/2016	177.2

Appendix F
Mann-Kendall Analysis - 50WW08 Upper Shallow



Appendix F
Mann-Kendall Analysis - 50WW09 Lower Shallow

50WW09
Chemical: TCE
MCL: 5 µg/L

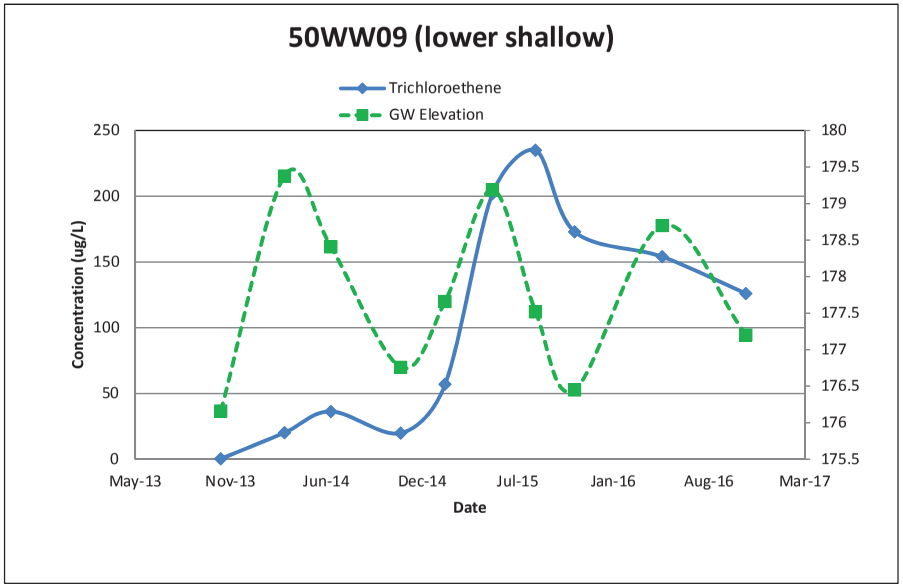
Date	Concentration (µg/L)
11/1/2013	0.26
3/14/2014	20.2
6/19/2014	36.3
11/12/2014	19.8
2/13/2015	57
5/23/2015	202
8/21/2015	235
11/11/2015	173
5/12/2016	154
11/3/2016	126

count:n	10.0
Average/mean	102.4
std dev	85.7
Neg - Pos: s (x on table)	23
p (cross of n and s)	0.023
a: defined significance (95 %)	0.05
Significant trend?	Yes

Date	11/1/2013	3/14/2014	6/19/2014	11/12/2014	2/13/2015	5/23/2015	8/21/2015	11/11/2015	5/12/2016	11/3/2016		
data	0.26	20.2	36.3	19.8	57	202	235	173	154	126	Positive	Negative
0.26	0	19.94	36.04	19.54	56.74	201.74	234.74	172.74	153.74	125.74	9	0
20.2		0.00	16.10	-0.40	36.80	181.80	214.80	152.80	133.80	105.80	7	1
36.3			0.00	-16.50	20.70	165.70	198.70	136.70	117.70	89.70	6	1
19.8				0.00	37.20	182.20	215.20	153.20	134.20	106.20	6	0
57					0.00	145.00	178.00	116.00	97.00	69.00	5	0
202						0.00	33.00	-29.00	-48.00	-76.00	1	3
235							0.00	-62.00	-81.00	-109.00	0	3
173								0.00	-19.00	-47.00	0	2
154									0.00	-28.00	0	1
126										0.00	0	0
											34	11

Date	GW Elevation
11/1/2013	176.16
3/14/2014	179.38
6/19/2014	178.41
11/12/2014	176.76
2/13/2015	177.66
5/23/2015	179.19
8/21/2015	177.52
11/11/2015	176.45
5/12/2016	178.7
11/3/2016	177.2

Appendix F
Mann-Kendall Analysis - 50WW09 Lower Shallow



Appendix F
Mann-Kendall Analysis - 50WW11 Upper Shallow

50WW11
Chemical: Trichloroethene
MCL: 5 µg/L

Date	Concentration (µg/L)
10/28/2013	2,750
3/13/2014	362
6/25/2014	831
11/5/2014	3,550
2/17/2015	512
5/20/2015	230
8/18/2015	1,550
11/12/2015	2,670
5/10/2016	254
11/1/2016	2,800

Date	10/28/2013	3/13/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	2,750	362	831	3,550	512	230	1,550	2,670	254	2,800	Positive	Negative
2,750	0	-2,388	-1,919	800	-2,238	-2,520	-1,200	-80	-2,496	50	2	7
362		0.00	469	3,188	150	-132	1,188	2,308	-108	2,438	6	2
831			0.00	2,719	-319	-601	719	1,839	-577	1,969	4	3
3,550				0.00	-3,038	-3,320	-2,000	-880	-3,296	-750	0	6
512					0.00	-282	1,038	2,158	-258	2,288	3	2
230						0.00	1,320	2,440	24	2,570	4	0
1,550							0.00	1,120	-1,296	1,250	2	1
2,670								0.00	-2,416	130	1	1
254									0.00	2,546	1	0
2,800										0.00	0	0
											23	22

count:n	10
Average/mean	1,551
std dev	1,277
Neg - Pos: s (x on table)	1
p (cross of n and s)	0.5
a: defined significance (95 %)	0.05
Signifcant trend?	No
coefficient of variaton	0.82
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean

50WW11
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/28/2013	21,700
3/13/2014	2,570
6/25/2014	8,910
11/5/2014	22,300
2/17/2015	2,690
5/20/2015	1,140
8/18/2015	14,600
11/12/2015	22,800
5/10/2016	1,300
11/1/2016	13,400

Date	10/28/2013	3/13/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	21,700	2,570	8,910	22,300	2,690	1,140	14,600	22,800	1,300	13,400	Positive	Negative
21,700	0	-19,130	-12,790	600	-19,010	-20,560	-7,100	1,100	-20,400	-8,300	2	7
2,570		0	6,340	19,730	120	-1,430	12,030	20,230	-1,270	10,830	6	2
8,910			0	13,390	-6,220	-7,770	5,690	13,890	-7,610	4,490	4	3
22,300				0	-19,610	-21,160	-7,700	500	-21,000	-8,900	1	5
2,690					0	-1,550	11,910	20,110	-1,390	10,710	3	2
1,140						0	13,460	21,660	160	12,260	4	0
14,600							0	8,200	-13,300	-1,200	1	2
22,800								0	-21,500	-9,400	0	2
1,300									0	12,100	1	0
13,400										0	0	0
											22	23

count:n	10
Average/mean	11,141
std dev	9,042
Neg - Pos: s (x on table)	1
p (cross of n and s)	0.5
a: defined significance (95 %)	0.05
Signifcant trend?	No
coefficient of variaton	0.81
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean

Appendix F
Mann-Kendall Analysis - 50WW11 Upper Shallow

50WW11
Chemical: cis-1,2-DCE
MCL: 70 µg/L

Date	Concentration (µg/L)
10/28/2013	43.9
3/13/2014	4.46
6/25/2014	12.6
11/5/2014	70.8
2/17/2015	6.86
5/20/2015	2.4
8/18/2015	36.3
11/12/2015	54.1
5/10/2016	5.35
11/1/2016	67.4

Date	10/28/2013	3/13/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	43.9	4.5	12.6	70.8	6.9	2.4	36.3	54.1	5.4	67.4	Positive	Negative
43.9	0	-39	-31	27	-37	-42	-8	10	-39	24	3	6
4.5		0	8	66	2	-2	32	50	1	63	7	1
12.6			0	58	-6	-10	24	42	-7	55	4	3
70.8				0	-64	-68	-35	-17	-65	-3	0	6
6.9					0	-4	29	47	-2	61	3	2
2.4						0	34	52	3	65	4	0
36.3							0	18	-31	31	2	1
54.1								0	-49	13	1	1
5.4									0	62	1	0
67.4										0	0	0
											25	20

count:n	10
Average/mean	30.4
std dev	27.4
Neg - Pos: s (x on table)	5
p (cross of n and s)	0.364
a: defined significance (95 %)	0.05
Signifcant trend?	No
coefficient of variaton	0.90
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean

50WW11
Chemical: 1,1-DCE
MCL: 7 µg/L

Date	Concentration (µg/L)
10/28/2013	17.4
3/13/2014	1.88
6/25/2014	7.35
11/5/2014	27.9
2/17/2015	2.47
5/20/2015	1.03
8/18/2015	13.1
11/12/2015	17.5
5/10/2016	1.5
11/1/2016	21.4

Date	10/28/2013	3/13/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	17.4	1.9	7.4	27.9	2.5	1.0	13.1	17.5	1.5	21.4	Positive	Negative
17.4	0	-16	-10	11	-15	-16	-4	0	-16	4	3	6
1.9		0	5	26	1	-1	11	16	0	20	6	2
7.4			0	21	-5	-6	6	10	-6	14	4	3
27.9				0	-25	-27	-15	-10	-26	-7	0	6
2.5					0	-1	11	15	-1	19	3	2
1.0						0	12	16	0	20	4	0
13.1							0	4	-12	8	2	1
17.5								0	-16	4	1	1
1.5									0	20	1	0
21.4										0	0	0
											24	21

count:n	10
Average/mean	11.2
std dev	9.7
Neg - Pos: s (x on table)	3
p (cross of n and s)	0.431
a: defined significance (95 %)	0.05
Signifcant trend?	No
coefficient of variaton	0.87
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean

Appendix F
Mann-Kendall Analysis - 50WW11 Upper Shallow

50WW11
Chemical: 1,2-DCA
MCL: 5 µg/L

Date	Concentration (µg/L)
10/28/2013	15.2
3/13/2014	2.28
6/25/2014	6.01
11/5/2014	24.3
2/17/2015	2.42
5/20/2015	1.2
8/18/2015	16.7
11/12/2015	22.9
5/10/2016	1.84
11/1/2016	26.1

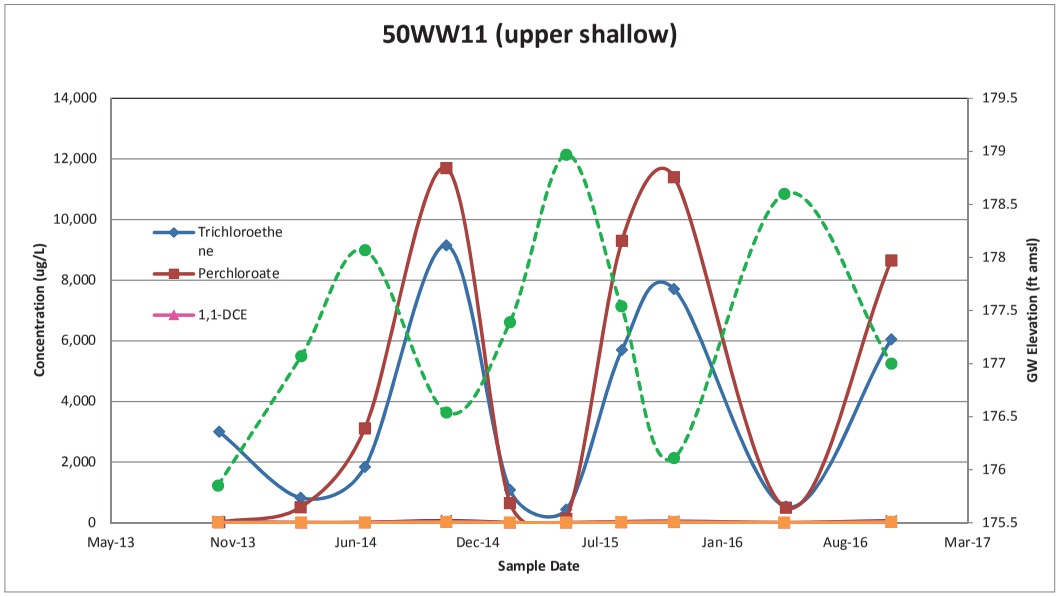
count:n	10
Average/mean	11.9
std dev	10.2
Neg - Pos: s (x on table)	7
p (cross of n and s)	0.300
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.86
Stable?	Yes

Date	10/28/2013	3/13/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	15.2	2.3	6.0	24.3	2.4	1.2	16.7	22.9	1.8	26.1	Positive	Negative
15.2	0	-13	-9	9	-13	-14	2	8	-13	11	4	5
2.3		0	4	22	0	-1	14	21	0	24	6	2
6.0			0	18	-4	-5	11	17	-4	20	4	3
24.3				0	-22	-23	-8	-1	-22	2	1	5
2.4					0	-1	14	20	-1	24	3	2
1.2						0	16	22	1	25	4	0
16.7							0	6	-15	9	2	1
22.9								0	-21	3	1	1
1.8									0	24	1	0
26.1										0	0	0
											26	19

There is not a trend at a 95% confidence, however the concentrations are stable around the mean

Date	GW Elevation
10/28/2013	175.85
3/13/2014	177.07
6/25/2014	178.07
11/5/2014	176.54
2/17/2015	177.39
5/20/2015	178.97
8/18/2015	177.54
11/12/2015	176.11
5/10/2016	178.6
11/1/2016	177

Appendix F
Mann-Kendall Analysis - 50WW11 Upper Shallow



Appendix F
Mann-Kendall Analysis - 50WW12 Upper Shallow

50WW12
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L)
10/23/2013	0.25
3/11/2014	0.257
6/26/2014	0.411
11/4/2014	0.25
2/18/2015	0.25
5/20/2015	33.9
8/18/2015	5.59
11/12/2015	18
5/10/2016	417
11/1/2016	109

count:n	10
Average/mean	58.5
std dev	130.4
Neg - Pos: s (x on table)	28
p (cross of n and s)	0.006
a: defined significance (95 %)	0.05
Significant trend?	Yes

Date	10/23/2013	3/11/2014	6/26/2014	11/4/2014	2/18/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	0.25	0.257	0.411	0.25	0.25	33.9	5.59	17.6	417	109	Positive	Negative
0.25	0	0.01	0.16	0.00	0.00	33.65	5.34	17.35	416.75	108.75	7	0
0.257		0.00	0.15	-0.01	-0.01	33.64	5.33	17.34	416.74	108.74	6	2
0.411			0.00	-0.16	-0.16	33.49	5.18	17.19	416.59	108.59	5	2
0.25				0.00	0.00	33.65	5.34	17.35	416.75	108.75	5	0
0.25					0.00	33.65	5.34	17.35	416.75	108.75	5	0
33.9						0.00	-28.31	-16.30	383.10	75.10	2	2
5.59							0.00	12.01	411.41	103.41	3	0
17.6								0.00	399.40	91.40	2	0
417									0.00	-308.00	0	1
109										0.00	0	0
											35	7

An increasing trend at a 95% confidence in observed concentrations. The trend is not stable around the mean.
Non detect uses 1/2 the detection limit per the AECOM document

Appendix F
Mann-Kendall Analysis - 50WW12 Upper Shallow

50WW12
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/23/2013	23,600
3/11/2014	35,700
6/26/2014	35,500
11/4/2014	14,300
2/18/2015	30,600
5/20/2015	59,200
8/18/2015	17,300
11/12/2015	37,900
5/10/2016	87,800
11/1/2016	25,300

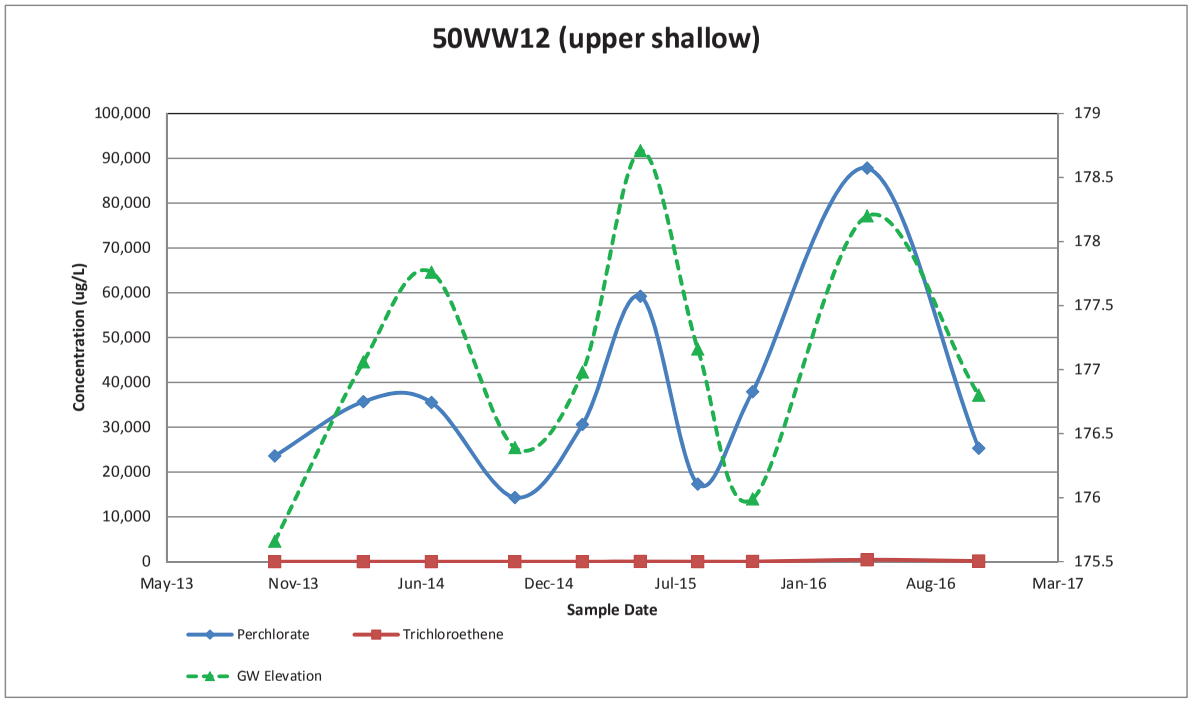
count:n	10
Average/mean	36,720
std dev	21,955
Neg - Pos: s (x on table)	9
p (cross of n and s)	0.242
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.60
Stable?	Yes

Date	10/23/2013	3/11/2014	6/26/2014	11/4/2014	2/18/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	23,600	35,700	35,500	14,300	30,600	59,200	17,300	37,900	87,800	25,300	Positive	Negative
23,600	0	12,100	11,900	-9,300	7,000	35,600	-6,300	14,300	64,200	1,700	7	2
35,700		0	-200	-21,400	-5,100	23,500	-18,400	2,200	52,100	-10,400	3	5
35,500			0	-21,200	-4,900	23,700	-18,200	2,400	52,300	-10,200	3	4
14,300				0	16,300	44,900	3,000	23,600	73,500	11,000	6	0
30,600					0	28,600	-13,300	7,300	57,200	-5,300	3	2
59,200						0	-41,900	-21,300	28,600	-33,900	1	3
17,300							0	20,600	70,500	8,000	3	0
37,900								0	49,900	-12,600	1	1
87,800									0	-62,500	0	1
25,300										0	0	0
											27	18

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Date	GW Elevation
10/23/2013	175.66
3/11/2014	177.06
6/26/2014	177.76
11/4/2014	176.39
2/18/2015	176.98
5/20/2015	178.71
8/18/2015	177.16
11/12/2015	175.99
5/10/2016	178.2
11/1/2016	176.8

Appendix F
Mann-Kendall Analysis - 50WW12 Upper Shallow



Appendix F
Mann-Kendall Analysis - 50WW13 Upper Shallow

50WW13
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L)
10/30/2013	3,000
3/12/2014	823
6/25/2014	1,840
11/5/2014	9,150
2/17/2015	1,080
5/20/2015	433
8/19/2015	5,700
11/12/2015	7,710
5/13/2016	529
11/1/2016	6,050

Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016		
data	3,000	823	1,840	9,150	1,080	433	5,700	7,710	322	6,050	Positive	Negative
3000	0	-2,177	-1,160	6,150	-1,920	-2,567	2,700	4,710	-2,678	3,050	4	5
823		0	1,017	8,327	257	-390	4,877	6,887	-501	5,227	6	2
1840			0	7,310	-760	-1,407	3,860	5,870	-1,518	4,210	4	3
9150				0	-8,070	-8,717	-3,450	-1,440	-8,828	-3,100	0	6
1080					0	-647	4,620	6,630	-758	4,970	3	2
433						0	5,267	7,277	-111	5,617	3	1
5700							0	2,010	-5,378	350	2	1
7710								0	-7,388	-1,660	0	2
529									-207	5,521	1	1
6050										0	0	0
											23	23

count:n	10
Average/mean	3,632
std dev	3,250
Neg - Pos: s (x on table)	0
p (cross of n and s)	0.5
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.90
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

50WW13
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/30/2013	14.7
3/12/2014	510
6/25/2014	3,110
11/5/2014	11,700
2/17/2015	648
5/20/2015	126
8/19/2015	9,300
11/12/2015	11,400
5/13/2016	493
11/1/2016	8,650

Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016		
data	15	510	3,110	11,700	648	126	9,300	11,400	493	8,650	Positive	Negative
15	0	495	3,095	11,685	633	111	9,285	11,385	478	8,635	9	0
510		0	2,600	11,190	138	-384	8,790	10,890	-17	8,140	6	2
3,110			0	8,590	-2,462	-2,984	6,190	8,290	-2,617	5,540	4	3
11,700				0	-11,052	-11,574	-2,400	-300	-11,207	-3,050	0	6
648					0	-522	8,652	10,752	-155	8,002	3	2
126						0	9,174	11,274	367	8,524	4	0
9,300							0	2,100	-8,807	-650	1	2
11,400								0	-10,907	-2,750	0	2
493									0	8,157	1	0
8,650										0	0	0
											28	17

count:n	10
Average/mean	4,595
std dev	5,029
Neg - Pos: s (x on table)	11
p (cross of n and s)	0.242
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	1.09
Stable?	No

There is not a trend at a 95% confidence. The concentrations are not stable around the mean.

Appendix F

Mann-Kendall Analysis - 50WW13 Upper Shallow

50WW13
Chemical: 1,2-DCA
MCL: 5 µg/L

Date	Concentration (µg/L)
10/30/2013	42
3/12/2014	4.45
6/25/2014	10.6
11/5/2014	42.4
2/17/2015	4.99
5/20/2015	1.78
8/19/2015	31.5
11/12/2015	43.4
5/13/2016	4.31
11/1/2016	36.7

Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016		
data	42.0	4.5	10.6	42.4	5.0	1.8	31.5	43.4	4.3	36.7	Positive	Negative
42.0	0	-38	-31	0	-37	-40	-11	1	-38	-5	2	7
4.5		0	6	38	1	-3	27	39	0	32	6	2
10.6			0	32	-6	-9	21	33	-6	26	4	3
42.4				0	-37	-41	-11	1	-38	-6	1	5
5.0					0	-3	27	38	-1	32	3	2
1.8						0	30	42	3	35	4	0
31.5							0	12	-27	5	2	1
43.4								0	-39	-7	0	2
4.3									0	32	1	0
36.7										0	0	0
											23	22

count:n	10
Average/mean	22.2
std dev	18.3
Neg - Pos: s (x on table)	1
p (cross of n and s)	0.5
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.83
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

50WW13
Chemical: cis-1,2-DCE
MCL: 70 µg/L

Date	Concentration (µg/L)
10/30/2013	205
3/12/2014	25
6/25/2014	56.3
11/5/2014	239
2/17/2015	32.1
5/20/2015	10.7
8/19/2015	184
11/12/2015	231
5/13/2016	25
11/1/2016	228

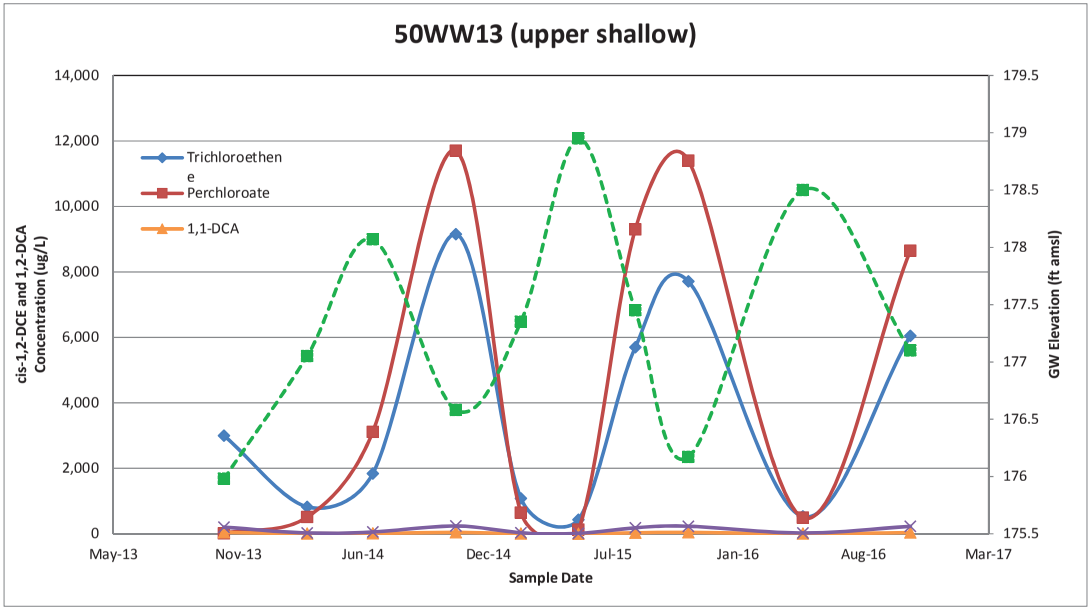
Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016		
data	205.0	25.0	56.3	239.0	32.1	10.7	184.0	231.0	25.0	228.0	Positive	Negative
205.0	0	-180	-149	34	-173	-194	-21	26	-180	23	3	6
25.0		0	31	214	7	-14	159	206	0	203	6	1
56.3			0	183	-24	-46	128	175	-31	172	4	3
239.0				0	-207	-228	-55	-8	-214	-11	0	6
32.1					0	-21	152	199	-7	196	3	2
10.7						0	173	220	14	217	4	0
184.0							0	47	-159	44	2	1
231.0								0	-206	-3	0	2
25.0									0	203	1	0
228.0										0	0	0
											23	21

count:n	10
Average/mean	124
std dev	101
Neg - Pos: s (x on table)	2
p (cross of n and s)	0.5
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.81
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Appendix F
Mann-Kendall Analysis - 50WW13 Upper Shallow

Date	GW Elevation
10/30/2013	175.98
3/12/2014	177.05
6/25/2014	178.07
11/5/2014	176.58
2/17/2015	177.35
5/20/2015	178.95
8/19/2015	177.45
11/12/2015	176.17
5/13/2016	178.5
11/1/2016	177.1



Appendix F
Mann-Kendall Analysis - 50WW14 Lower Shallow

50WW14
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L)
10/28/2013	93.8
3/12/2014	37.4
6/25/2014	21.9
11/5/2014	26.7
2/17/2015	9.14
5/20/2015	6.05
8/19/2015	12
11/12/2015	5.78
5/3/2016	1.75
11/12/2016	10.9

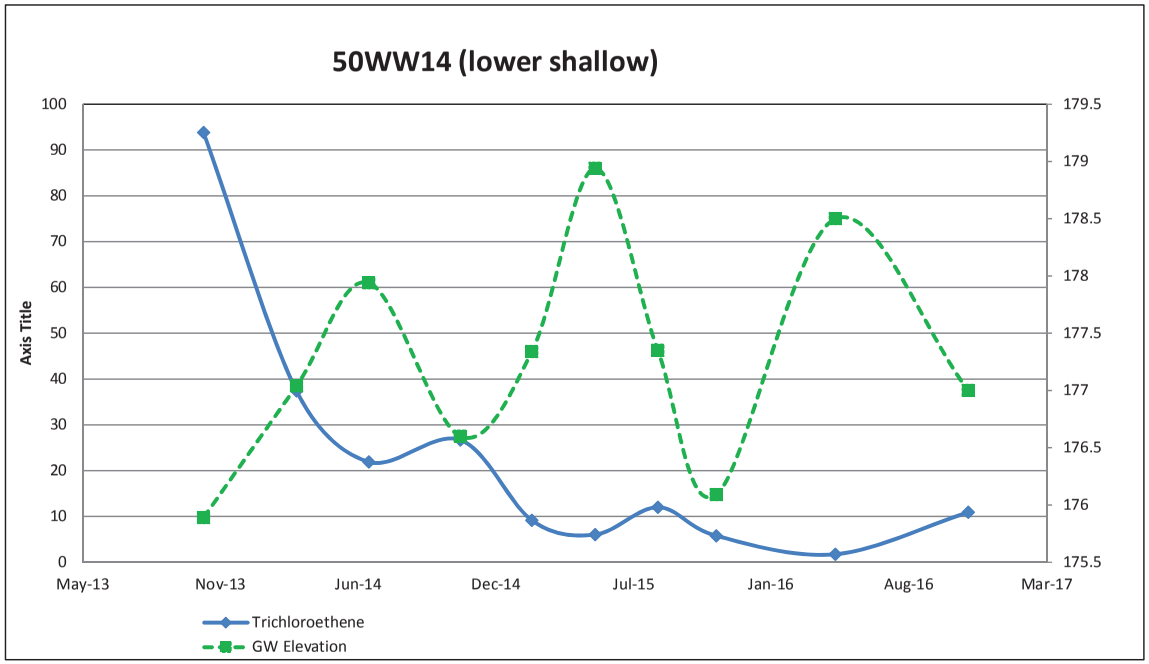
count:n	10
Average/mean	22.5
std dev	27.3
Neg - Pos: s (x on table)	31
p (cross of n and s)	0.002
a: defined significance (95 %)	0.05
Significant trend?	Yes

Date	10/28/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/3/2016	11/12/2016		
data	93.8	37.4	21.9	26.7	9.14	6.05	12	5.78	1.75	10.9	Positive	Negative
93.8	0	-56.40	-71.90	-67.10	-84.66	-87.75	-81.80	-88.02	-92.05	-82.90	0	9
37.4		0.00	-15.50	-10.70	-28.26	-31.35	-25.40	-31.62	-35.65	-26.50	0	8
21.9			0.00	4.80	-12.76	-15.85	-9.90	-16.12	-20.15	-11.00	1	6
26.7				0.00	-17.56	-20.65	-14.70	-20.92	-24.95	-15.80	0	6
9.14					0.00	-3.09	2.86	-3.36	-7.39	1.76	2	3
6.05						0.00	5.95	-0.27	-4.30	4.85	2	2
12							0.00	-6.22	-10.25	-1.10	0	3
5.78								0.00	-4.03	5.12	1	1
1.75									0.00	9.15	1	0
10.9										0.00	0	0
											7	38

A decreasing trend at a 95% confidence in observed concentrations, but the trend is not stable around the mean.

Date	GW Elevation
10/28/2013	175.89
3/12/2014	177.04
6/25/2014	177.94
11/5/2014	176.6
2/17/2015	177.34
5/20/2015	178.94
8/19/2015	177.35
11/12/2015	176.09
5/3/2016	178.5
11/12/2016	177

Appendix F
Mann-Kendall Analysis - 50WW14 Lower Shallow



Appendix F
Mann-Kendall Analysis - 50WW15 Upper Shallow

50WW15
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L
10/25/2013	17.3
3/17/2014	23.5
6/19/2014	18.9
11/7/2014	35.4
2/12/2015	48.3
5/23/2015	13
8/20/2015	15.2
11/11/2015	8.2
5/12/2016	5.32
11/2/2016	9.52

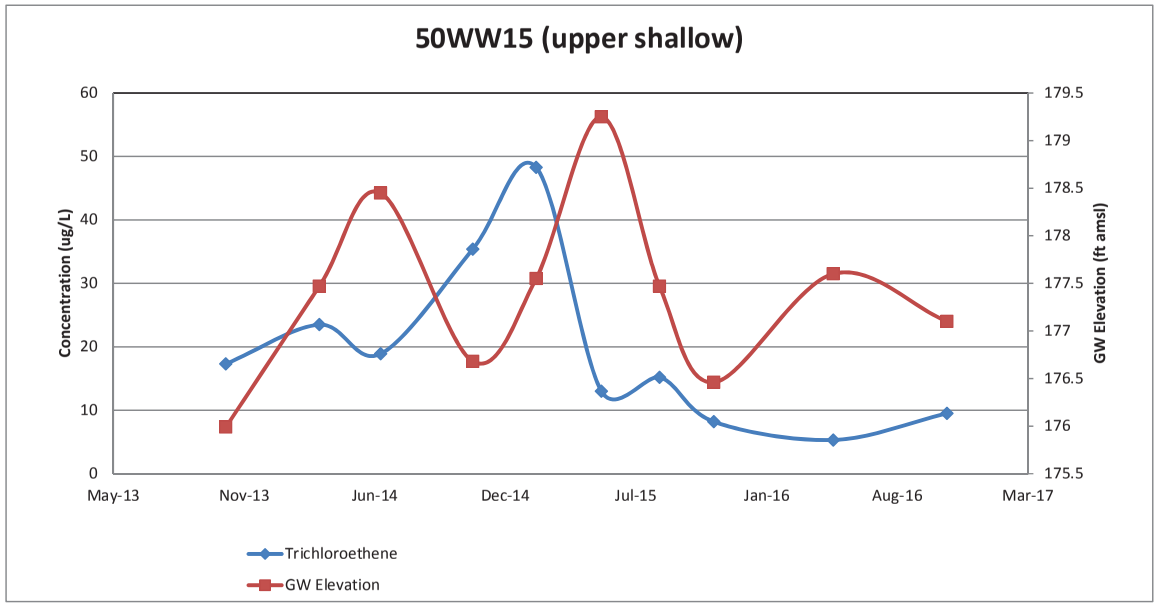
Date	10/25/2013	3/17/2014	6/19/2014	11/7/2014	2/12/2015	5/23/2015	8/20/2015	11/11/2015	5/12/2016	11/2/2016		
data	17.3	23.5	18.9	35.4	48.3	13	15.2	8.2	5.32	9.52	Positive	Negative
17.3	0	6.20	1.60	18.10	31.00	-4.30	-2.10	-9.10	-11.98	-7.78	4	5
23.5		0.00	-4.60	11.90	24.80	-10.50	-8.30	-15.30	-18.18	-13.98	2	6
18.9			0.00	16.50	29.40	-5.90	-3.70	-10.70	-13.58	-9.38	2	5
35.4				0.00	12.90	-22.40	-20.20	-27.20	-30.08	-25.88	1	5
48.3					0.00	-35.30	-33.10	-40.10	-42.98	-38.78	0	5
13						0.00	2.20	-4.80	-7.68	-3.48	1	3
15.2							0.00	-7.00	-9.88	-5.68	0	3
8.2								0.00	-2.88	1.32	1	1
5.32									0.00	4.20	1	0
9.52										0.00	0	0
											12	33

count:n	10
Average/mean	19.5
std dev	13.3
Neg - Pos: s (x on table)	21
p (cross of n and s)	0.036
a: defined significance (95 %)	0.05
Significant trend?	Yes

A decreasing trend at a 95% confidence is observed and the trend is stable around the mean.

Date	GW Elevation
10/25/2013	175.99
3/17/2014	177.47
6/19/2014	178.45
11/7/2014	176.68
2/12/2015	177.55
5/23/2015	179.25
8/20/2015	177.47
11/11/2015	176.46
5/12/2016	177.6
11/2/2016	177.1

Appendix F
Mann-Kendall Analysis - 50WW15 Upper Shallow



Appendix F
Mann-Kendall Analysis - 50WW24 Upper Shallow

50WW24
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/29/2013	0.479
3/26/2014	0.1 U
6/26/2014	110
11/4/2014	0.1 U
2/18/2015	0.1 U
5/28/2015	0.1 U
8/17/2015	0.1 U
11/16/2015	0.5 U
5/10/2016	36.8
11/3/2016	0.1

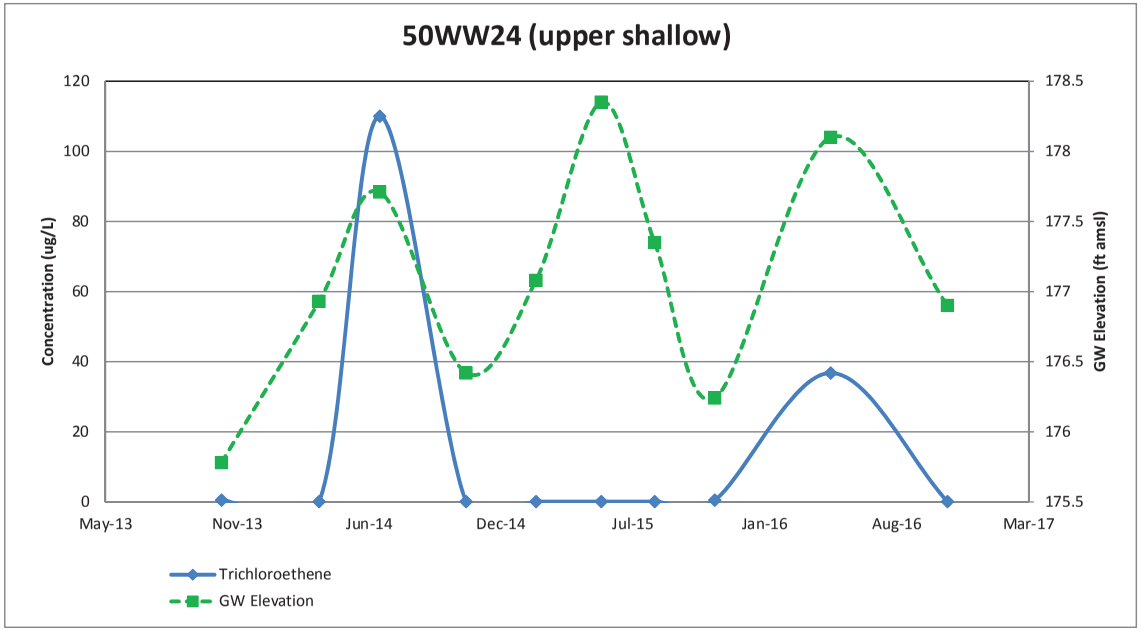
Date	10/29/2013	3/26/2014	6/26/2014	11/4/2014	2/18/2015	5/28/2015	8/17/2015	11/16/2015	5/10/2016	11/3/2016		
data	0.479	0.1	110	0.1	0.1	0.1	0.1	0.5	36.8	0.1	Positive	Negative
0.479	0	-0.38	109.52	-0.38	-0.38	-0.38	-0.38	0.02	36.32	-0.38	3	6
0.1		0.00	109.90	0.00	0.00	0.00	0.00	0.40	36.70	0.00	3	0
110			0.00	-109.90	-109.90	-109.90	-109.90	-109.50	-73.20	-109.90	0	7
0.1				0.00	0.00	0.00	0.00	0.40	36.70	0.00	2	0
0.1					0.00	0.00	0.00	0.40	36.70	0.00	2	0
0.1						0.00	0.00	0.40	36.70	0.00	2	0
0.1							0.00	0.40	36.70	0.00	2	0
0.5								0.00	36.30	-0.40	1	1
36.8									0.00	-36.70	0	1
0.1										0.00	0	0
											15	15

count:n	10
Average/mean	14.8
std dev	35.4
Neg - Pos: s (x on table)	0
p (cross of n and s)	0.535
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	2.38
Stable?	No

There is not a trend at a 95% confidence. The concentrations are not stable around the mean.
Non detect uses 1/2 the detection limit per the AECOM document

Date	GW Elevation
10/29/2013	175.78
3/26/2014	176.93
6/26/2014	177.71
11/4/2014	176.42
2/18/2015	177.08
5/28/2015	178.35
8/17/2015	177.35
11/16/2015	176.24
5/10/2016	178.1
11/3/2016	176.9

Appendix F
Mann-Kendall Analysis - 50WW24 Upper Shallow

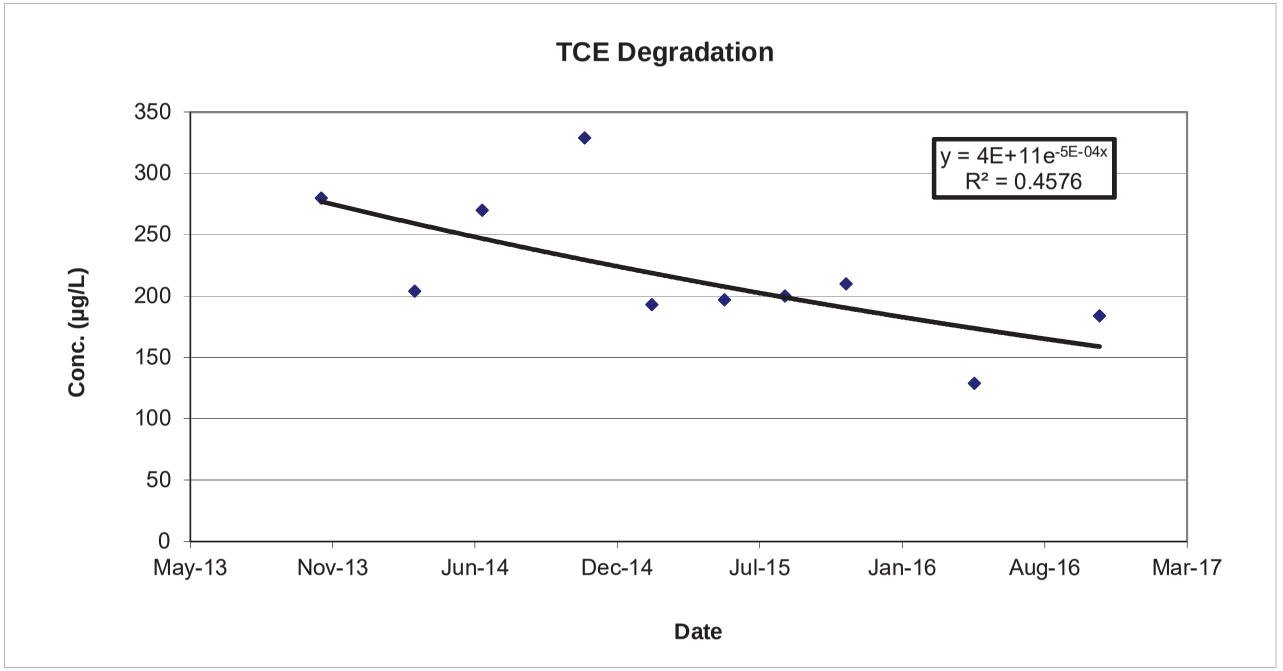


Appendix G

Regression Analysis

Appendix G, Figure G-1
Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
50WW005

Sampling Date	TCE in 50WW05 (µg/L)
11/6/2013	280
3/17/2014	204
6/20/2014	270
11/11/2014	329
2/13/2015	193
5/26/2015	197
8/19/2015	200
11/13/2015	210
5/11/2016	129
11/3/2016	184



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
50WW015	0.00004	0.0146	17328.7	47.5	184	5	247.0

Notes:

1) The estimated cleanup time was calculated as the time it would take the most recent detected TCE concentration to reach the MCL using the site-specific attenuation rate, and assuming first order degradation kinetics.

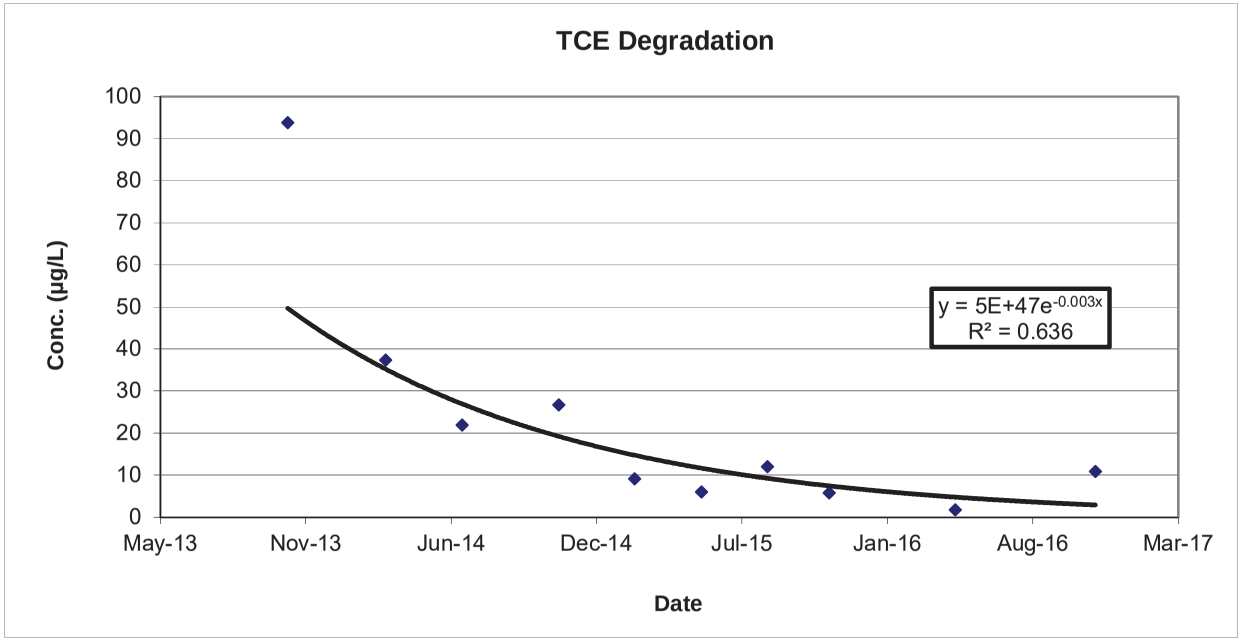
µg/L - micrograms per liter

MCL - maximum contaminant level

TCE - trichloroethene

Appendix G, Figure G-2
Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
50WW014

Sampling Date	TCE in 50WW14 (µg/L)
10/28/2013	93.8
3/12/2014	37.4
6/25/2014	21.9
11/5/2014	26.7
2/17/2015	9.14
5/20/2015	6.05
8/19/2015	12
11/12/2015	5.78
5/3/2016	1.75
11/12/2016	10.9



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
50WW014	0.0030	1.0950	231.0	0.6	10.9	5	0.7

Notes:

1) The estimated cleanup time was calculated as the time it would take the most recent detected TCE concentration to reach the MCL using the site-specific attenuation rate, and assuming first order degradation kinetics.

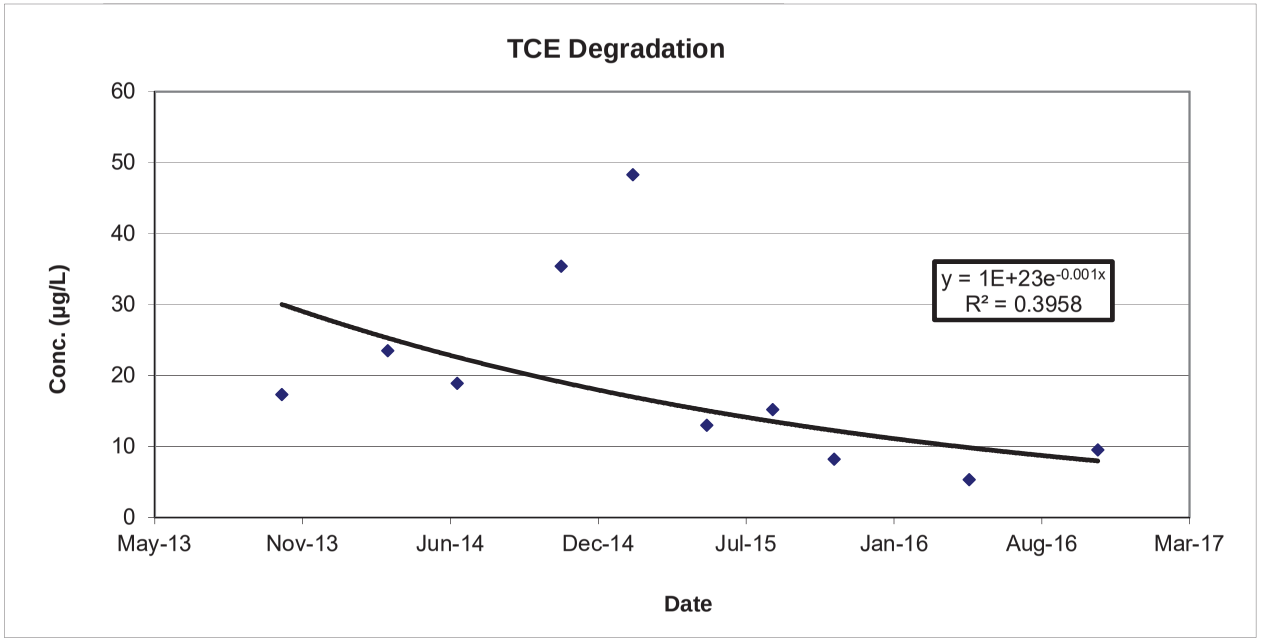
µg/L - micrograms per liter

MCL - maximum contaminant level

TCE - trichloroethene

Appendix G, Figure G-3
Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
50WW015

Sampling Date	TCE in 50WW15 (µg/L)
10/25/2013	17.3
3/17/2014	23.5
6/19/2014	18.9
11/7/2014	35.4
2/12/2015	48.3
5/23/2015	13
8/20/2015	15.2
11/11/2015	8.2
5/12/2016	5.32
11/2/2016	9.52



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
50WW015	0.0010	0.3650	693.1	1.9	9.52	5	1.8

Notes:

1) The estimated cleanup time was calculated as the time it would take the most recent detected TCE concentration to reach the MCL using the site-specific attenuation rate, and assuming first order degradation kinetics.

µg/L - micrograms per liter

MCL - maximum contaminant level

TCE - trichloroethene

Microbac



Laboratory Report Number: L16021328

Kayla Teague
AECOM Technical Services, Inc.
16000 Dallas Parkway
Dallas, TX 75248

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Stephanie Mossburg – Team Chemist/Data Specialist
(740) 373-4071
Stephanie.Mossburg@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on March 07 2016

David Vandenberg – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
0010170	I	1.0		J2317165965	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	NA
12	Were VOA samples free of headspace (less than 6mm)?	NA

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Samples Received

Client ID	Laboratory ID	Date Collected	Date Received
HBW 7- 022516	L16021328-01	02/25/2016 12:40	02/26/2016 09:41
HBW 10- 022516	L16021328-02	02/25/2016 12:50	02/26/2016 09:41
HBW 1- 022516	L16021328-03	02/25/2016 13:05	02/26/2016 09:41
GPW 3- 022516	L16021328-04	02/25/2016 13:20	02/26/2016 09:41
GPW 1- 022516	L16021328-05	02/25/2016 13:40	02/26/2016 09:41

Microbac REPORT L16021328
PREPARED FOR AECOM Technical Services, Inc.
WORK ID:

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1.0 Summary Data

1.1 Narratives

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16021328
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG559292	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-03-07 00:00:00		

Laboratory Data Package Cover Page

X	R1	Field chain-of-custody documentation;
X	R2	Sample identification cross-reference;
X	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
X	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
X	R5	Test reports/summary forms for blank samples;
X	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
X	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
X	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
X	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
X	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2016-03-07 13:45:06

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16021328
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG559292	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-03-07 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16021328
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG559292	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-03-07 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16021328
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG559292	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-03-07 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16021328
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG559292	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-03-07 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16021328
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG559292	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-03-07 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

1.2 Certificate of Analysis

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 05:45
Collect Date:	02/25/2016 12:40	**Dilution:**	1	**File ID:**	1LM.LM33634
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 10- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:00
Collect Date:	02/25/2016 12:50	**Dilution:**	1	**File ID:**	1LM.LM33638
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 1- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:19
Collect Date:	02/25/2016 13:05	**Dilution:**	1	**File ID:**	1LM.LM33639
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-04	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 3- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:38
Collect Date:	02/25/2016 13:20	**Dilution:**	1	**File ID:**	1LM.LM33640
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.474		0.400	0.200	0.100

Certificate of Analysis

Sample #:	L16021328-05	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 1- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:57
Collect Date:	02/25/2016 13:40	**Dilution:**	1	**File ID:**	1LM.LM33641
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.447		0.400	0.200	0.100

2.0 Full Sample Data Package

2.1 General Chromatography Data

2.1.1 6850 LC/MS Data

2.1.1.1 Summary Data

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 05:45
Collect Date:	02/25/2016 12:40	**Dilution:**	1	**File ID:**	1LM.LM33634
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 10- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:00
Collect Date:	02/25/2016 12:50	**Dilution:**	1	**File ID:**	1LM.LM33638
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 1- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:19
Collect Date:	02/25/2016 13:05	**Dilution:**	1	**File ID:**	1LM.LM33639
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16021328
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16021328-04	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 3- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:38
Collect Date:	02/25/2016 13:20	**Dilution:**	1	**File ID:**	1LM.LM33640
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.474		0.400	0.200	0.100

Certificate of Analysis

Sample #:	L16021328-05	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 1- 022516	**Prep Method:**	6850	**Prep Date:**	03/02/2016 08:34
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/02/2016 10:46
Workgroup #:	WG559292	**Analyst:**	WTD	**Run Date:**	03/03/2016 07:57
Collect Date:	02/25/2016 13:40	**Dilution:**	1	**File ID:**	1LM.LM33641
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.447		0.400	0.200	0.100

2.1.1.2 QC Summary Data

Example Calculation 6850 - Perchlorate

Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, y = mx + b

y = response ratio = response of analyte / response of internal standard (IS) = Rx/Ristd

x = amount ratio = concentration analyte/concentration internal standard (IS) = Cx / Cistd

m = slope from curve (1.45)

b = intercept from curve (-0.00242)

y = 1.45x + -0.00242

Step 2: Substitute the value for y

where y = 12600/226000 = 0.055752

Step 3: Solve for x

x = (y - b)/m = 0.0040119

Step 4: Solve for analyte concentration Cx

Cx = (Cis)(x) = (5 ug/L)(0.040119) = 0.200594 ug/L

Example Calculation - Water:

Slope from curve, m:	1.45
Intercept from curve, b:	-0.00242
Response of analyte, Rx:	12600
Response of Internal Standard , Ristd:	226000
Concentration of IS, Cistd (ug/L):	5.00
Response Ratio:	0.05575
Amount Ratio:	0.04012
Analyte Concentration, Cx (ug/L) :	0.200594

Example Calculation - Soil:

Analyte Concentration, Cx (ug/L):	0.20059
Amount of soil extracted (g):	5.00
Final volume of extract (mL):	50.00
Percent solids (Pct wt.)	100
Concentration in soil (ug/kg):	2.005938

Perchlorate Conductivity Check
(perchlorate1)

Conductivity Probe Calibration Check: 1400 /1410 µs/cm

Working MCT Level: 10,000 µs/cm

Sample	Conductivity (µs/cm)	Pretreatment or Dilution Needed
WG559292-01 MCT	9840	
-02 WLK	1.1	
-03 LCS	1.1	
L16021255-01 Rol	1151	
-02 MS	707	
-03 MSD	697	
~~12[illegible]~~		
~~-03~~		
-04	699	
-05	1137	
-06	173	
-07	239	
-08	40.6	
-09	226	
-10	402	
-11	2370	
-12	3580	
-13	3600	
-14	3560	
L16021328-01	75.2	
-02	74.3	
-03	75.5	
-04	57.3	
-05	58.5	
L16030008-01	2900	

Analyst: Anthony Carter

Date/Time: 3/2/16 / 12:00 pm

DCN#116977

Microbac Laboratories Inc.

Instrument Run Log

Instrument: LCMS1 Dataset: 030216_WTD.TXT
Analyst1: WTD Analyst2: ADC
Method: 6850 SOP: HPLC06 Rev: 7

Maintenance Log ID: Syringe Filter Lot#: 150506254
Eluent ID#:

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
WG559015, WG559292
Internal STD: COA18071 Surrogate STD: NA Calibration STD STD72683 (02/17/2016)
CCV STD: STD72683 LCS STD: STD72685 MS/MSD STD: STD72685

Comments: L16021262s and L16021255s diluted based on historical data.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM33567	WG559340-01 CCB	1	1		03/02/16 08:34
2	1LM.LM33568	WG559340-02 STD (0.1 ug/L)	1	1	STD72683	03/02/16 08:53
3	1LM.LM33569	WG559340-03 STD (0.2 ug/L)	1	1	STD72683	03/02/16 09:12
4	1LM.LM33570	WG559340-04 STD (0.5 ug/L)	1	1	STD72683	03/02/16 09:31
5	1LM.LM33571	WG559340-05 STD (1.0 ug/L)	1	1	STD72683	03/02/16 09:50
6	1LM.LM33572	WG559340-06 STD (2.0 ug/L)	1	1	STD72683	03/02/16 10:09
7	1LM.LM33573	WG559340-07 STD (5.0 ug/L)	1	1	STD72683	03/02/16 10:28
8	1LM.LM33574	WG559340-08 STD (10 ug/L)	1	1	STD72683	03/02/16 10:46
9	1LM.LM33575	WG559340-09 SSCV (1.0 ug/L)	1	1	STD72685	03/02/16 11:05
10	1LM.LM33576	WG559291-01 CCB	1	1		03/02/16 11:25
11	1LM.LM33577	WG559291-02 CCV (1.0ug/L)	1	1	STD72683	03/02/16 11:44
12	1LM.LM33578	WG559015-05 MRL (0.2ug/L)	1	1	STD72683	03/02/16 12:03
13	1LM.LM33579	WG559015-01 MCT (0.2ug/L)	1	1	STD72685	03/02/16 12:22
14	1LM.LM33580	WG559015-02 BLANK	1	1		03/02/16 12:41
15	1LM.LM33581	WG559015-05 MRL (0.2ug/L)	1	1	STD72683	03/02/16 13:01
16	1LM.LM33582	WG559015-03 LCS (0.2ug/L)	1	1	STD72685	03/02/16 13:20
17	1LM.LM33583	WG559015-04 LCS2 (0.2ug/L)	1	1	STD72685	03/02/16 13:39
18	1LM.LM33584	L16021060-01 ADC	1	1	STD72685	03/02/16 13:58
19	1LM.LM33585	L16021060-02 ADC	1	1	STD72685	03/02/16 14:17
20	1LM.LM33586	L16021060-03 ADC	1	1	STD72685	03/02/16 14:36
21	1LM.LM33587	L16021060-04 ADC	1	1	STD72685	03/02/16 14:55
22	1LM.LM33588	L16021262-01 (20x)	1	20		03/02/16 15:13
23	1LM.LM33589	L16021262-02 (5000x)	1	5000		03/02/16 15:32
24	1LM.LM33590	WG559291-03 CCV (1.0ug/L)	1	1	STD72683	03/02/16 15:51
25	1LM.LM33591	WG559015-06 MRL (0.2ug/L)	1	1	STD72683	03/02/16 16:10
26	1LM.LM33592	WG559291-04 CCB	1	1		03/02/16 16:29
27	1LM.LM33593	L16021262-03 (100X)	1	100		03/02/16 16:48
28	1LM.LM33594	L16021262-04 (2000X)	1	2000		03/02/16 17:07
29	1LM.LM33595	L16021262-05 (1000X)	1	1000		03/02/16 17:26
30	1LM.LM33596	L16021262-06 (10,000X)	1	10000		03/02/16 17:45
31	1LM.LM33597	L16021262-07 (10,000X)	1	10000		03/02/16 18:04
32	1LM.LM33598	L16021262-08 (5000X)	1	5000		03/02/16 18:23
33	1LM.LM33599	L16021262-09 (5000X)	1	5000		03/02/16 18:42

Page: 1 Approved: 04-MAR-16

Microbac Laboratories Inc.

Instrument Run Log

Instrument: LCMS1 Dataset: 030216_WTD.TXT
Analyst1: WTD Analyst2: ADC
Method: 6850 SOP: HPLC06 Rev: 7

Maintenance Log ID: Syringe Filter Lot#: 150506254
Eluent ID#:

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
WG559015, WG559292
Internal STD: COA18071 Surrogate STD: NA STD72683 (02/17/2016)
CCV STD: STD72683 LCS STD: STD72685 STD72685

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
34	1LM.LM33600	L16021262-10 (100,000X)	1	100000		03/02/16 19:01
35	1LM.LM33601	L16021262-11 (10,000X)	1	10000		03/02/16 19:20
36	1LM.LM33602	L16021262-12 (10,000X)	1	10000		03/02/16 19:39
37	1LM.LM33603	WG559291-05 CCV (1.0ug/L)	1	1	STD72683	03/02/16 19:58
38	1LM.LM33604	WG559015-07 MRL (0.2ug/L)	1	1	STD72683	03/02/16 20:17
39	1LM.LM33605	WG559291-06 CCB	1	1		03/02/16 20:35
40	1LM.LM33606	L16021262-13 (10,000X)	1	10000		03/02/16 20:54
41	1LM.LM33607	L16021262-14 (10,000X)	1	10000		03/02/16 21:13
42	1LM.LM33608	WG559291-07 CCV (1.0ug/L)	1	1	STD72683	03/02/16 21:32
43	1LM.LM33609	WG559015-08 MRL (0.2ug/L)	1	1	STD72683	03/02/16 21:51
44	1LM.LM33610	WG559291-08 CCB	1	1		03/02/16 22:10
45	1LM.LM33611	WG559292-07 MRL (0.2ug/L)	1	1	STD72685	03/02/16 22:29
46	1LM.LM33612	WG559292-01 MCT (0.2ug/L)	1	1	STD72685	03/02/16 22:48
47	1LM.LM33613	WG559292-02 BLANK	1	1		03/02/16 23:07
48	1LM.LM33614	WG559292-03 LCS (0.2ug/L)	1	1	STD72685	03/02/16 23:26
93	1LM.LM33615	L16021255-01 REF 100X	1	100		03/02/16 23:45
50	1LM.LM33616	L16021255-02 MS 100X	1	100	STD72685	03/03/16 00:04
51	1LM.LM33617	L16021255-03 MSD 100X	1	100	STD72685	03/03/16 00:23
94	1LM.LM33618	L16021255-04 20X	1	20		03/03/16 00:42
53	1LM.LM33619	L16021255-05 20X	1	20		03/03/16 01:01
54	1LM.LM33620	L16021255-06 200X	1	200		03/03/16 01:20
55	1LM.LM33621	L16021255-07 100X	1	100		03/03/16 01:39
56	1LM.LM33622	WG559291-09 CCV (1.0ug/L)	1	1	STD72685	03/03/16 01:57
57	1LM.LM33623	WG559292-08 MRL (0.2ug/L)	1	1	STD72685	03/03/16 02:16
58	1LM.LM33624	WG559291-10 CCB	1	1		03/03/16 02:35
59	1LM.LM33625	L16021255-08	1	1		03/03/16 02:54
60	1LM.LM33626	L16021255-09 500X	1	500		03/03/16 03:13
61	1LM.LM33627	L16021255-10 5000X	1	5000		03/03/16 03:32
62	1LM.LM33628	L16021255-11 5000X	1	5000		03/03/16 03:51
63	1LM.LM33629	L16021255-12 100X	1	100		03/03/16 04:10
64	1LM.LM33630	L16021255-13 10,000X	1	10000		03/03/16 04:29
65	1LM.LM33631	L16021255-14 10,000X	1	10000		03/03/16 04:48
66	1LM.LM33632	L16030008-01	1	1		03/03/16 05:07
67	1LM.LM33633	L16030008-01 10X	1	10		03/03/16 05:26
68	1LM.LM33634	L16021328-01	1	1		03/03/16 05:45
69	1LM.LM33635	WG559291-11 CCV (1.0ug/L)	1	1	STD72685	03/03/16 06:04

Page: 2 Approved: 04-MAR-16



Microbac Laboratories Inc.

Instrument Run Log

Instrument: LCMS1 Dataset: 030216_WTD.TXT

Analyst1: WTD Analyst2: ADC

Method: 6850 SOP: HPLC06 Rev: 7

Maintenance Log ID: Syringe Filter Lot#: 150506254

Eluent ID#:

Column 1 ID: KP-RPPX250 Column 2 ID: NA

Workgroups: WG559015, WG559292

Internal STD: COA18071 Surrogate STD: NA STD72683 (02/17/2016)

CCV STD: STD72683 LCS STD: STD72685 STD72685

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
70	1LM.LM33636	WG559292-09 MRL (0.2ug/L)	1	1	STD72685	03/03/16 06:23
71	1LM.LM33637	WG559291-12 CCB	1	1		03/03/16 06:41
72	1LM.LM33638	L16021328-02	1	1		03/03/16 07:00
73	1LM.LM33639	L16021328-03	1	1		03/03/16 07:19
74	1LM.LM33640	L16021328-04	1	1		03/03/16 07:38
75	1LM.LM33641	L16021328-05	1	1		03/03/16 07:57
76	1LM.LM33642	WG559291-13 CCV (1.0ug/L)	1	1	STD72685	03/03/16 08:16
77	1LM.LM33643	WG559292-10 MRL (0.2ug/L)	1	1	STD72685	03/03/16 08:35
78	1LM.LM33644	WG559291-14 CCB	1	1		03/03/16 08:54
79	1LM.LM33645	L16021255-05 200X	1	200		03/03/16 09:13
80	1LM.LM33646	L16021255-06	1	1		03/03/16 09:32
81	1LM.LM33647	L16021255-12 1000X	1	1000		03/03/16 09:51
95	1LM.LM33648	L16021255-04	1	1		03/03/16 10:10
96	1LM.LM33649	L16021255-02 MS	1	1	STD72685	03/03/16 10:29
97	1LM.LM33650	L16021255-03 MSD	1	1	STD72685	03/03/16 10:48
85	1LM.LM33651	WG559291-15 CCV (1.0ug/L)	1	1	STD72685	03/03/16 11:07
86	1LM.LM33652	WG559292-11 MRL (0.2ug/L)	1	1	STD72685	03/03/16 11:25
87	1LM.LM33653	WG559291-16 CCB	1	1		03/03/16 11:44

Comments

Seq.	Rerun	Dil.	Reason	Analytes
12	X			
	WG559015-05 incorrect vial location.			
50				
	DNR. Incorrect information on the supplied Chain of Custody.			
51				
	DNR. Incorrect information on the supplied Chain of Custody.			
94	X	1	Analyzed too dilute	
	L16021255-04			
53	X	200	Over Calibration Range	Perchlorate
	L16021255-05			
54	X	1	Analyzed too dilute	
	L16021255-06			
63	X	1000	Over Calibration Range	
	L16021255-12 100X			

Page: 3 Approved: 04-MAR-16

Microbac Laboratories Inc.

Data Checklist

Date: 02-MAR-2016
Analyst: WTD
Analyst: ADC
Method: 6850
Instrument: LCMS1
Curve Workgroup: NA
Runlog ID: 73617
Analytical Workgroups: L16021255,L16021328,030008,021262,021060

ANALYTICAL	
System Performance Check	NA
DFTPP (GCMS)	NA
Endrin/DDT breakdown (8081/GCMS)	NA
Pentachlorophenol/benzidine tailing (GCMS)	NA
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	NA
Average RF	NA
Linear regression or higher order curve	NA
Alternate source standard (ICV) % Difference	NA
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (GCMS)	X
Continuing calibration blank (CCB) (IC/LCMS)	X
Limit of quantitation verification (LOQV) (LCMS)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	X
Library searches (GCMS)	NA
Calculations & correct factors	X
Compounds above calibration range	X
Reruns	X
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	
Check for completeness	X
Primary Reviewer	WTD
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	MES

Primary Reviewer: 03-MAR-2016

Secondary Reviewer: 04-MAR-2016

CHECKLIST1 - Modified 03/05/2008

Generated: MAR-04-2016 13:53:03

Microbac Laboratories Inc.

HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6850 AAB#: WG559292

Login Number: L16021328

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
HBW 7- 022516	01	02/25/16					03/02/2016	5.8	28		03/03/16	.9	28	
HBW 10- 022516	02	02/25/16					03/02/2016	5.8	28		03/03/16	.9	28	
HBW 1- 022516	03	02/25/16					03/02/2016	5.8	28		03/03/16	.9	28	
GPW 3- 022516	04	02/25/16					03/02/2016	5.8	28		03/03/16	1	28	
GPW 1- 022516	05	02/25/16					03/02/2016	5.8	28		03/03/16	1	28	

* = SEE PROJECT QAPP REQUIREMENTS

HOLD_TIMES - Modified 03/06/2008
PDF File ID: 4656042
Report generated 03/04/2016 13:54

METHOD BLANK SUMMARY

Login Number: L16021328
Blank File ID: 1LM.LM33613
Prep Date: 03/02/16 08:34
Analyzed Date: 03/02/16 23:07
Analyst: WTD

Work Group: WG559292
Blank Sample ID: WG559292-02
Instrument ID: LCMS1
Method: 6850

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG559292-07	1LM.LM33611	03/02/16 22:29	01
MCT	WG559292-01	1LM.LM33612	03/02/16 22:48	01
LCS	WG559292-03	1LM.LM33614	03/02/16 23:26	01
QCMRL	WG559292-08	1LM.LM33623	03/03/16 02:16	01
HBW 7- 022516	L16021328-01	1LM.LM33634	03/03/16 05:45	01
QCMRL	WG559292-09	1LM.LM33636	03/03/16 06:23	01
HBW 10- 022516	L16021328-02	1LM.LM33638	03/03/16 07:00	01
HBW 1- 022516	L16021328-03	1LM.LM33639	03/03/16 07:19	01
GPW 3- 022516	L16021328-04	1LM.LM33640	03/03/16 07:38	01
GPW 1- 022516	L16021328-05	1LM.LM33641	03/03/16 07:57	01
QCMRL	WG559292-10	1LM.LM33643	03/03/16 08:35	01
QCMRL	WG559292-11	1LM.LM33652	03/03/16 11:25	01

Report Name: BLANK_SUMMARY
PDF File ID: 4656080
Report generated 03/04/2016 13:54

Microbac Laboratories Inc.

METHOD BLANK REPORT

Login Number: L16021328 Prep Date: 03/02/16 08:34 Sample ID: WG559292-02
Instrument ID: LCMS1 Run Date: 03/02/16 23:07 Prep Method: 6850
File ID: 1LM.LM33613 Analyst: WTD Method: 6850
Workgroup (AAB#): WG559292 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-02-MAR-16

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Perchlorate	0.100	0.400	0.100	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name:BLANK
PDF ID: 4656081
04-MAR-2016 13:54

Microbac Laboratories Inc.
LABORATORY CONTROL SAMPLE (LCS)

Login Number: L16021328 Run Date: 03/02/2016 Sample ID: WG559292-03
Instrument ID: LCMS1 Run Time: 23:26 Prep Method: 6850
File ID: 1LM.LM33614 Analyst: WTD Method: 6850
Workgroup (AAB#): WG559292 Matrix: Water Units: ug/L
QC Key: DOD4 Lot#: STD72685 Cal ID: LCMS1-02-MAR-16

Analytes	Expected	Found	% Rec	LCS Limits	Q
Perchlorate	0.200	0.198	99.0	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 4656082
Report generated: 03/04/2016 13:54

Microbac Laboratories Inc.
INITIAL CALIBRATION SUMMARY

Login Number: L16021328
Analytical Method: 6850
ICAL Workgroup: WG559340

Instrument ID: LCMS1
Initial Calibration Date: 02-MAR-16 10:46
Column ID: F

Analyte		AVG RF	% RSD	LINEAR (R)	QUAD (R^2)
Perchlorate		1.808	3.97	1.00000	

R = Correlation coefficient; 0.995 minimum
R^2 = Coefficient of determination; 0.99 minimum

INT_CAL - Modified 03/06/2008
PDF File ID: 4656084
Report generated 03/04/2016 13:54

Microbac Laboratories Inc.
INITIAL CALIBRATION DATA

Login Number: L16021328
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 02-MAR-16 10:46
Column ID: F

Analyte	WG559340-02			WG559340-03			WG559340-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	18400.0000	1.879	0.200	37000.0000	1.850	0.500	89000.0000	1.810

INT_CAL - Modified 03/06/2008
PDF File ID: 4656084
Report generated 03/04/2016 13:54

Login Number: L16021328
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 02-MAR-16 10:46
Column ID: F

Analyte	WG559340-05			WG559340-06			WG559340-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	183000.000	1.829	2.00	363000.000	1.777	5.00	871000.000	1.779

INT_CAL - Modified 03/06/2008
PDF File ID: 4656084
Report generated 03/04/2016 13:54

Microbac Laboratories Inc.
INITIAL CALIBRATION DATA

Login Number: L16021328
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 02-MAR-16 10:46
Column ID: F

Analyte	WG559340-08		
	CONC	RESP	RF
Perchlorate	10.0	1650000.00	1.729

INT_CAL - Modified 03/06/2008
PDF File ID: 4656084
Report generated 03/04/2016 13:54

Microbac Laboratories Inc.
ALTERNATE SOURCE CALIBRATION REPORT

Login Number: L16021328 Run Date: 03/02/2016 Sample ID: WG559340-09
Instrument ID: LCMS1 Run Time: 11:05 Method: 6850
File ID: 1LM.LM33575 Analyst: WTD QC Key: DOD4
ICal Workgroup: WG559340 Cal ID: LCMS1 - 02-MAR-16

Analyte		Expected	Found	Units	RF	%D	UCL	Q
Perchlorate		1.00	1.03	ug/L	1.83	3.00	15	

* Exceeds %D Limit

ALT - Modified 09/06/2007
Version 1.5 PDF File ID: 4656085
Report generated 03/04/2016 13:55

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L16021328 Run Date: 03/02/2016 Sample ID: WG559291-08
Instrument ID: LCMS1 Run Time: 22:10 Method: 6850
File ID: 1LM.LM33610 Analyst: WTD Units: ug/L
Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 4656087
Report generated 03/04/2016 13:55

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559291-10
Instrument ID: LCMS1 Run Time: 02:35 Method: 6850
File ID: 1LM.LM33624 Analyst: WTD Units: ug/L
Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 4656087
Report generated 03/04/2016 13:55

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559291-12
Instrument ID: LCMS1 Run Time: 06:41 Method: 6850
File ID: 1LM.LM33637 Analyst: WTD Units: ug/L
Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 4656087
Report generated 03/04/2016 13:55

Microbac Laboratories Inc.

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559291-14

Instrument ID: LCMS1 Run Time: 08:54 Method: 6850

File ID: 1LM.LM33644 Analyst: WTD Units: ug/L

Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16

Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 4656087
Report generated 03/04/2016 13:55

Microbac Laboratories Inc.
CONTINUING CALIBRATION BLANK (CCB)

Login Number:	L16021328	**Run Date:**	03/03/2016	**Sample ID:**	WG559291-16
Instrument ID:	LCMS1	**Run Time:**	11:44	**Method:**	6850
File ID:	1LM.LM33653	**Analyst:**	WTD	**Units:**	ug/L
Workgroup (AAB#):	WG559292	**Cal ID:**	LCMS1 - 02-MAR-16		
Matrix:	WATER	**QAPP:**	DOD4		

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 4656087
Report generated 03/04/2016 13:55

Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L16021328 Run Date: 03/02/2016 Sample ID: WG559291-07

Instrument ID: LCMS1 Run Time: 21:32 Method: 6850

File ID: 1LM.LM33608 Analyst: WTD QC Key: DOD4

Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16

Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.02	ug/L	1.81	2.00	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008

PDF File ID: 4656086

Report generated 03/04/2016 13:55

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559291-09
Instrument ID: LCMS1 Run Time: 01:57 Method: 6850
File ID: 1LM.LM33622 Analyst: WTD QC Key: DOD4
Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.00	ug/L	1.78	0	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 4656086
Report generated 03/04/2016 13:55

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559291-11
Instrument ID: LCMS1 Run Time: 06:04 Method: 6850
File ID: 1LM.LM33635 Analyst: WTD QC Key: DOD4
Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.02	ug/L	1.81	2.00	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 4656086
Report generated 03/04/2016 13:55

Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559291-13

Instrument ID: LCMS1 Run Time: 08:16 Method: 6850

File ID: 1LM.LM33642 Analyst: WTD QC Key: DOD4

Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16

Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.02	ug/L	1.81	2.00	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008

PDF File ID: 4656086

Report generated 03/04/2016 13:55

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559291-15
Instrument ID: LCMS1 Run Time: 11:07 Method: 6850
File ID: 1LM.LM33651 Analyst: WTD QC Key: DOD4
Workgroup (AAB#): WG559292 Cal ID: LCMS1 - 02-MAR-16
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.02	ug/L	1.80	2.00	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 4656086
Report generated 03/04/2016 13:55

Login Number: L16021328 Run Date: 03/02/2016 Sample ID: WG559292-07
Instrument ID: LCMS1 Run Time: 22:29 Prep Method: 6850
File ID: 1LM.LM33611 Analyst: WTD Method: 6850
Workgroup (AAB#): WG559292 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-02-MAR-16

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.196	98.0	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 4656083
Report generated 03/04/2016 13:54

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559292-08
Instrument ID: LCMS1 Run Time: 02:16 Prep Method: 6850
File ID: 1LM.LM33623 Analyst: WTD Method: 6850
Workgroup (AAB#): WG559292 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-02-MAR-16

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.196	98.0	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 4656083
Report generated 03/04/2016 13:54

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559292-09
Instrument ID: LCMS1 Run Time: 06:23 Prep Method: 6850
File ID: 1LM.LM33636 Analyst: WTD Method: 6850
Workgroup (AAB#): WG559292 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-02-MAR-16

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.194	97.0	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 4656083
Report generated 03/04/2016 13:54

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559292-10
Instrument ID: LCMS1 Run Time: 08:35 Prep Method: 6850
File ID: 1LM.LM33643 Analyst: WTD Method: 6850
Workgroup (AAB#): WG559292 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-02-MAR-16

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.196	98.0	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 4656083
Report generated 03/04/2016 13:54

Login Number: L16021328 Run Date: 03/03/2016 Sample ID: WG559292-11
Instrument ID: LCMS1 Run Time: 11:25 Prep Method: 6850
File ID: 1LM.LM33652 Analyst: WTD Method: 6850
Workgroup (AAB#): WG559292 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-02-MAR-16

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.190	95.0	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 4656083
Report generated 03/04/2016 13:54

Microbac Laboratories Inc.
INTERNAL STANDARD AREA SUMMARY
(COMPARED TO AVERAGE OF ICAL)

Login Number:L16021328
Instrument ID:LCMS1
Workgroup (AAB#):WG559292

ICAL CCV Number:WG559340-05
CAL ID: LCMS1-02-MAR-16
Matrix:WATER

Sample Number	Dilution	Tag	IS-1
WG559340	NA	NA	494000
Upper Limit	NA	NA	741000
Lower Limit	NA	NA	247000
L16021328-01	1.00	01	512000
L16021328-02	1.00	01	536000
L16021328-03	1.00	01	522000
L16021328-04	1.00	01	520000
L16021328-05	1.00	01	522000
WG559292-02	1.00	01	515000
WG559292-03	1.00	01	529000

IS-1 - O18LP

Underline = Response outside limits

INTERNAL_STD_AVG_ICAL - Modified 03/10/2010
PDF File ID: 4656088
Report generated 03/04/2016 13:55

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	L16021328-01
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33634
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 05:45	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	8290	2570	3.23	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	L16021328-02
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33638
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 07:00	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	14900	5120	2.91	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	L16021328-03
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33639
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 07:19	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	8140	3360	2.42	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	L16021328-04
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33640
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 07:38	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	88500	27800	3.18	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	L16021328-05
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33641
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 07:57	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	83900	27200	3.08	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-07
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33608
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 21:32	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	193000	60100	3.21	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-08
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33610
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 22:10	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	959	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-09
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33622
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 01:57	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	186000	60200	3.09	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-10
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33624
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 02:35	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-11
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33635
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 06:04	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	189000	60400	3.13	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-12
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33637
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 06:41	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-13
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33642
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 08:16	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	192000	60400	3.18	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-14
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33644
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 08:54	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	656	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-15
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33651
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 11:07	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	185000	58400	3.17	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559291-16
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33653
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 11:44	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-01
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33612
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 22:48	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	36500	12000	3.04	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-02
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33613
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 23:07	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	721	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-03
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33614
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 23:26	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	38900	12000	3.24	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-07
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33611
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 22:29	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	39500	12700	3.11	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-08
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33623
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 02:16	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	38900	12300	3.16	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-09
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33636
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 06:23	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	38900	13500	2.88	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-10
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33643
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 08:35	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	39300	13500	2.91	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**	6850	**Samplenum:**	WG559292-11
Instrument:	LCMS1	**Prep Date:**	03/02/2016 08:34	**File ID:**	1LM.LM33652
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/03/2016 11:25	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	36800	12300	2.99	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33568
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 08:53	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	18400	5910	3.11	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33569
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 09:12	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	37000	11900	3.11	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33570
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 09:31	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	89000	30400	2.93	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33571
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 09:50	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	183000	56800	3.22	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33572
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 10:09	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	363000	117000	3.10	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-07
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33573
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 10:28	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	871000	282000	3.09	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-08
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33574
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 10:46	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1650000	530000	3.11	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L16021328	**Prep Method:**		**Samplenum:**	WG559340-09
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM33575
Analyst:	WTD	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG559292	**Analysis Date:**	03/02/2016 11:05	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	190000	62200	3.05	2.3	3.8	

2.1.1.3 Sample Data

Applied Biosystems | MDS SCIEX

Created with Analyst Reporter
Printed: 3/3/2016 2:41 PM

Data File	LM33634.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 5:45:09 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

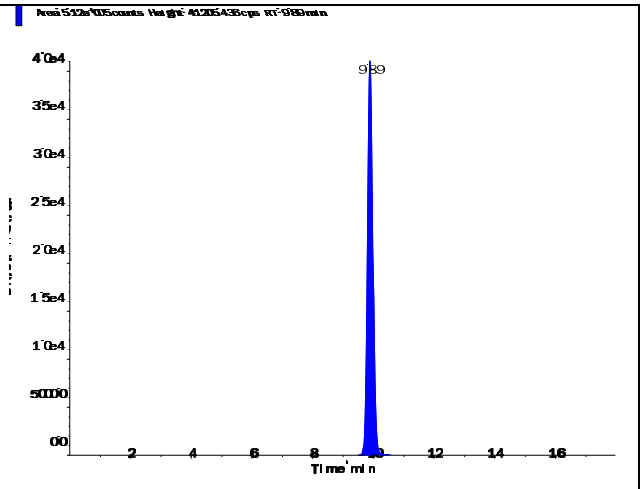
Sample Name	L16021328-01	**Injection Vial**	45.00
Data File	LM33634.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 5:45:09 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	L16021328-01	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.120e+05	9.89	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.290e+03	9.90	N/A	0.0339
Perchlorate conf	2.570e+03	9.90	N/A	0.0308

O18LP (Internal Standard)

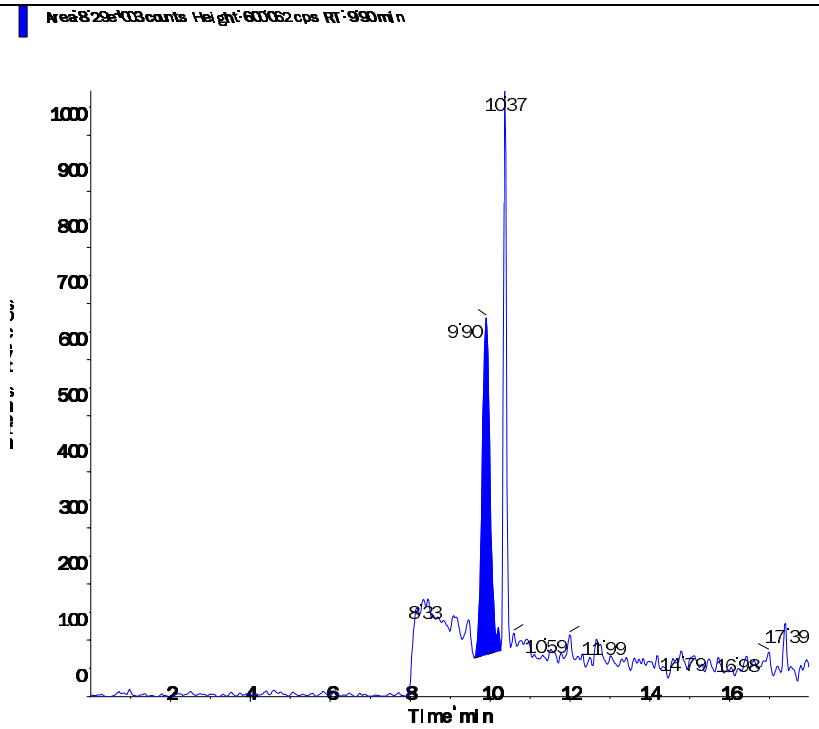
RT (Exp. RT): 9.89(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



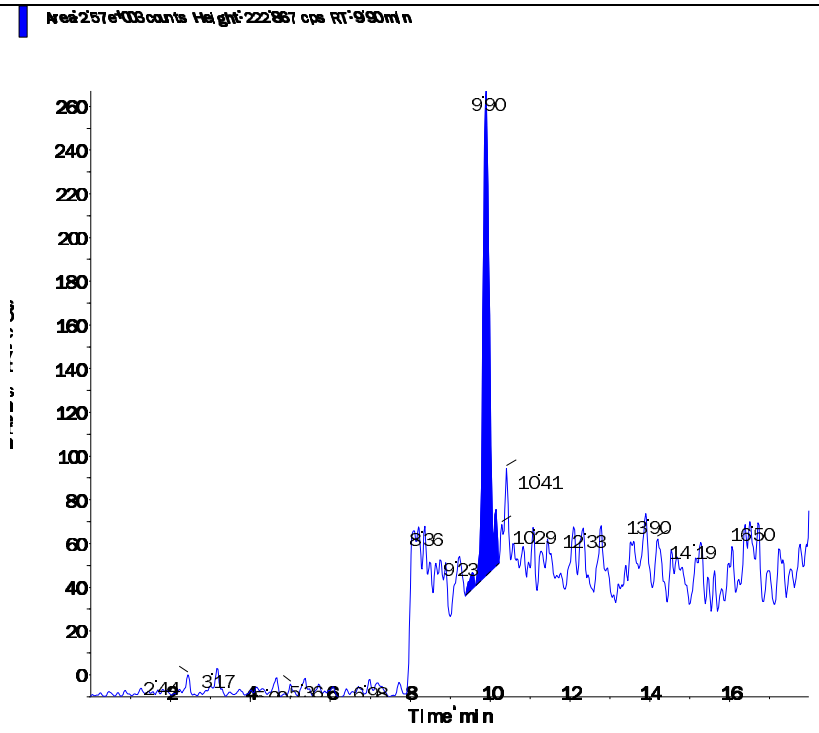
Applied Biosystems | MDS SCIEX

Created with Analyst Reporter
Printed: 3/3/2016 2:41 PM

Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.90 (9.94) min 0.0339 ng/ml 0.016 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.90 (9.92) min 0.0308 ng/ml 0.005 (Unknown)



Applied Biosystems | MDS SCIEX

Created with Analyst Reporter
Printed: 3/3/2016 2:42 PM

Data File	LM33638.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 7:00:53 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

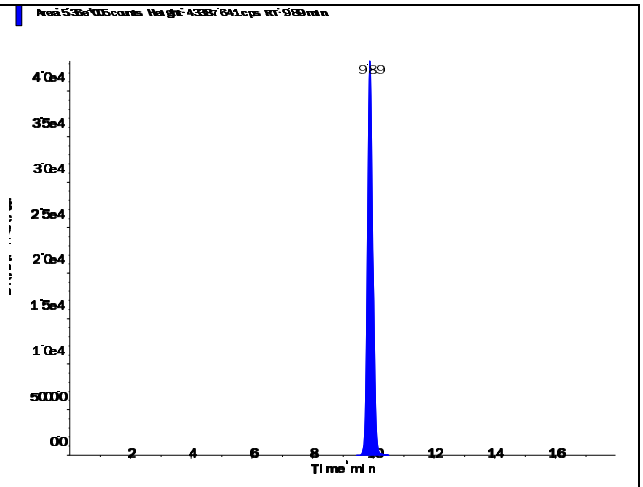
Sample Name	L16021328-02	**Injection Vial**	46.00
Data File	LM33638.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 7:00:53 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	L16021328-02	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.360e+05	9.89	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.490e+04	9.90	N/A	0.0669
Perchlorate conf	5.120e+03	9.88	N/A	0.0709

O18LP (Internal Standard)

RT (Exp. RT): 9.89(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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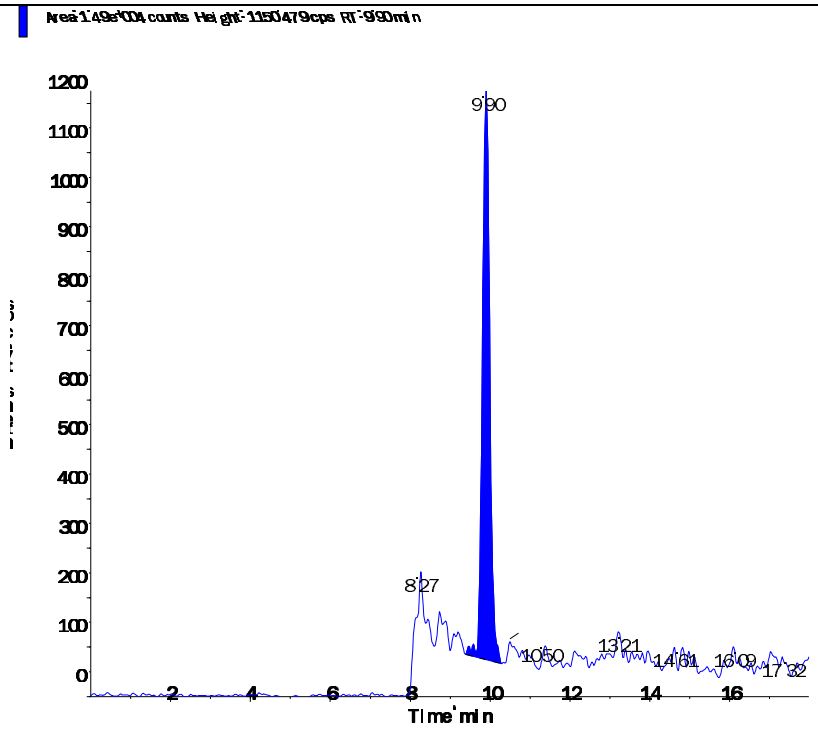
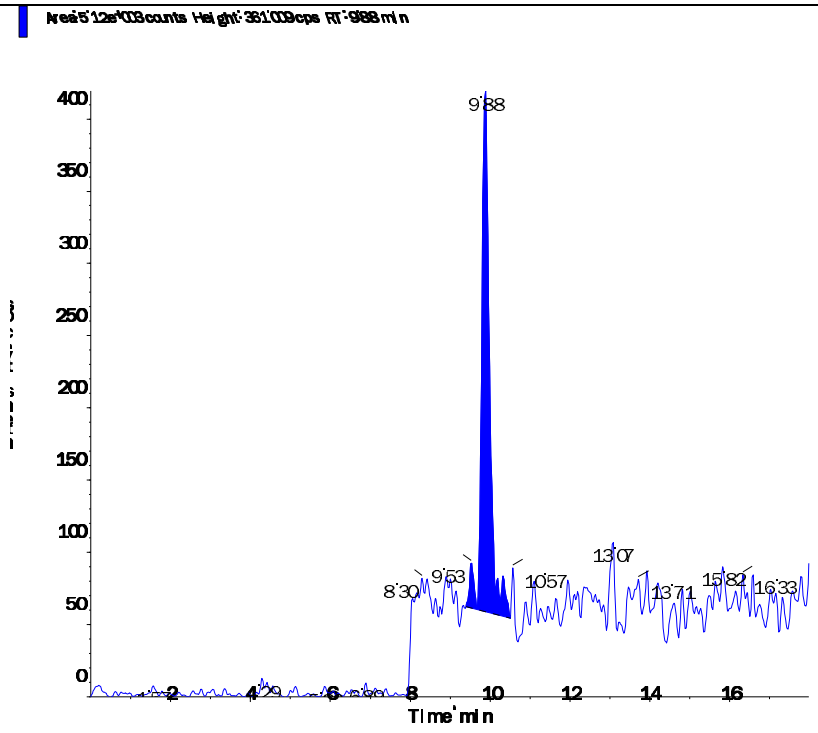
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.90 (9.94) min 0.0669 ng/ml 0.028 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.88 (9.92) min 0.0709 ng/ml 0.01 (Unknown)



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Data File	LM33639.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 7:19:50 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

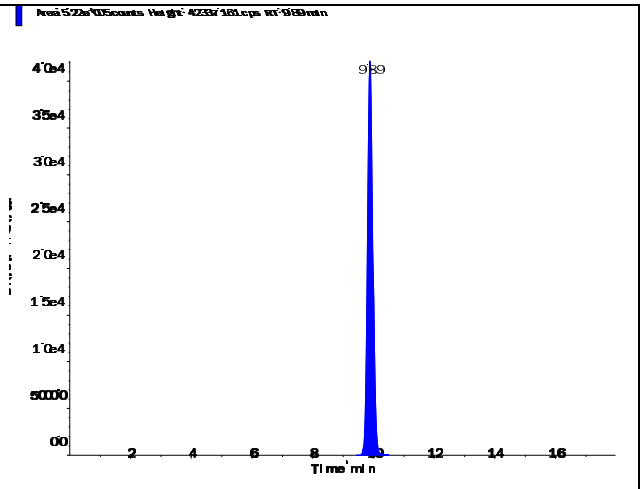
Sample Name	L16021328-03	**Injection Vial**	47.00
Data File	LM33639.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 7:19:50 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	L16021328-03	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

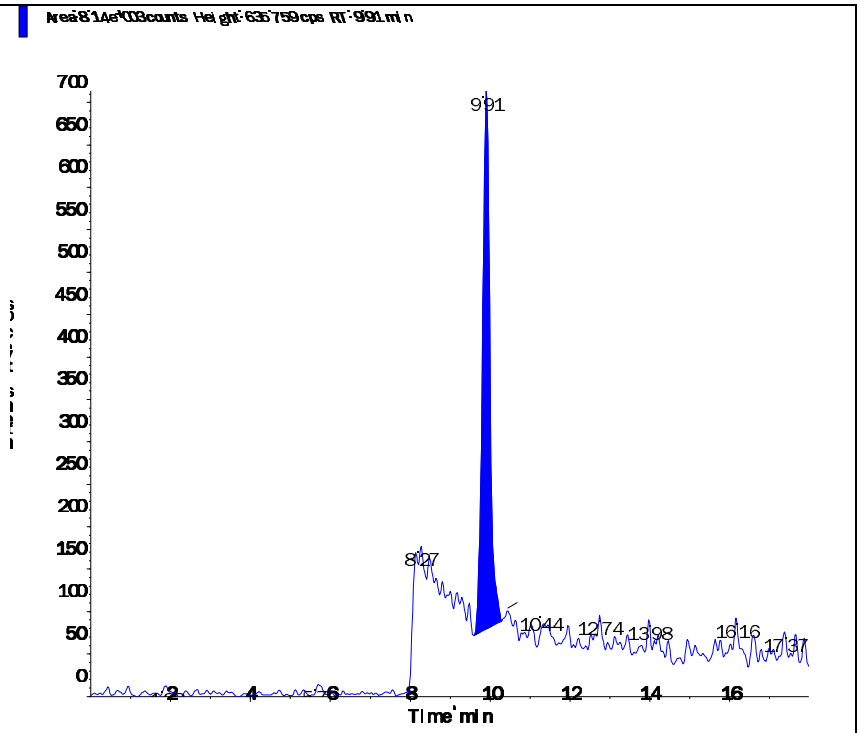
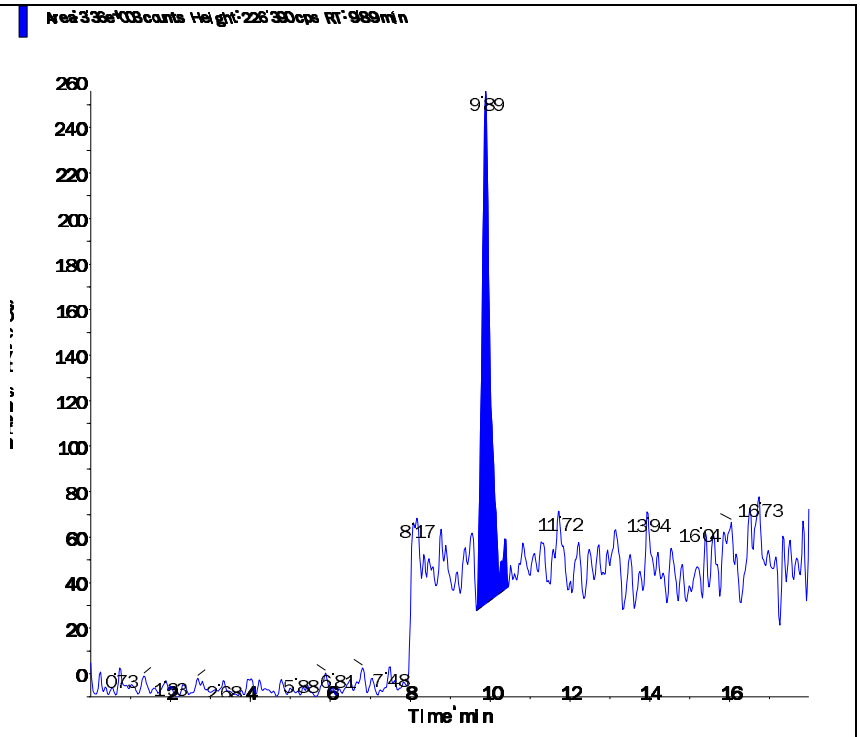
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.220e+05	9.89	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.140e+03	9.91	N/A	0.0321
Perchlorate conf	3.360e+03	9.89	N/A	0.0432

O18LP (Internal Standard)

RT (Exp. RT): 9.89(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 9.91 (9.94) min Calculated conc: 0.0321 ng/ml Area Ratio: 0.016 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 9.89 (9.92) min Calculated conc: 0.0432 ng/ml Area Ratio: 0.006 Sample Type: (Unknown)	

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Data File	LM33640.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 7:38:45 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

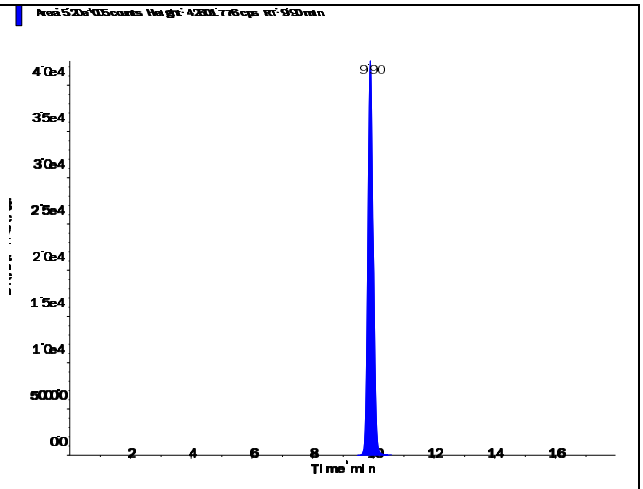
Sample Name	L16021328-04	**Injection Vial**	48.00
Data File	LM33640.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 7:38:45 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	L16021328-04	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.200e+05	9.90	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.850e+04	9.91	N/A	0.474
Perchlorate conf	2.780e+04	9.90	N/A	0.46

O18LP (Internal Standard)

RT (Exp. RT): 9.90(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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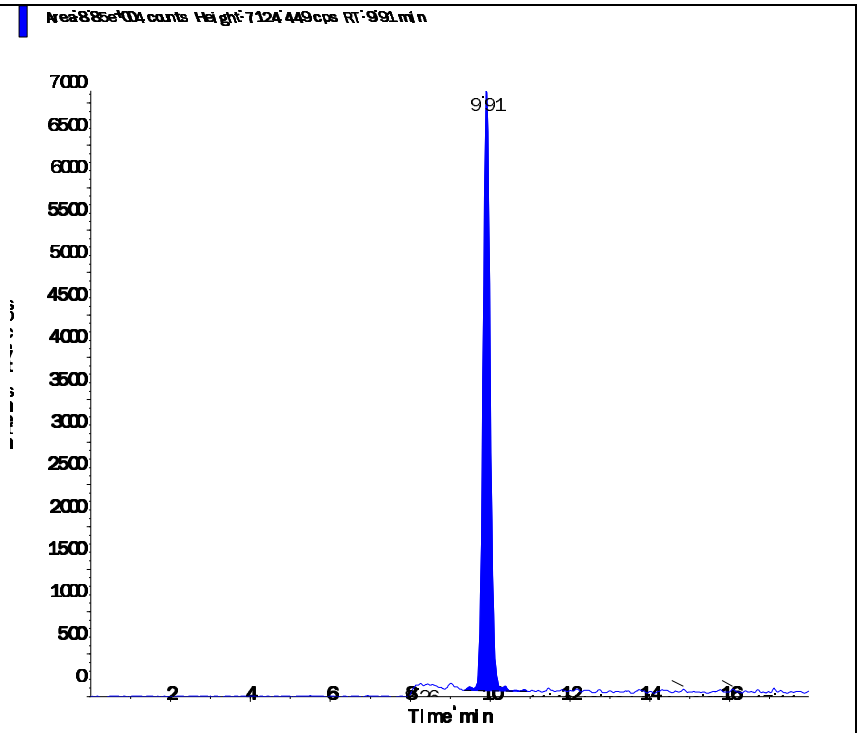
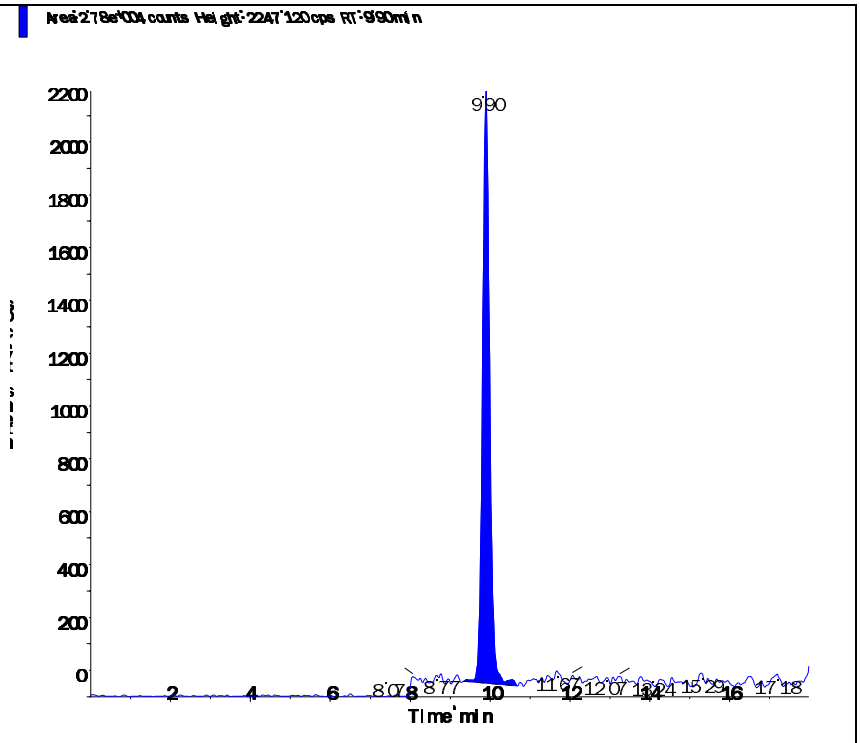
Perchlorate (98.8/83.3 amu)	
RT (Exp. RT):	9.91 (9.94) min
Calculated conc:	0.474 ng/ml
Area Ratio:	0.17
Sample Type:	(Unknown)



Perchlorate conf (100.8/85.2 amu)	
RT (Exp. RT):	9.90 (9.92) min
Calculated conc:	0.46 ng/ml
Area Ratio:	0.053
Sample Type:	(Unknown)



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Data File	LM33641.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 7:57:42 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

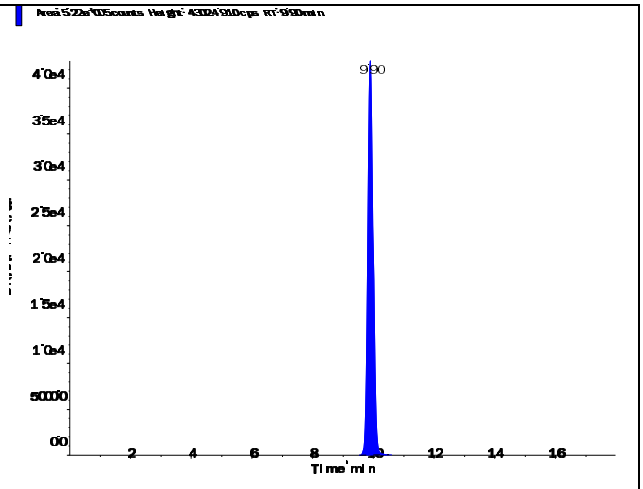
Sample Name	L16021328-05	**Injection Vial**	49.00
Data File	LM33641.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 7:57:42 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	L16021328-05	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.220e+05	9.90	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.390e+04	9.91	N/A	0.447
Perchlorate conf	2.720e+04	9.90	N/A	0.449

O18LP (Internal Standard)

RT (Exp. RT): 9.90(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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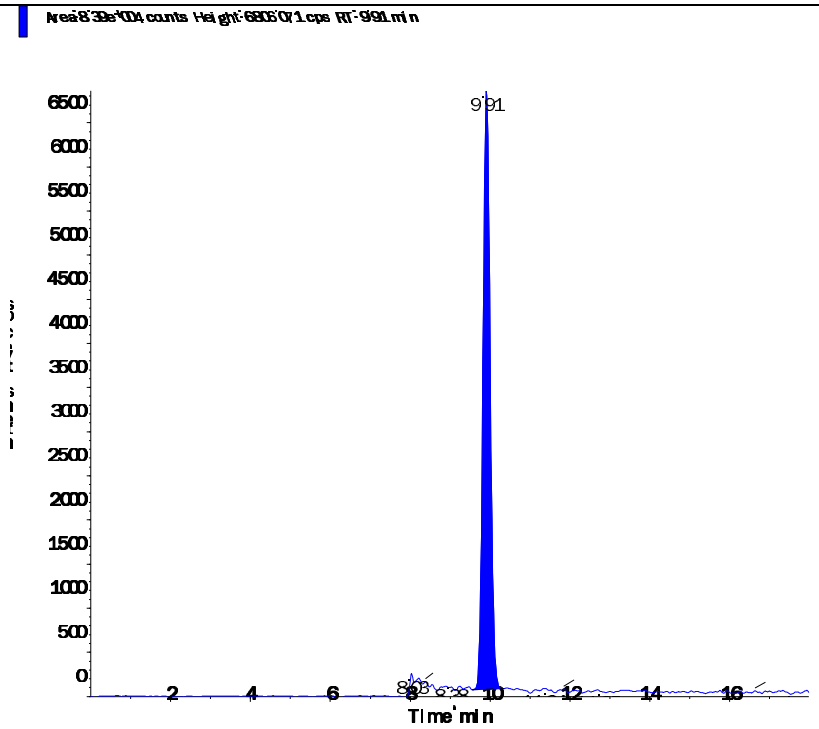
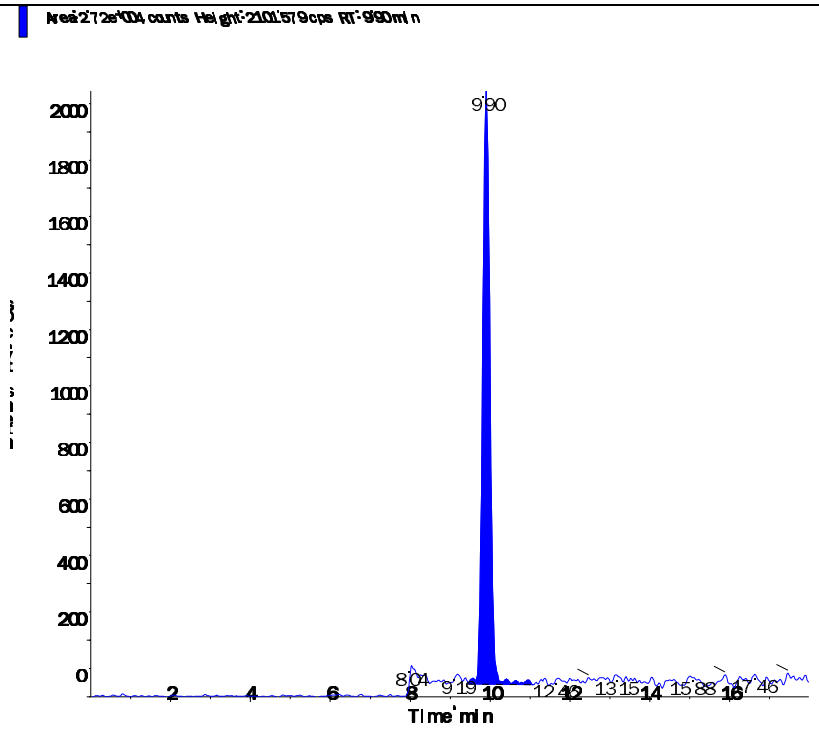
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.91 (9.94) min 0.447 ng/ml 0.161 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.90 (9.92) min 0.449 ng/ml 0.052 (Unknown)



2.1.1.4 Standards Data

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Data File	LM33567.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 8:34:25 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

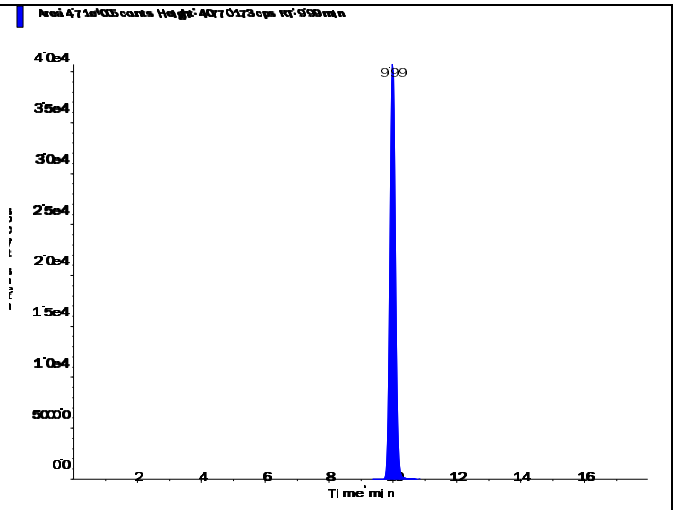
Sample Name	WG559340-01 CCB	**Injection Vial**	51.00
Data File	LM33567.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 8:34:25 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-01	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	4.710e+05	9.99	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	0.000e+00	0.00	N/A	No Peak

O18LP (Internal Standard)

RT (Exp. RT): 9.99(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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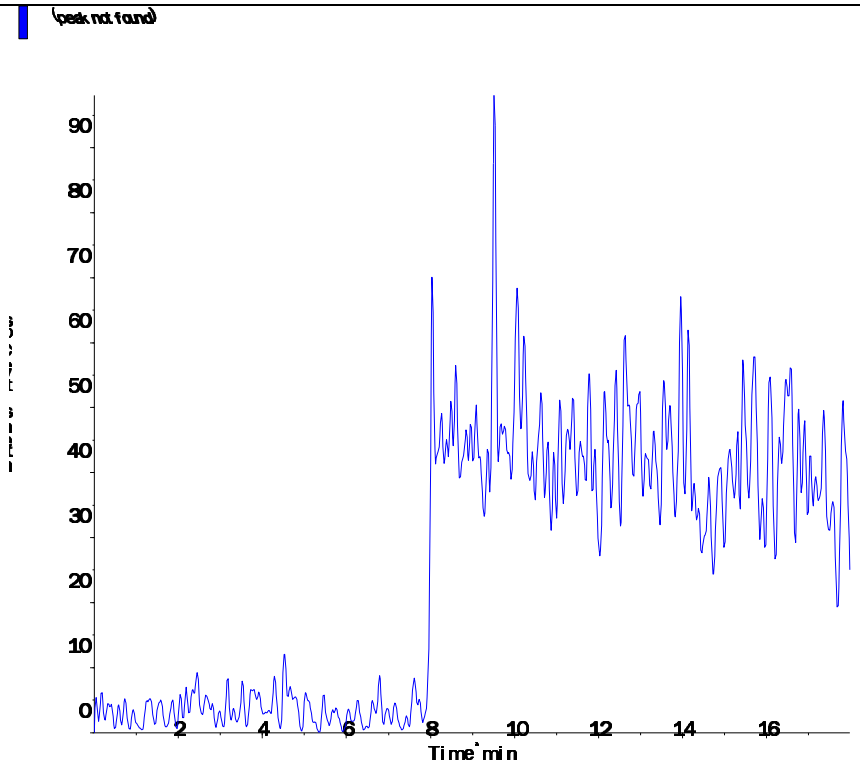
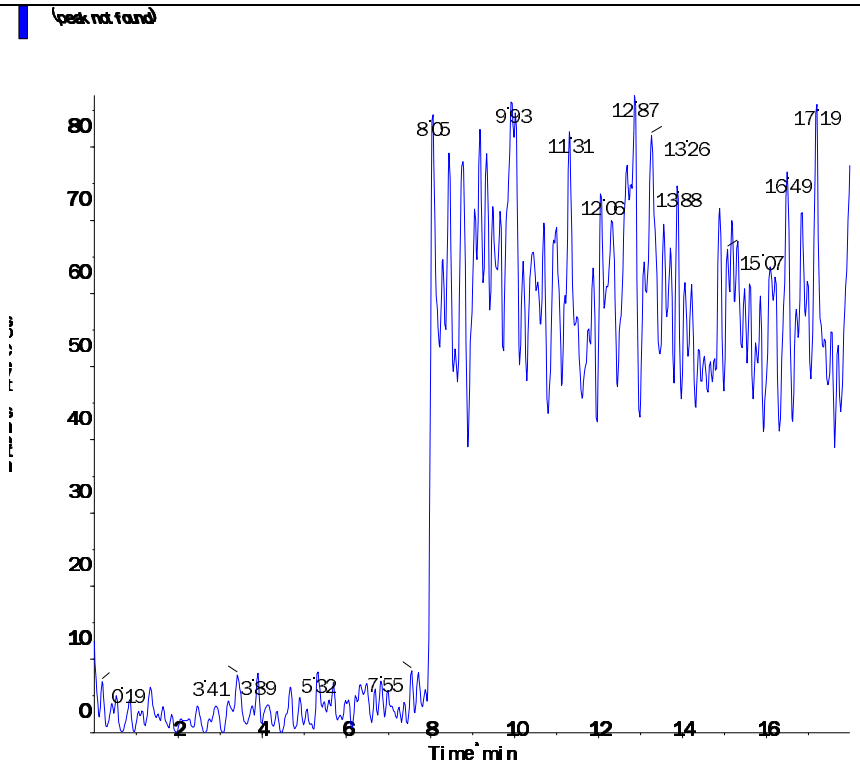
Perchlorate (98.8/83.3 amu) RT (Exp. RT): 0.00 (9.94) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 0.00 (9.92) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	

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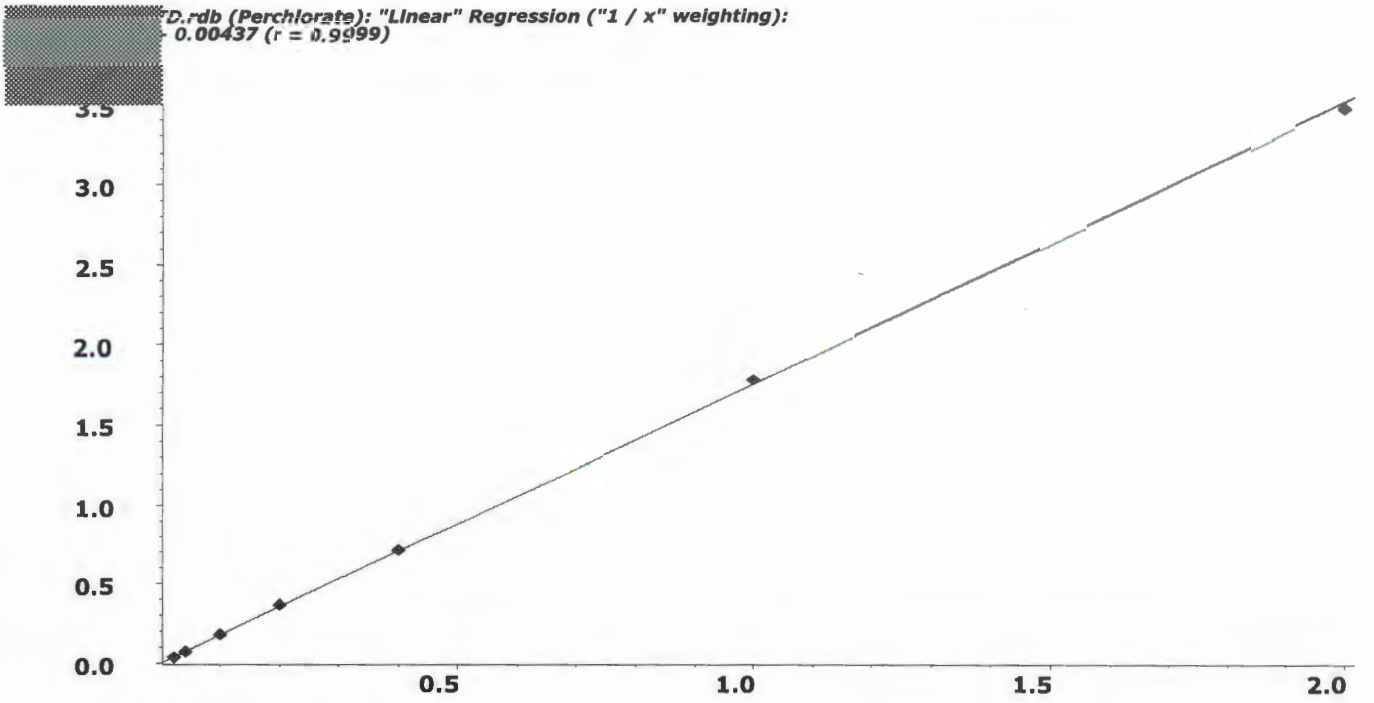
Analyte Name: **Perchlorate**
Internal Standard: O18LP

Data File	LM33567.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 8:34:25 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

Regression Equation: y = 1.75 x + 0.00437 (r = 0.9999)

Expected Concentration	Number of Values	Mean Calculated Concentration	% Accuracy	Std. Deviation	%CV
0.10	1	0.09	95.0	N/A	N/A
0.20	1	0.20	99.5	N/A	N/A
0.50	1	0.50	101.0	N/A	N/A
1.00	1	1.03	103.4	N/A	N/A
2.00	1	2.02	101.0	N/A	N/A
5.00	1	5.07	101.5	N/A	N/A
10.00	1	9.87	98.7	N/A	N/A



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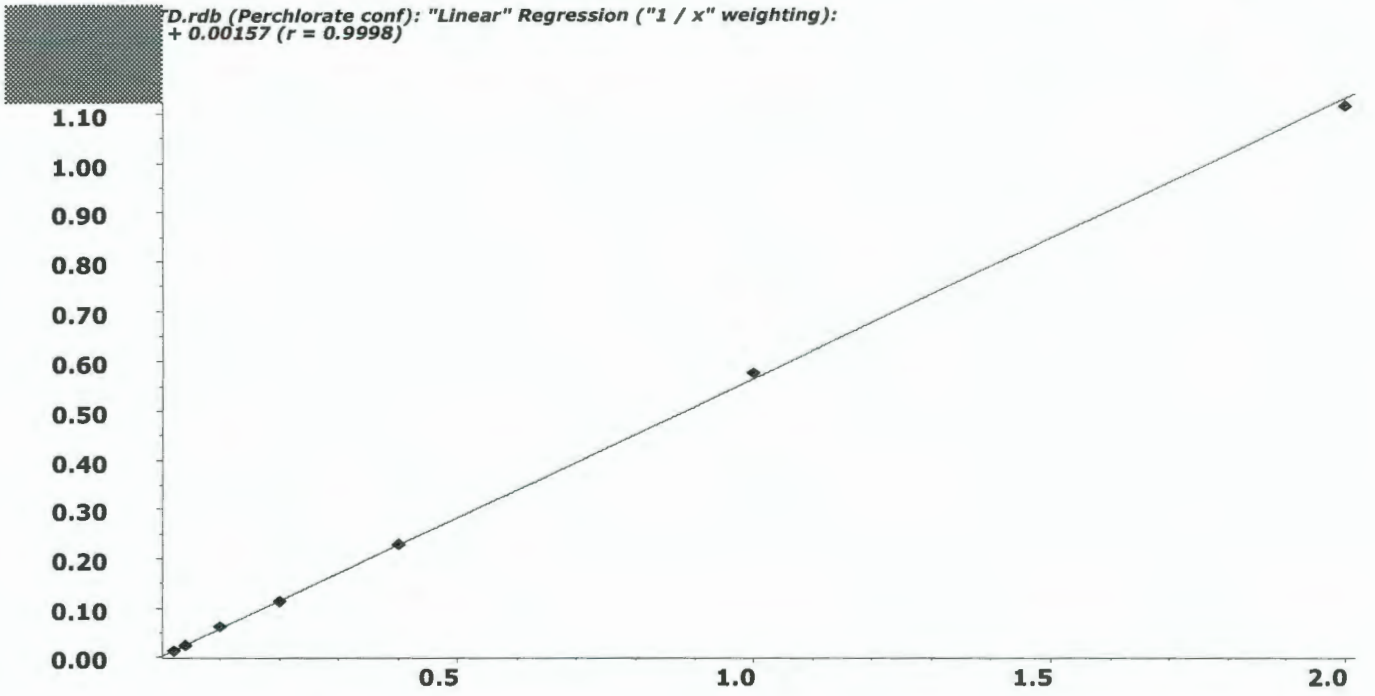
Printed: 3/3/2016 1:59 PM

Analyte Name: **Perchlorate conf**
Internal Standard: O18LP

Data File	LM33567.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 8:34:25 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

Regression Equation: y = 0.562 x + 0.00157 (r = 0.9998)

Expected Concentration	Number of Values	Mean Calculated Concentration	% Accuracy	Std. Deviation	%CV
0.10	1	0.09	93.4	N/A	N/A
0.20	1	0.20	98.6	N/A	N/A
0.50	1	0.54	107.2	N/A	N/A
1.00	1	1.00	99.5	N/A	N/A
2.00	1	2.01	100.7	N/A	N/A
5.00	1	5.11	102.2	N/A	N/A
10.00	1	9.85	98.5	N/A	N/A



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Data File	LM33568.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 8:53:21 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

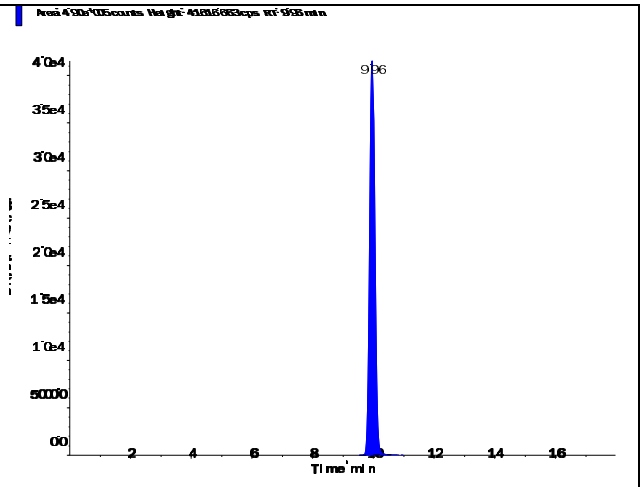
Sample Name	WG559340-02 STD (0.1 ug/L)	**Injection Vial**	52.00
Data File	LM33568.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 8:53:21 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-02	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	4.900e+05	9.96	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.840e+04	9.97	0.10	0.095
Perchlorate conf	5.910e+03	9.94	0.10	0.0934

O18LP (Internal Standard)

RT (Exp. RT): 9.96(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



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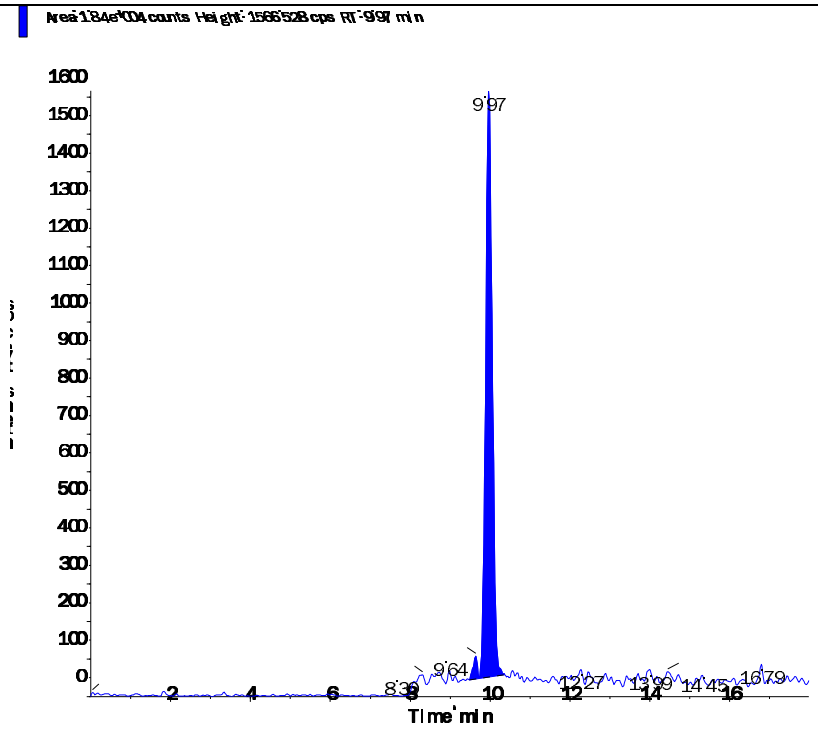
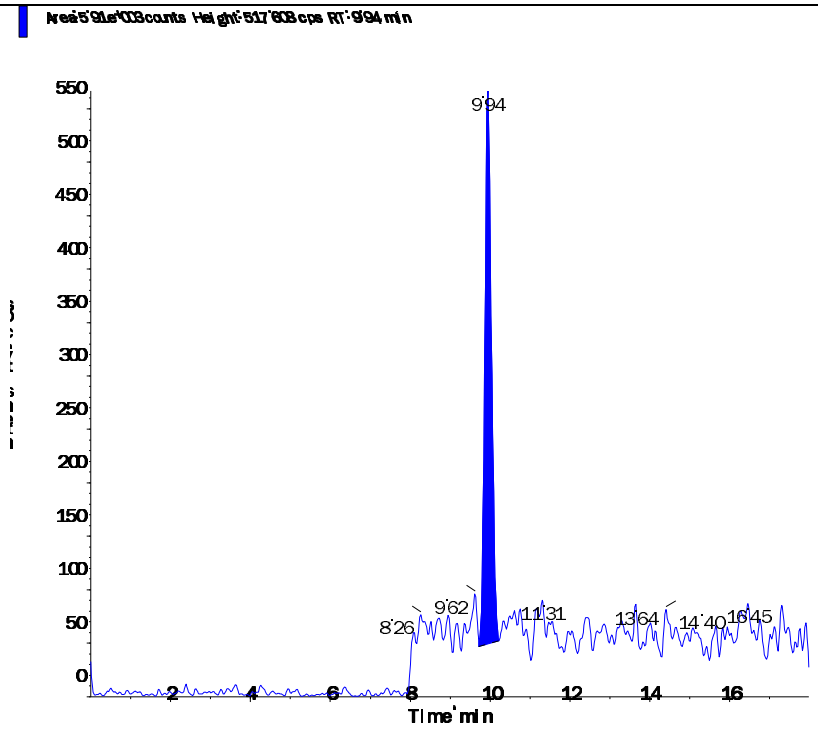
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.97 (9.94) min 0.095 ng/ml 0.038 (Standard)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.94 (9.92) min 0.0934 ng/ml 0.012 (Standard)



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Data File	LM33569.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 9:12:17 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

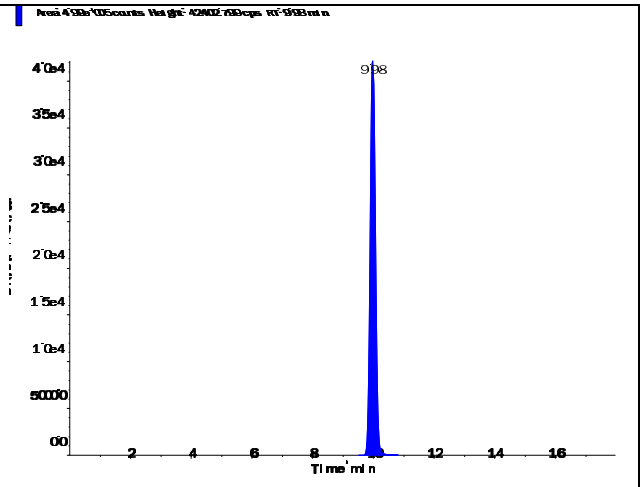
Sample Name	WG559340-03 STD (0.2 ug/L)	**Injection Vial**	53.00
Data File	LM33569.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 9:12:17 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-03	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	4.990e+05	9.98	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.700e+04	9.99	0.20	0.199
Perchlorate conf	1.190e+04	9.98	0.20	0.197

O18LP (Internal Standard)

RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



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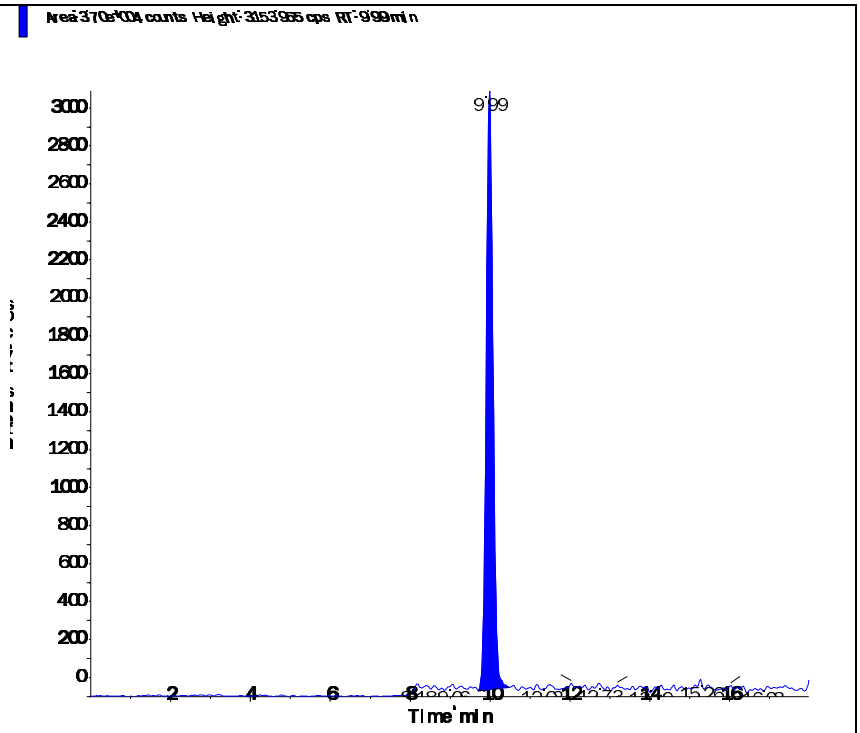
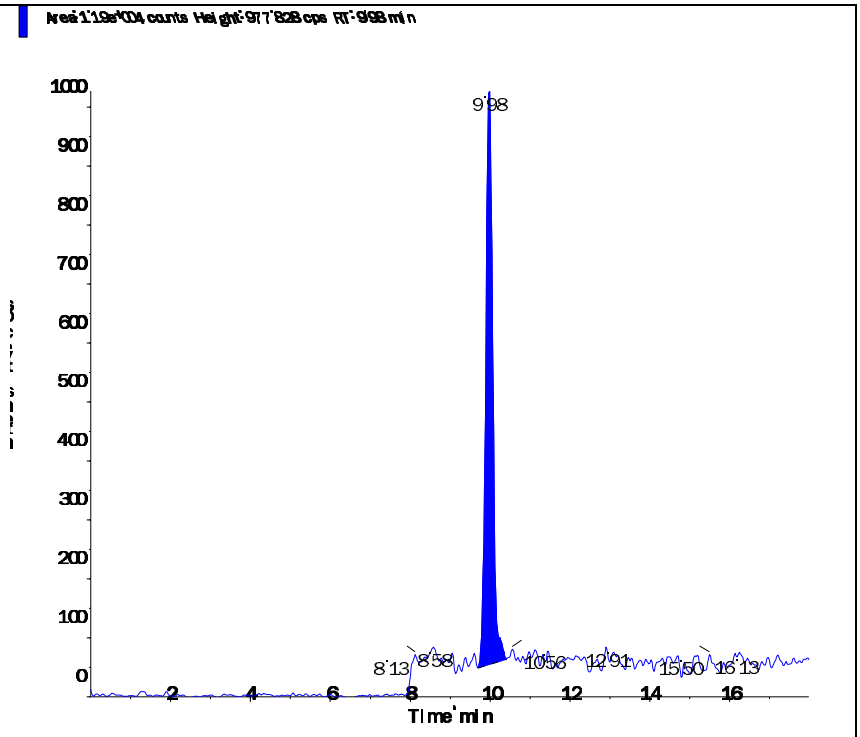
Perchlorate (98.8/83.3 amu) RT (Exp. RT): 9.99 (9.94) min Calculated conc: 0.199 ng/ml Area Ratio: 0.074 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 9.98 (9.92) min Calculated conc: 0.197 ng/ml Area Ratio: 0.024 Sample Type: (Standard)	

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Data File	LM33570.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 9:31:14 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

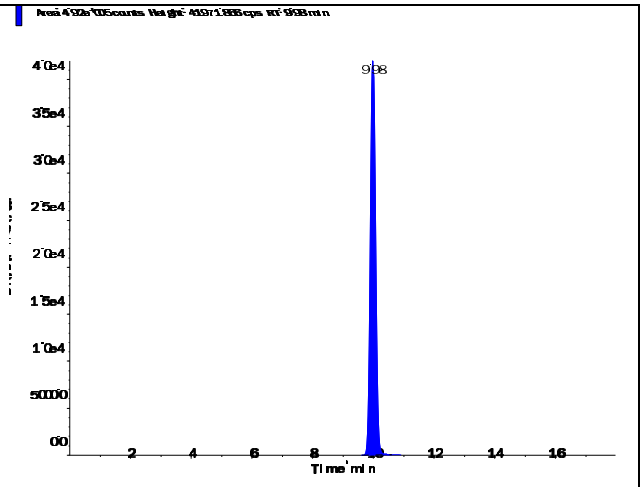
Sample Name	WG559340-04 STD (0.5 ug/L)	**Injection Vial**	54.00
Data File	LM33570.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 9:31:14 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-04	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	4.920e+05	9.98	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.900e+04	10.00	0.50	0.505
Perchlorate conf	3.040e+04	9.98	0.50	0.536

O18LP (Internal Standard)

RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



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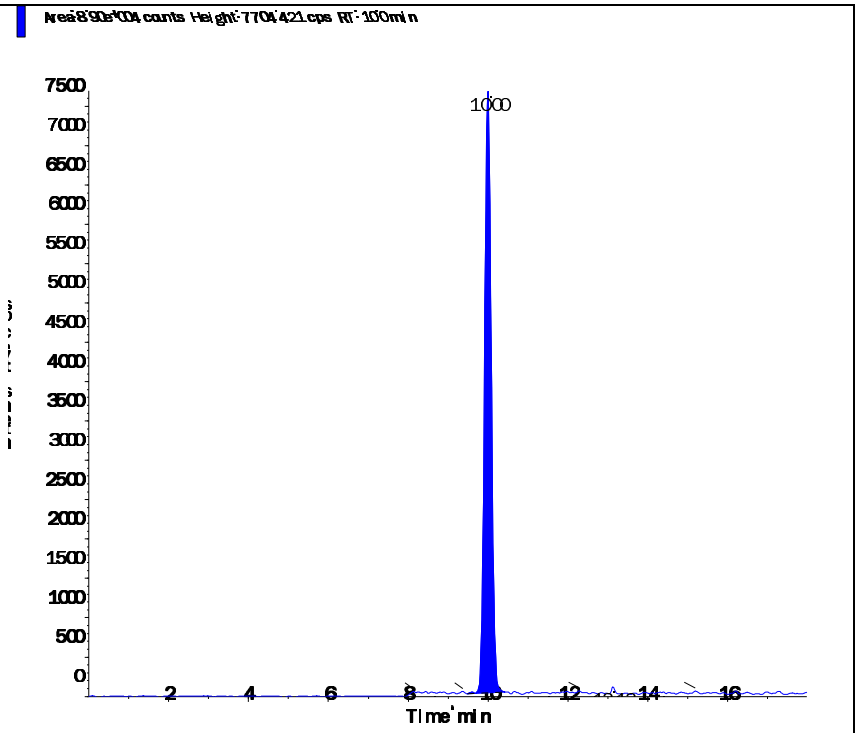
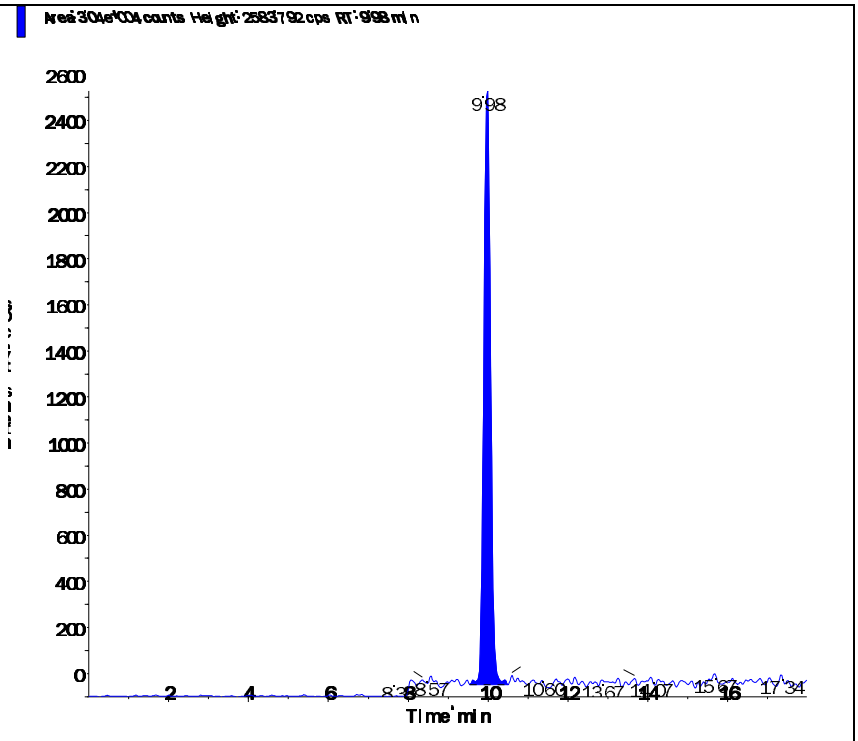
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	10.00 (9.94) min 0.505 ng/ml 0.181 (Standard)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	9.98 (9.92) min 0.536 ng/ml 0.062 (Standard)



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Printed: 3/4/2016 1:55 PM

Data File	LM33571.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 9:50:09 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

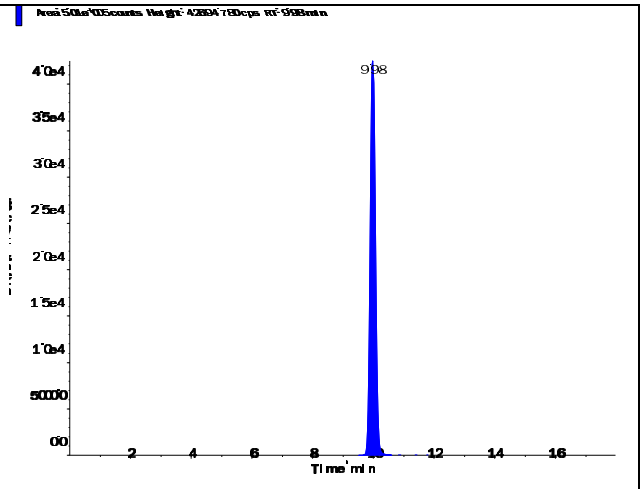
Sample Name	WG559340-05 STD (1.0 ug/L)	**Injection Vial**	55.00
Data File	LM33571.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 9:50:09 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-05	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.010e+05	9.98	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.830e+05	9.99	1.00	1.03
Perchlorate conf	5.680e+04	9.98	1.00	0.995

O18LP (Internal Standard)

RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



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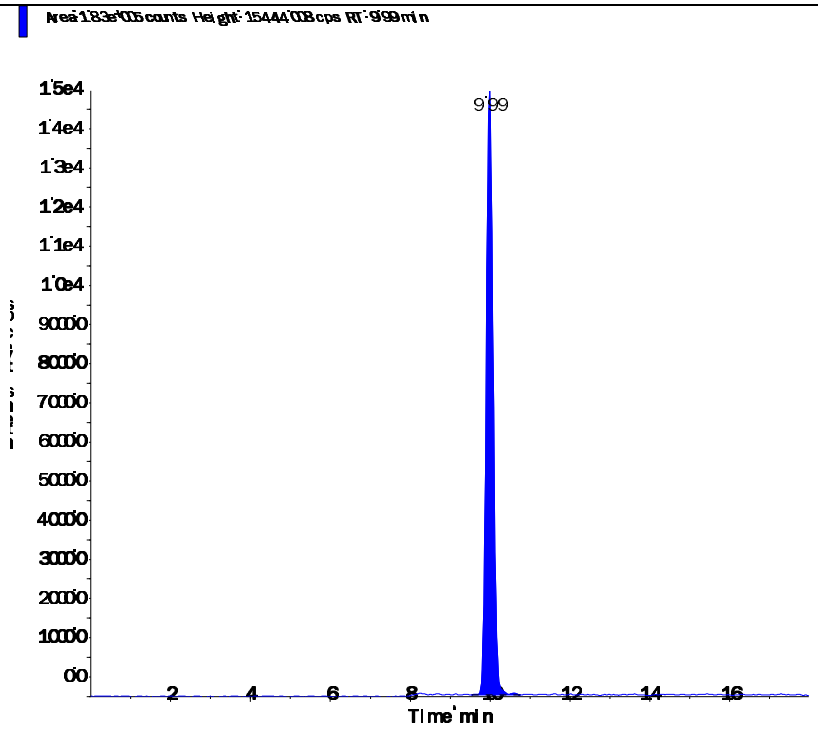
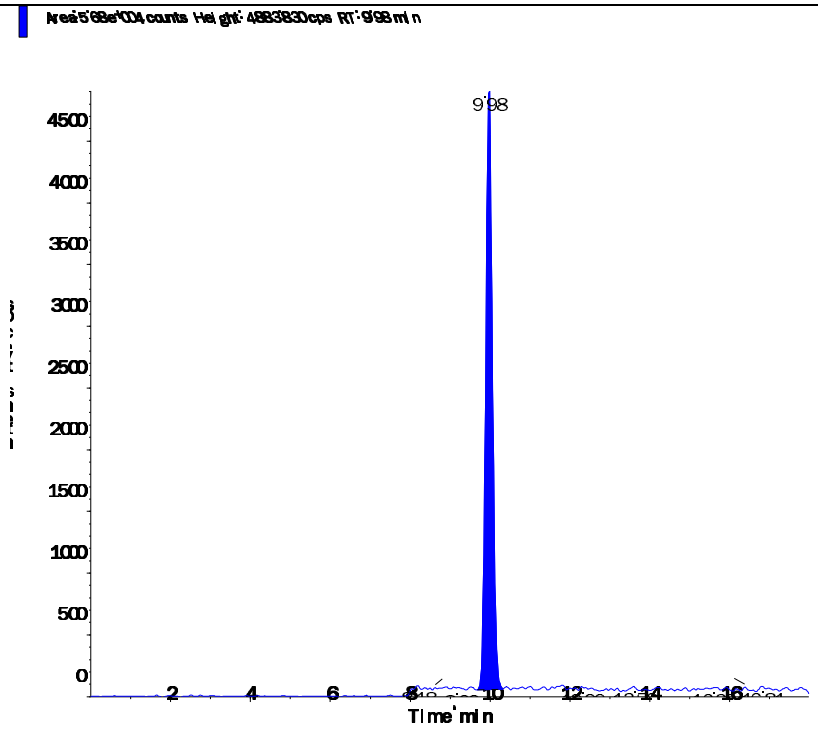
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.99 (9.94) min 1.03 ng/ml 0.366 (Standard)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.98 (9.92) min 0.995 ng/ml 0.113 (Standard)



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Data File	LM33572.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 10:09:06 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

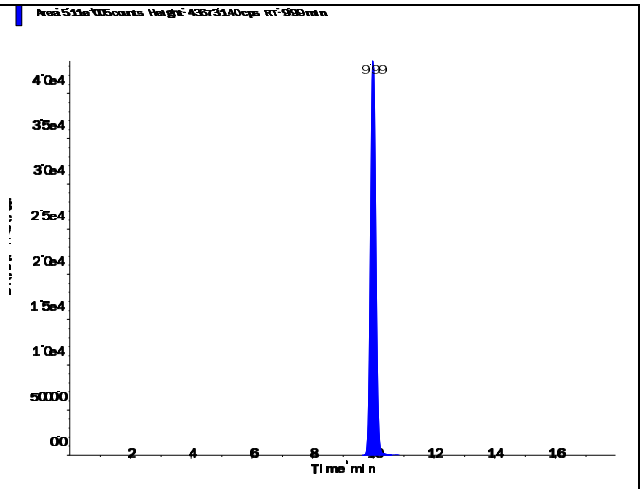
Sample Name	WG559340-06 STD (2.0 ug/L)	**Injection Vial**	56.00
Data File	LM33572.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 10:09:06 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-06	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.110e+05	9.99	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.630e+05	10.00	2.00	2.02
Perchlorate conf	1.170e+05	9.99	2.00	2.01

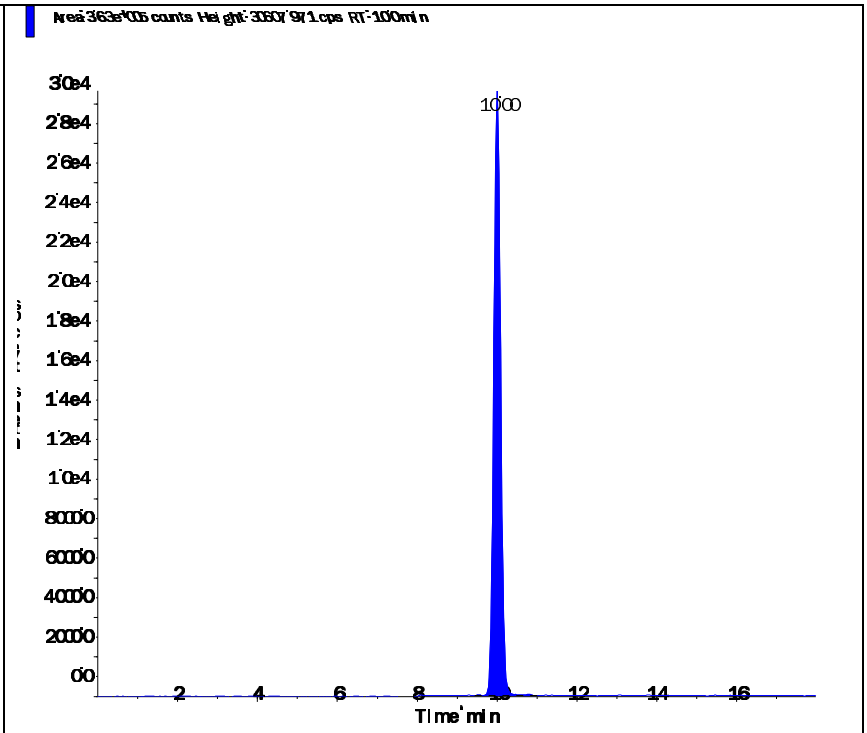
O18LP (Internal Standard)

RT (Exp. RT): 9.99(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



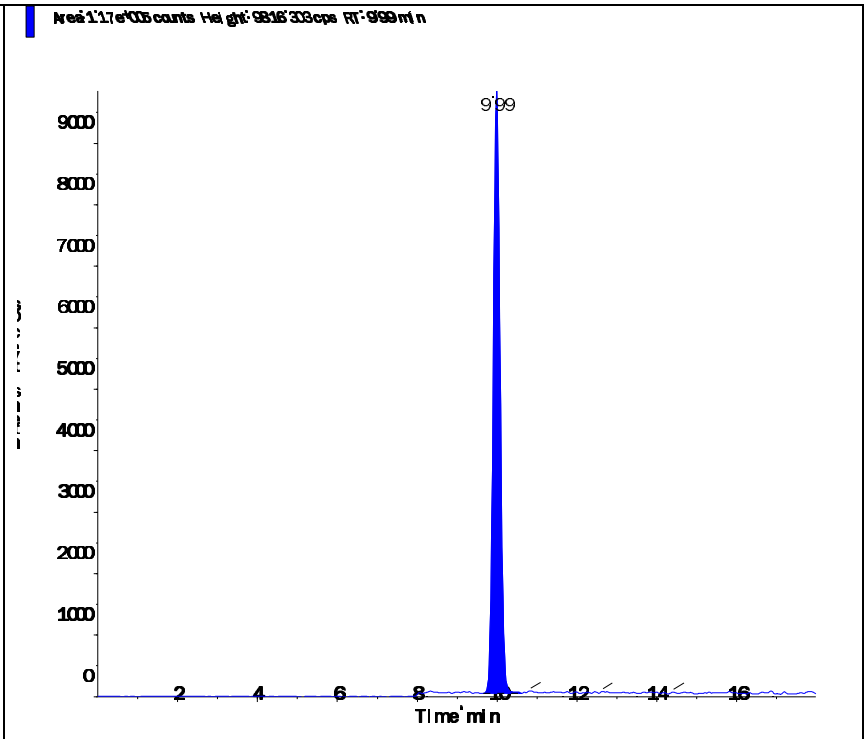
Perchlorate (98.8/83.3 amu)

RT (Exp. RT):	10.00 (9.94) min
Calculated conc:	2.02 ng/ml
Area Ratio:	0.711
Sample Type:	(Standard)



Perchlorate conf (100.8/85.2 amu)

RT (Exp. RT):	9.99 (9.92) min
Calculated conc:	2.01 ng/ml
Area Ratio:	0.228
Sample Type:	(Standard)



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Data File	LM33573.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 10:28:00 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

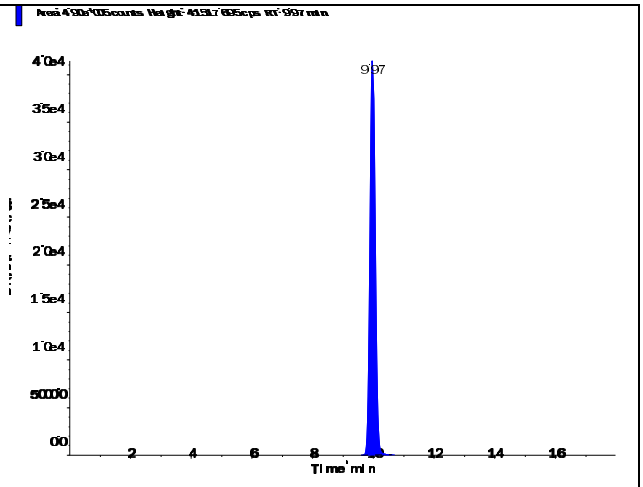
Sample Name	WG559340-07 STD (5.0 ug/L)	**Injection Vial**	57.00
Data File	LM33573.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 10:28:00 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-07	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

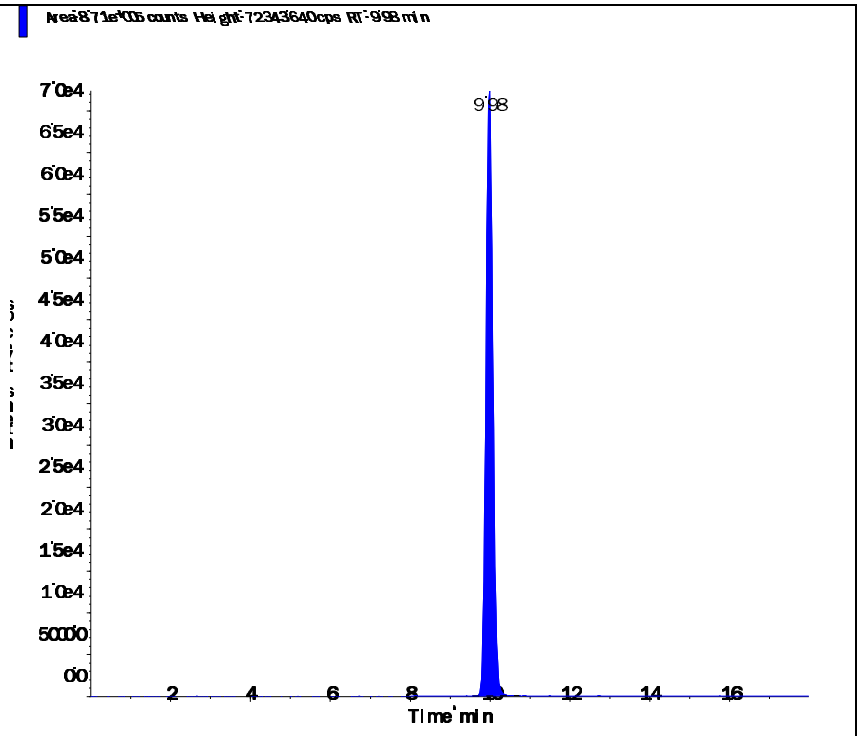
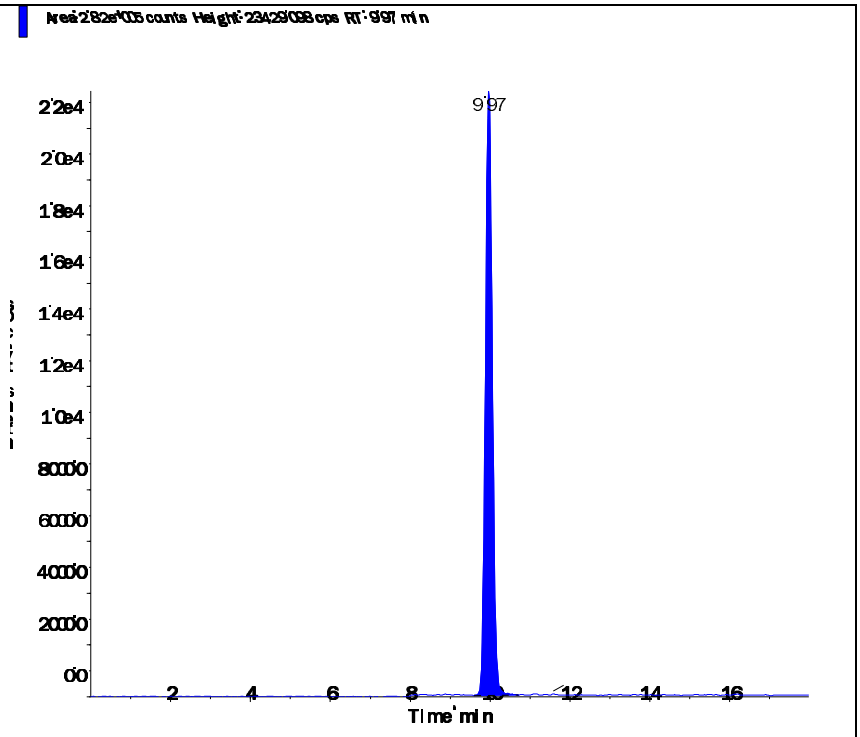
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	4.900e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.710e+05	9.98	5.00	5.07
Perchlorate conf	2.820e+05	9.97	5.00	5.11

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 9.98 (9.94) min Calculated conc: 5.07 ng/ml Area Ratio: 1.779 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 9.97 (9.92) min Calculated conc: 5.11 ng/ml Area Ratio: 0.576 Sample Type: (Standard)	

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Data File	LM33574.wiff	**Result Table**	030316_WTD.rdb
Acquisition Date	3/2/2016 10:46:56 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

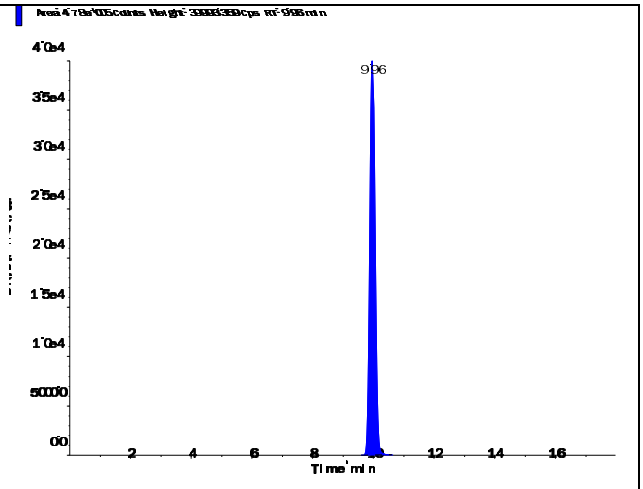
Sample Name	WG559340-08 STD (10 ug/L)	**Injection Vial**	58.00
Data File	LM33574.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 10:46:56 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	030316_WTD.rdb
Sample ID	WG559340-08	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

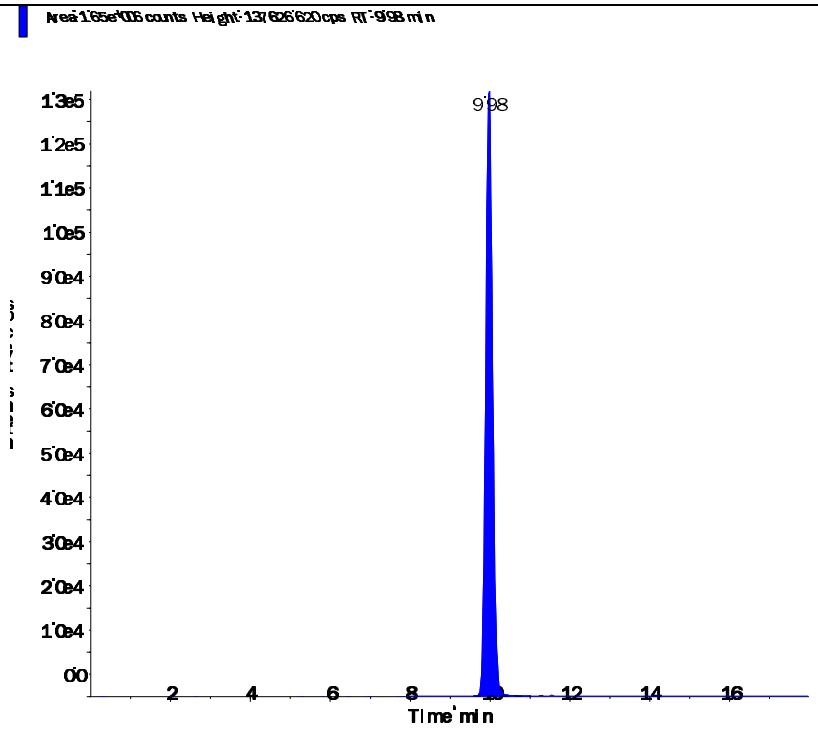
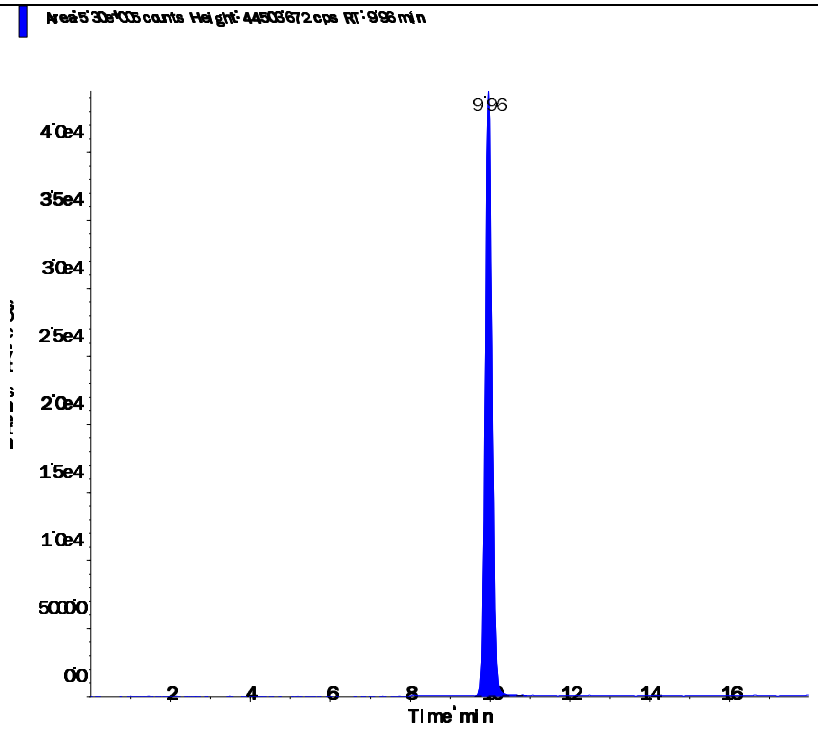
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	4.780e+05	9.96	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.650e+06	9.98	10.00	9.87
Perchlorate conf	5.300e+05	9.96	10.00	9.85

O18LP (Internal Standard)

RT (Exp. RT): 9.96(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 9.98 (9.94) min Calculated conc: 9.87 ng/ml Area Ratio: 3.458 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 9.96 (9.92) min Calculated conc: 9.85 ng/ml Area Ratio: 1.11 Sample Type: (Standard)	

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Data File	LM33575.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 11:05:52 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

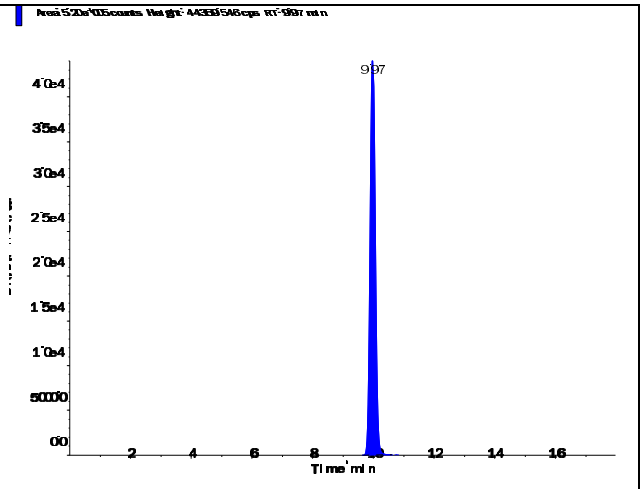
Sample Name	WG559340-09 SSCV (1.0 ug/L)	**Injection Vial**	59.00
Data File	LM33575.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 11:05:52 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559340-09	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

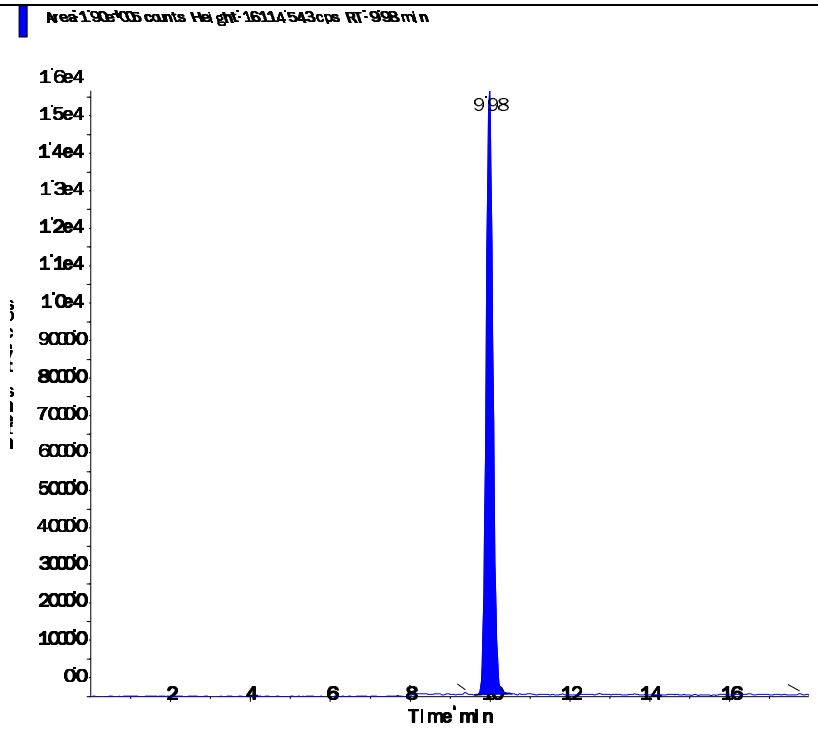
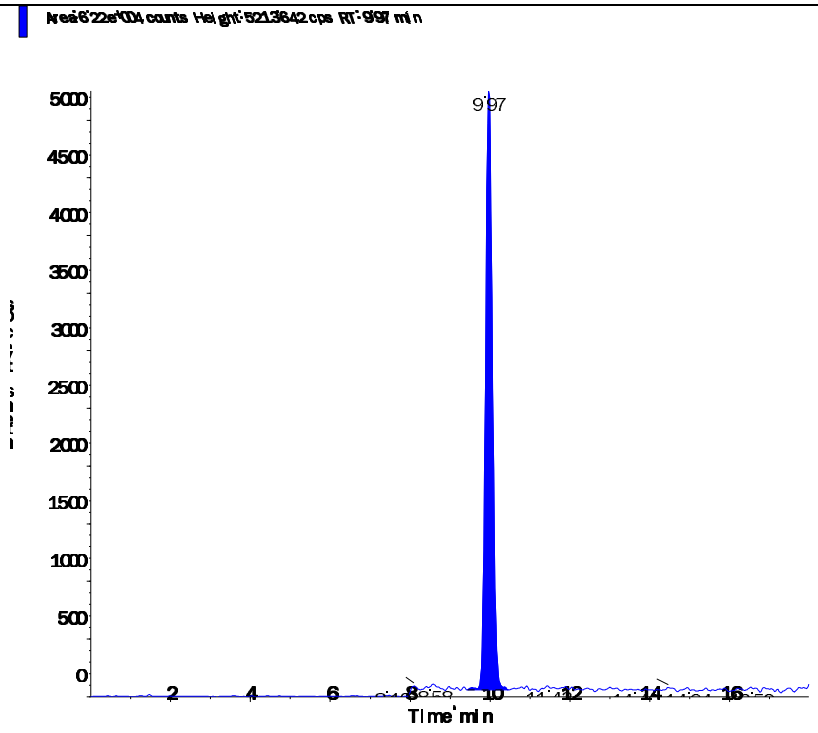
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.200e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.900e+05	9.98	1.00	1.03
Perchlorate conf	6.220e+04	9.97	1.00	1.05

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 9.98 (9.94) min Calculated conc: 1.03 ng/ml Area Ratio: 0.366 Sample Type: (Quality Control)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 9.97 (9.92) min Calculated conc: 1.05 ng/ml Area Ratio: 0.12 Sample Type: (Quality Control)	

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Data File	LM33608.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 9:32:45 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

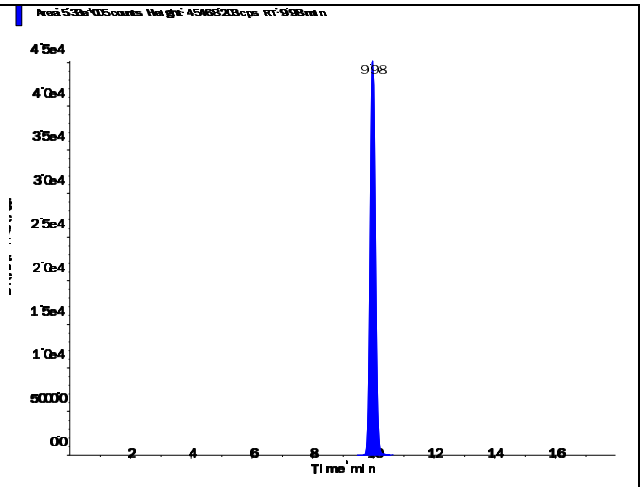
Sample Name	WG559291-07 CCV (1.0ug/L)	**Injection Vial**	55.00
Data File	LM33608.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 9:32:45 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-07	**Dilution Factor**	1.00
Sample Comment	1,1 STD72683	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.330e+05	9.98	5.00	-

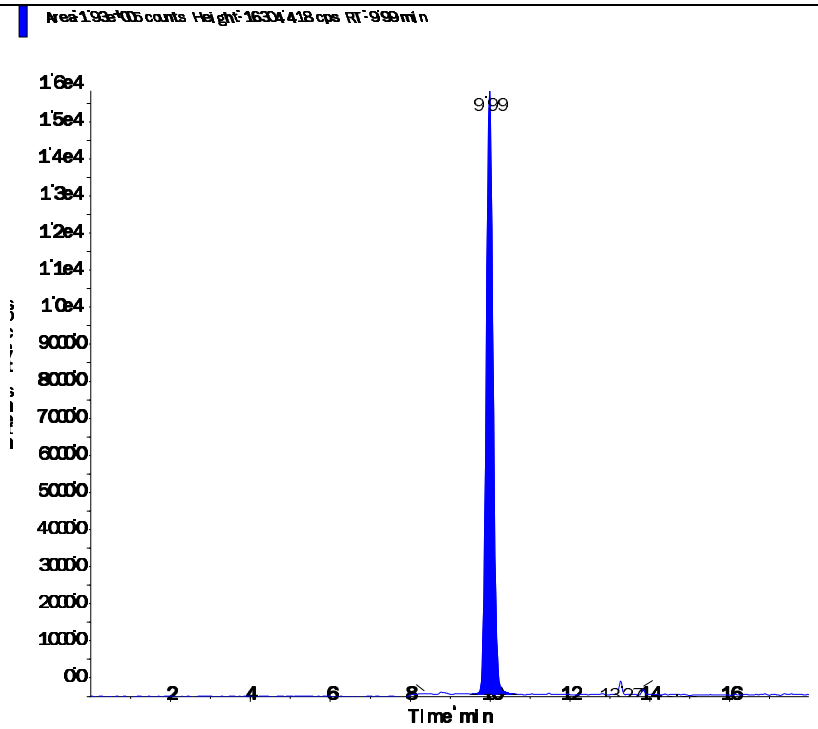
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.930e+05	9.99	1.00	1.02
Perchlorate conf	6.010e+04	9.97	1.00	0.988

O18LP (Internal Standard)

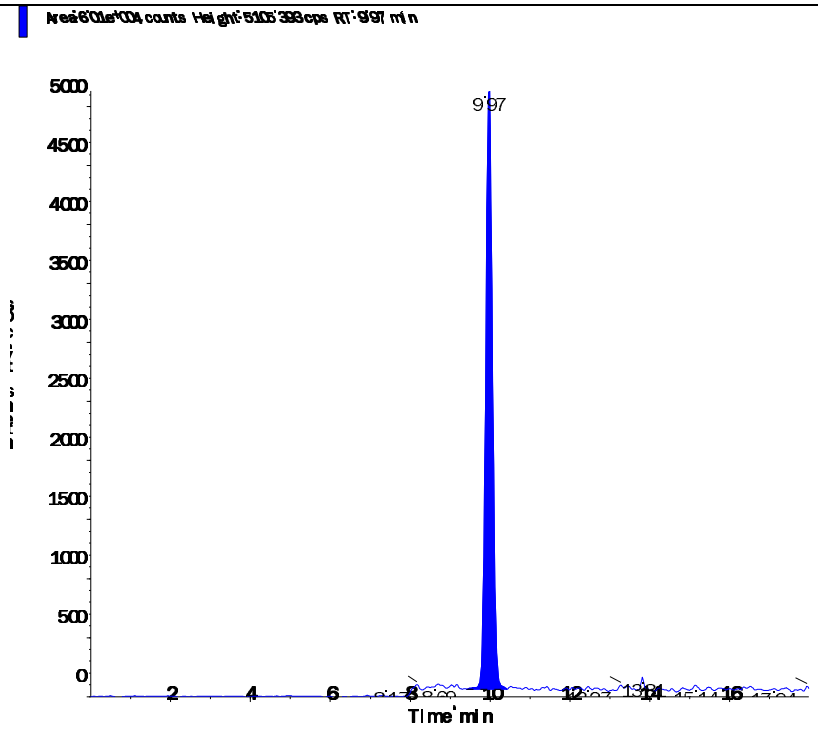
RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.99 (9.94) min 1.02 ng/ml 0.362 (Quality Control)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.97 (9.92) min 0.988 ng/ml 0.113 (Quality Control)



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Data File	LM33622.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 1:57:55 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

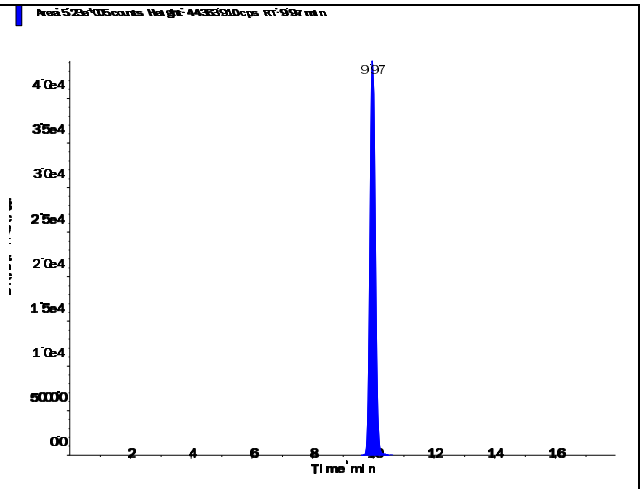
Sample Name	WG559291-09 CCV (1.0ug/L)	**Injection Vial**	55.00
Data File	LM33622.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 1:57:55 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-09	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.230e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.860e+05	9.98	1.00	1.00
Perchlorate conf	6.020e+04	9.97	1.00	1.01

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



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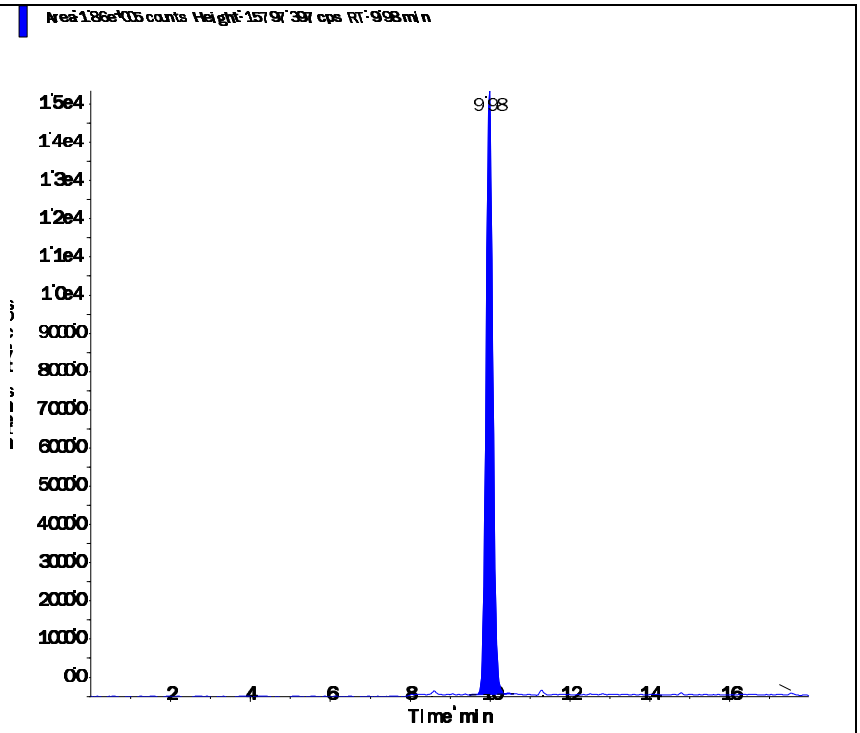
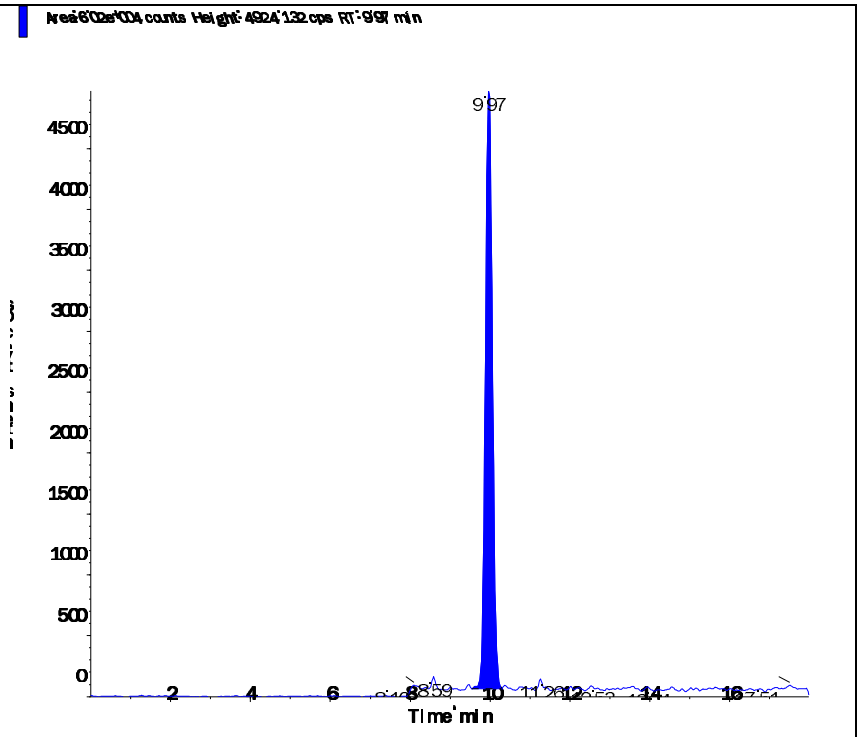
Perchlorate (98.8/83.3 amu)	
RT (Exp. RT):	9.98 (9.94) min
Calculated conc:	1.00 ng/ml
Area Ratio:	0.355
Sample Type:	(Quality Control)



Perchlorate conf (100.8/85.2 amu)	
RT (Exp. RT):	9.97 (9.92) min
Calculated conc:	1.01 ng/ml
Area Ratio:	0.115
Sample Type:	(Quality Control)



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Data File	LM33635.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 6:04:06 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

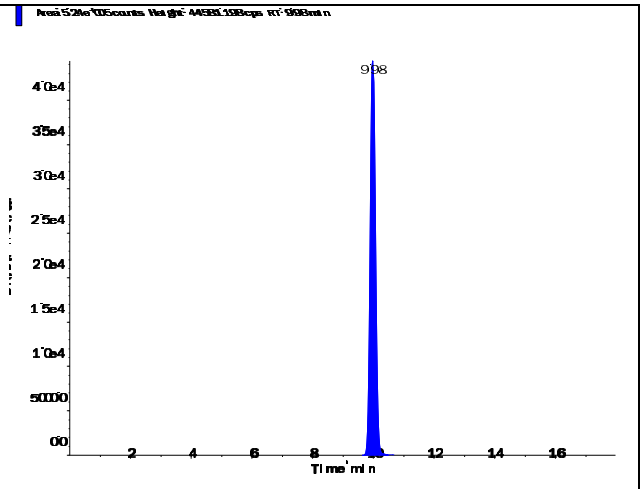
Sample Name	WG559291-11 CCV (1.0ug/L)	**Injection Vial**	55.00
Data File	LM33635.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 6:04:06 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-11	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.240e+05	9.98	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.890e+05	9.99	1.00	1.02
Perchlorate conf	6.040e+04	9.98	1.00	1.01

O18LP (Internal Standard)

RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



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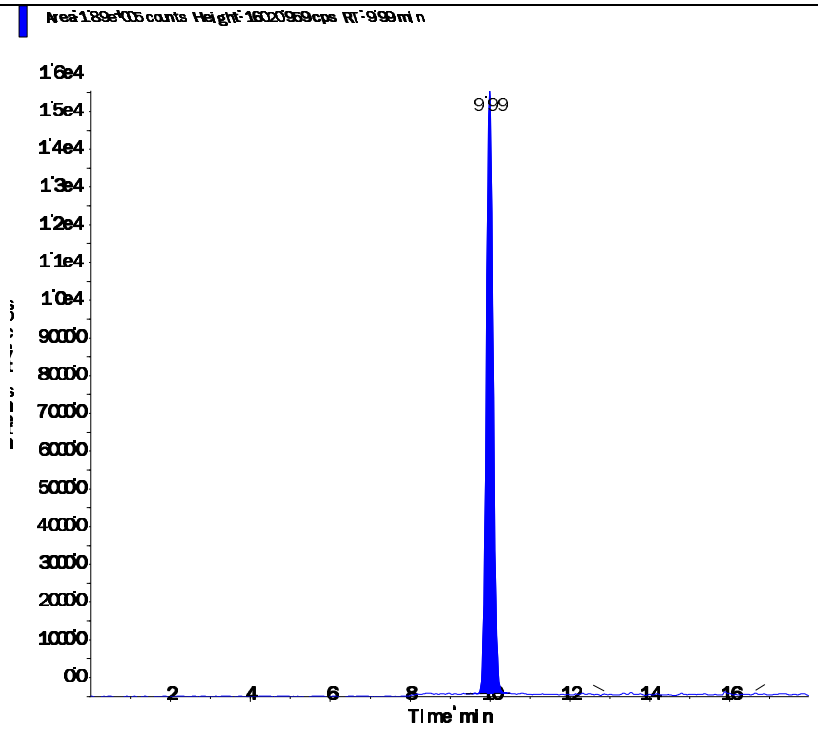
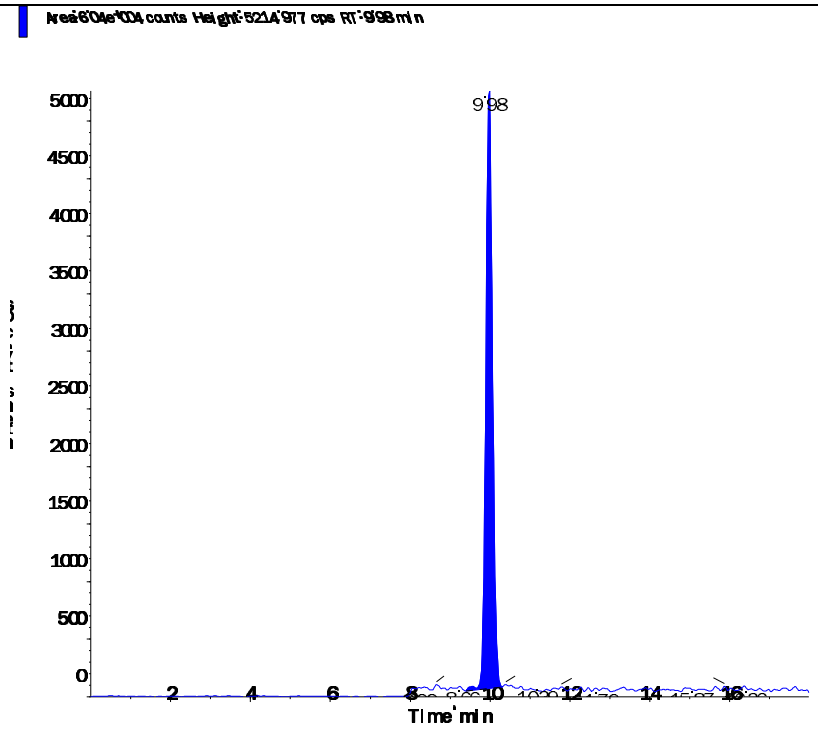
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.99 (9.94) min 1.02 ng/ml 0.362 (Quality Control)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.98 (9.92) min 1.01 ng/ml 0.115 (Quality Control)



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Data File	LM33642.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 8:16:40 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

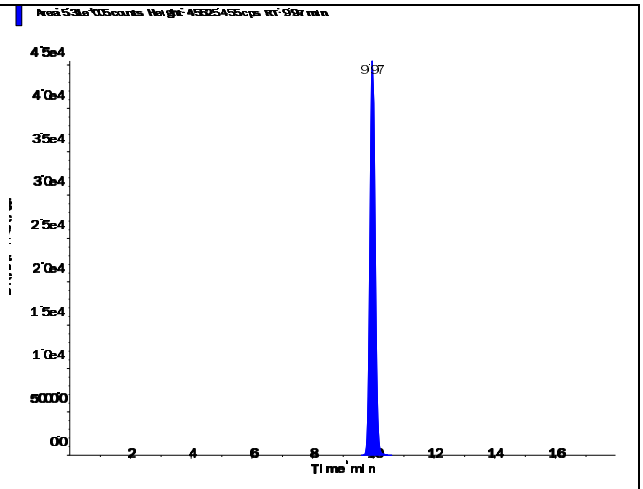
Sample Name	WG559291-13 CCV (1.0ug/L)	**Injection Vial**	55.00
Data File	LM33642.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 8:16:40 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-13	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.310e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.920e+05	9.98	1.00	1.02
Perchlorate conf	6.040e+04	9.97	1.00	0.996

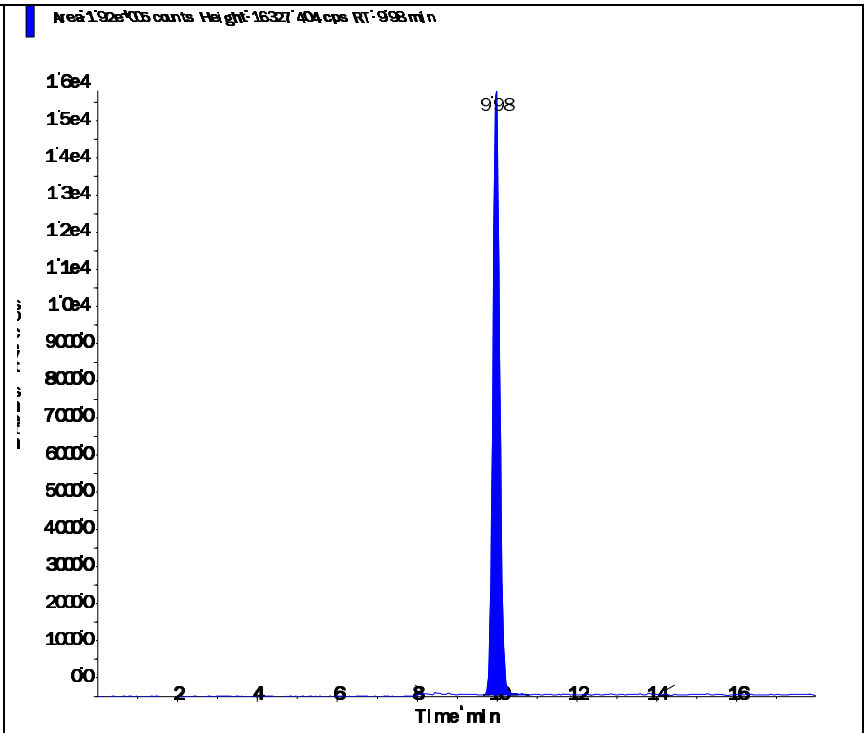
O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



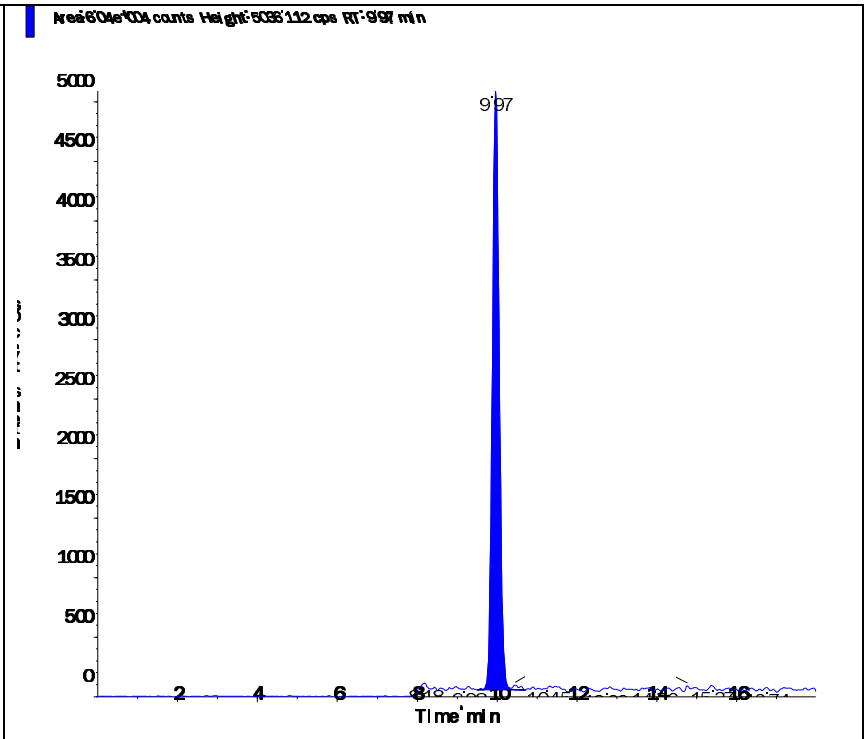
Perchlorate (98.8/83.3 amu)

RT (Exp. RT):	9.98 (9.94) min
Calculated conc:	1.02 ng/ml
Area Ratio:	0.361
Sample Type:	(Quality Control)



Perchlorate conf (100.8/85.2 amu)

RT (Exp. RT):	9.97 (9.92) min
Calculated conc:	0.996 ng/ml
Area Ratio:	0.114
Sample Type:	(Quality Control)



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Data File	LM33651.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 11:07:03 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

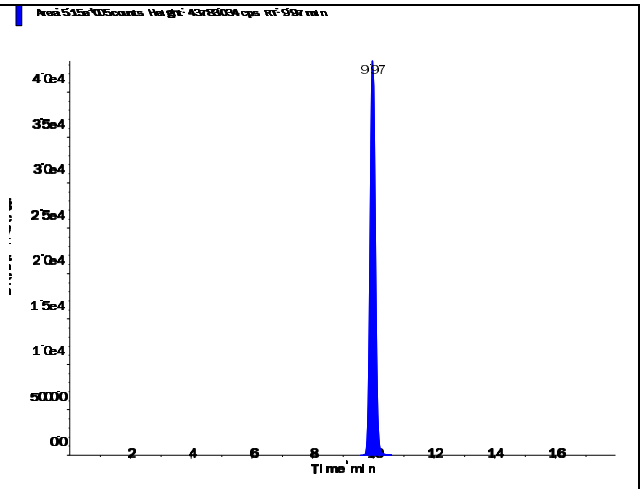
Sample Name	WG559291-15 CCV (1.0ug/L)	**Injection Vial**	55.00
Data File	LM33651.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 11:07:03 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-15	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.150e+05	9.97	5.00	-

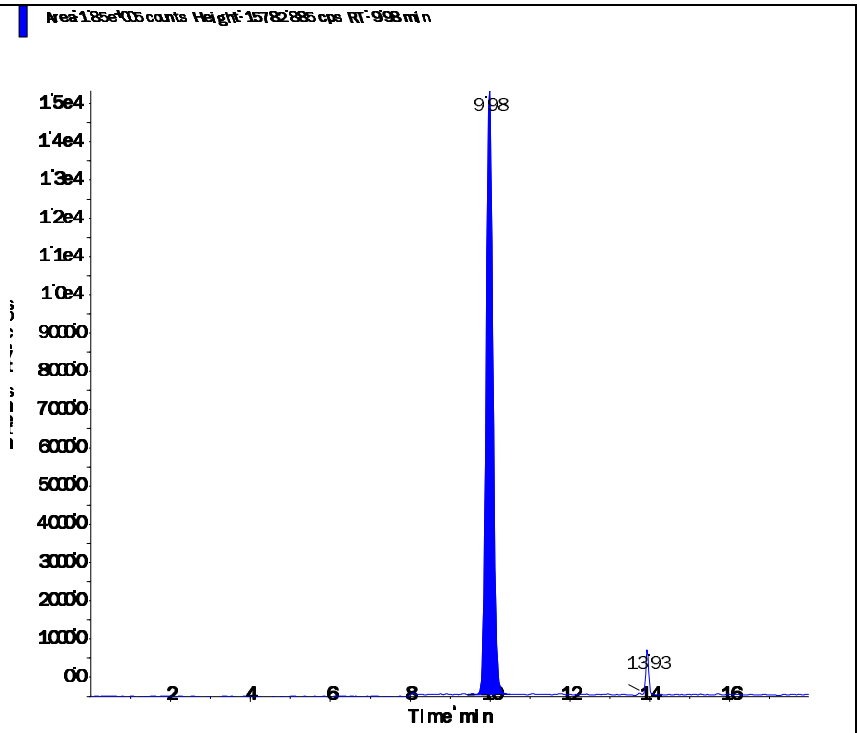
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.850e+05	9.98	1.00	1.02
Perchlorate conf	5.840e+04	9.97	1.00	0.994

O18LP (Internal Standard)

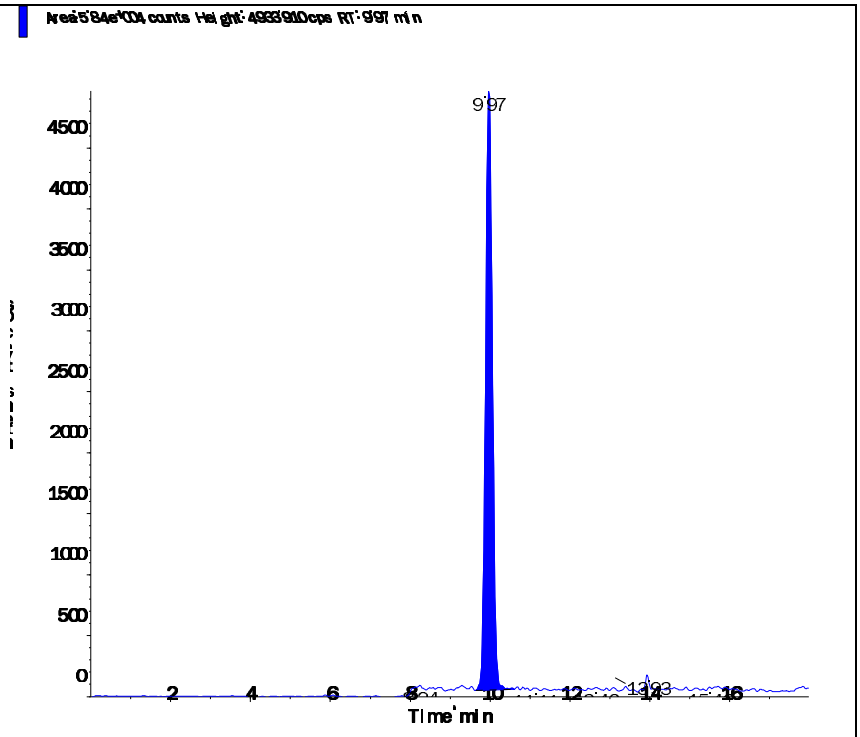
RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	9.98 (9.94) min 1.02 ng/ml 0.36 (Quality Control)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	9.97 (9.92) min 0.994 ng/ml 0.113 (Quality Control)



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Data File	LM33611.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 10:29:34 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

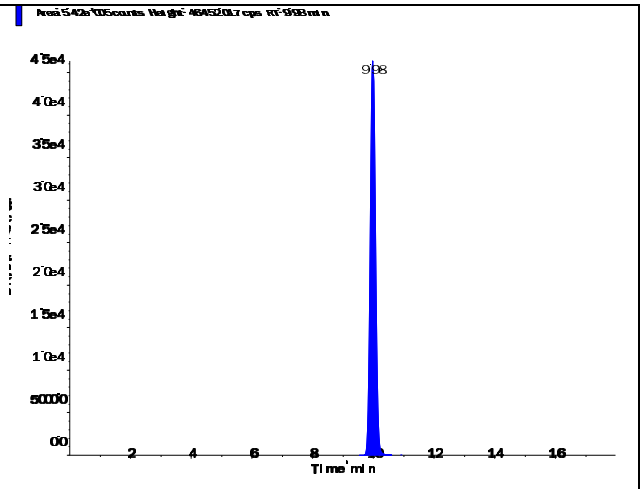
Sample Name	WG559292-07 MRL (0.2ug/L)	**Injection Vial**	53.00
Data File	LM33611.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 10:29:34 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-07	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

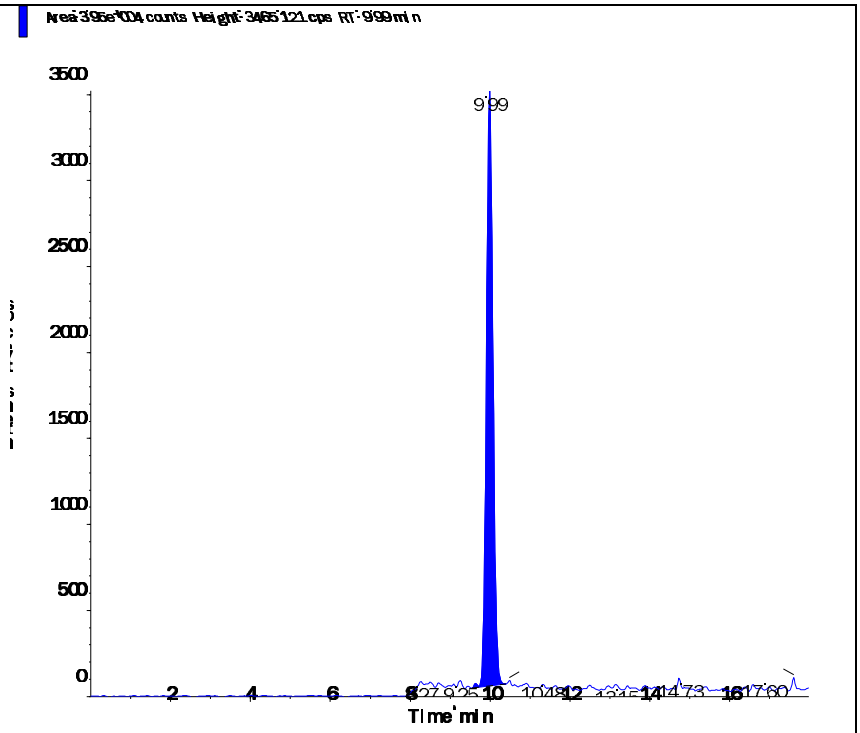
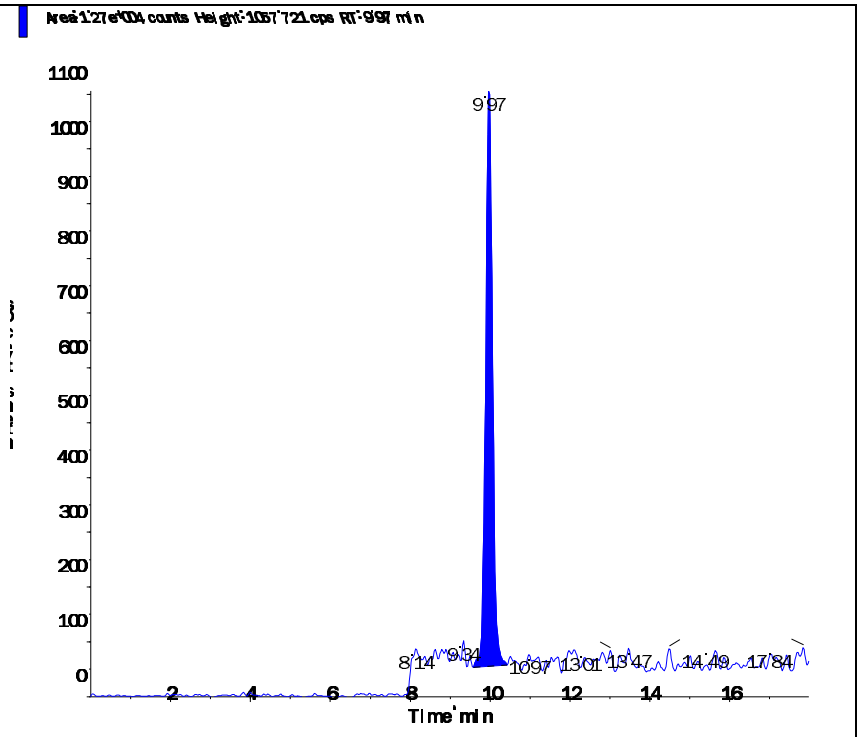
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.420e+05	9.98	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.950e+04	9.99	N/A	0.196
Perchlorate conf	1.270e+04	9.97	N/A	0.194

O18LP (Internal Standard)

RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 9.99 (9.94) min Calculated conc: 0.196 ng/ml Area Ratio: 0.073 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 9.97 (9.92) min Calculated conc: 0.194 ng/ml Area Ratio: 0.023 Sample Type: (Unknown)	

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Data File	LM33623.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 2:16:51 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

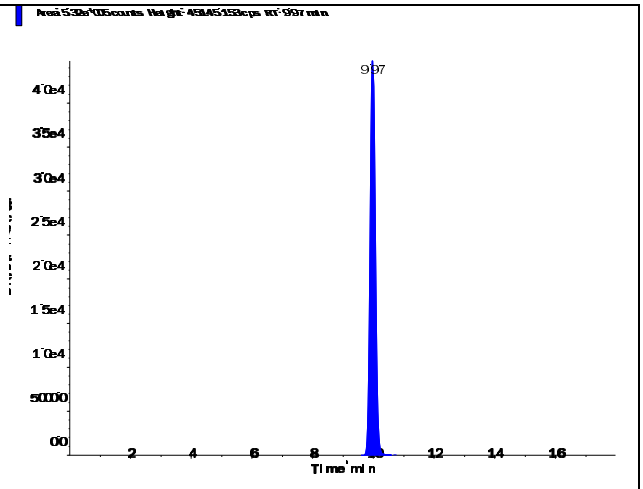
Sample Name	WG559292-08 MRL (0.2ug/L)	**Injection Vial**	53.00
Data File	LM33623.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 2:16:51 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-08	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

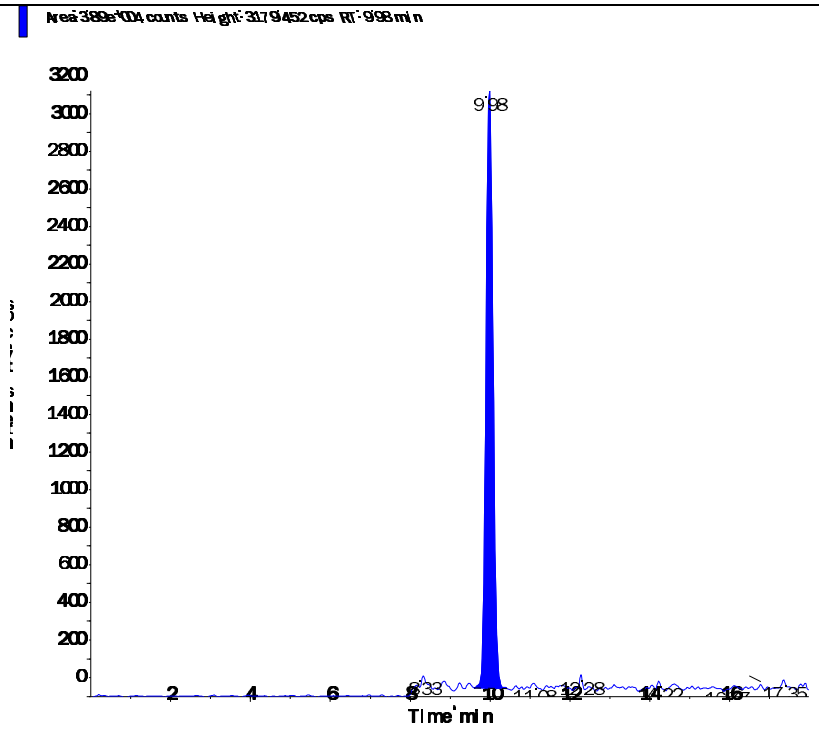
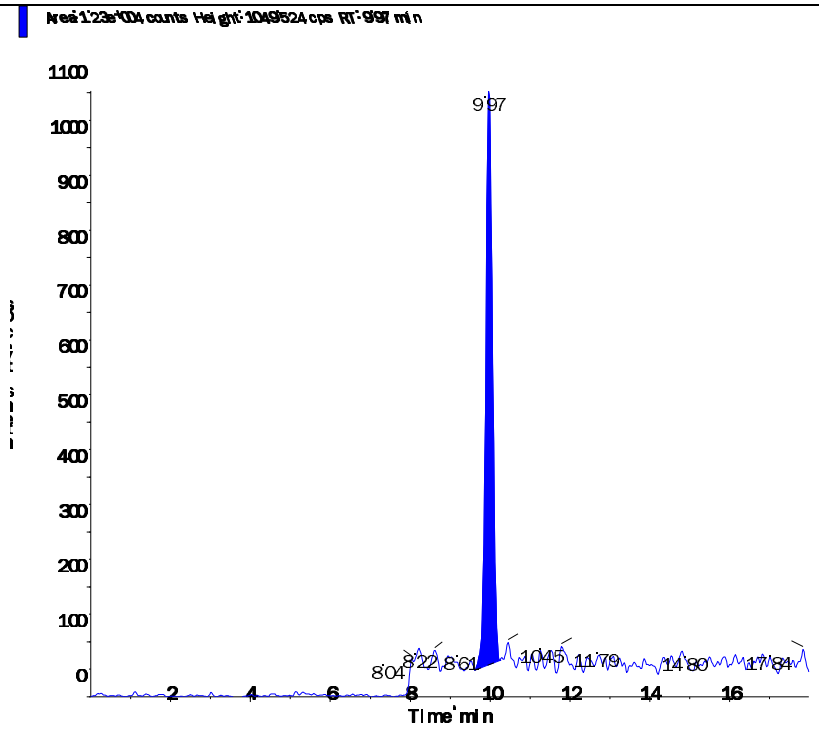
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.320e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.890e+04	9.98	N/A	0.196
Perchlorate conf	1.230e+04	9.97	N/A	0.191

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 9.98 (9.94) min Calculated conc: 0.196 ng/ml Area Ratio: 0.073 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 9.97 (9.92) min Calculated conc: 0.191 ng/ml Area Ratio: 0.023 Sample Type: (Unknown)	

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Data File	LM33636.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 6:23:01 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

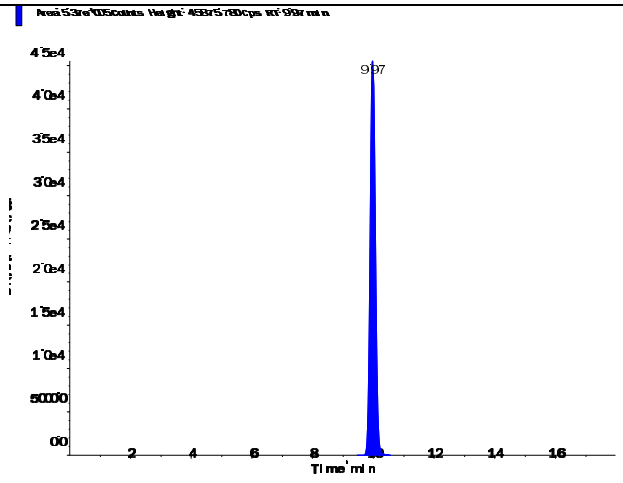
Sample Name	WG559292-09 MRL (0.2ug/L)	**Injection Vial**	53.00
Data File	LM33636.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 6:23:01 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-09	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.370e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.890e+04	9.99	N/A	0.194
Perchlorate conf	1.350e+04	9.97	N/A	0.209

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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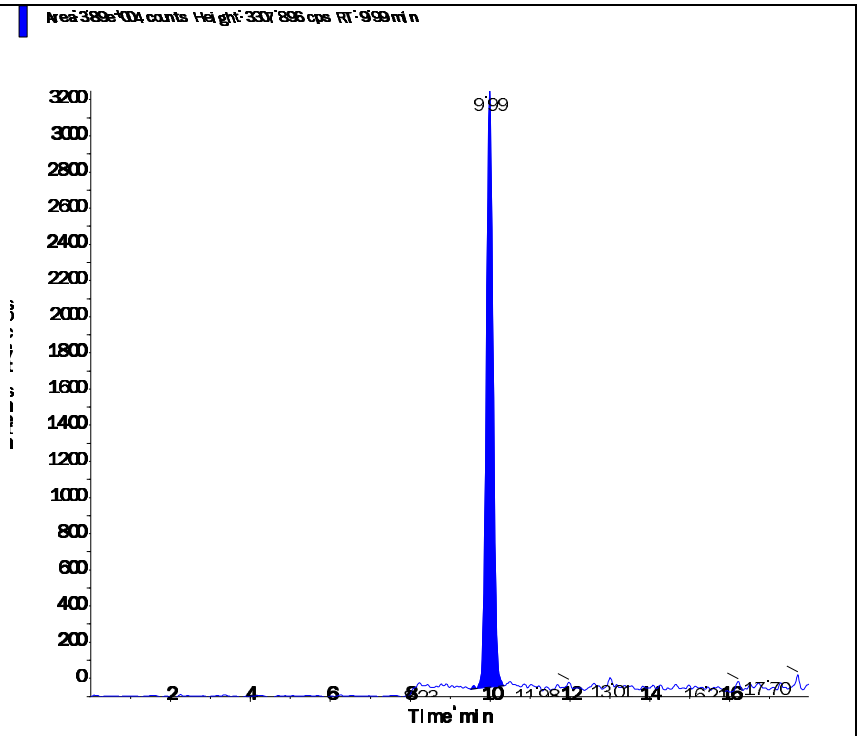
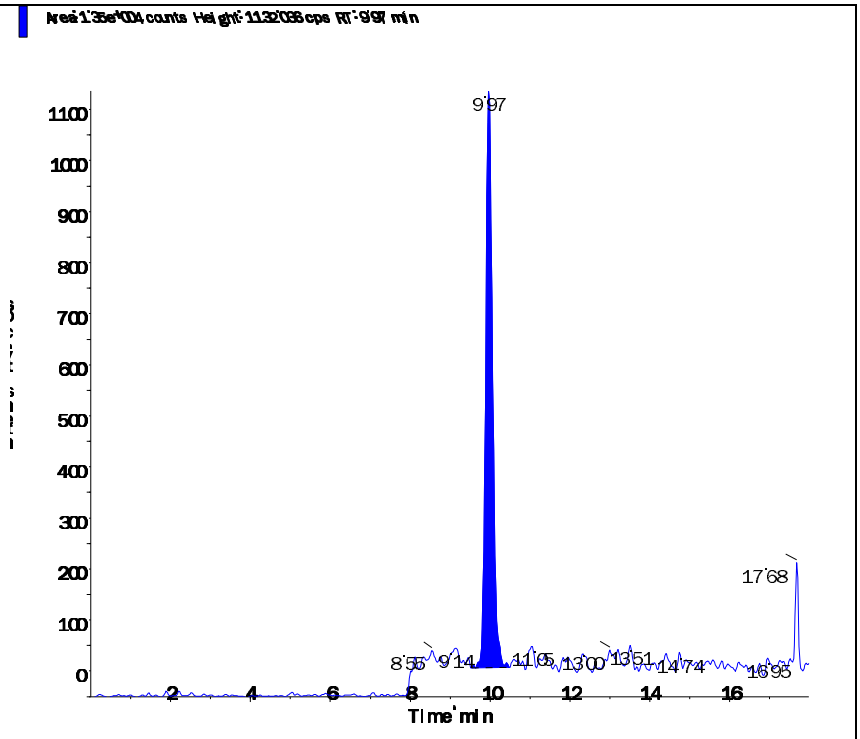
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.99 (9.94) min 0.194 ng/ml 0.072 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.97 (9.92) min 0.209 ng/ml 0.025 (Unknown)



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Data File	LM33643.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 8:35:36 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

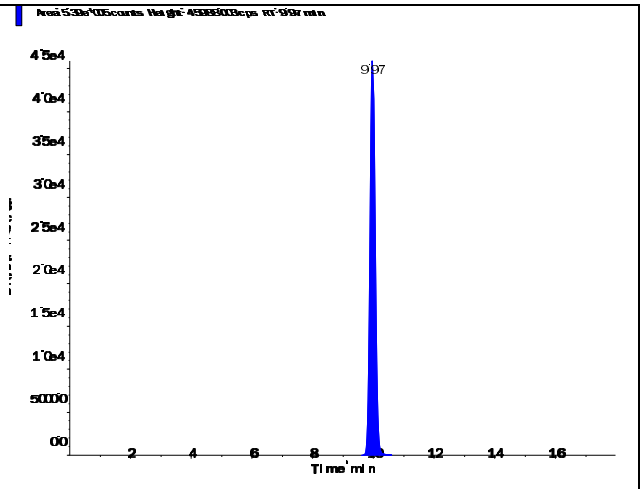
Sample Name	WG559292-10 MRL (0.2ug/L)	**Injection Vial**	53.00
Data File	LM33643.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 8:35:36 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-10	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.390e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.930e+04	9.98	N/A	0.196
Perchlorate conf	1.350e+04	9.97	N/A	0.209

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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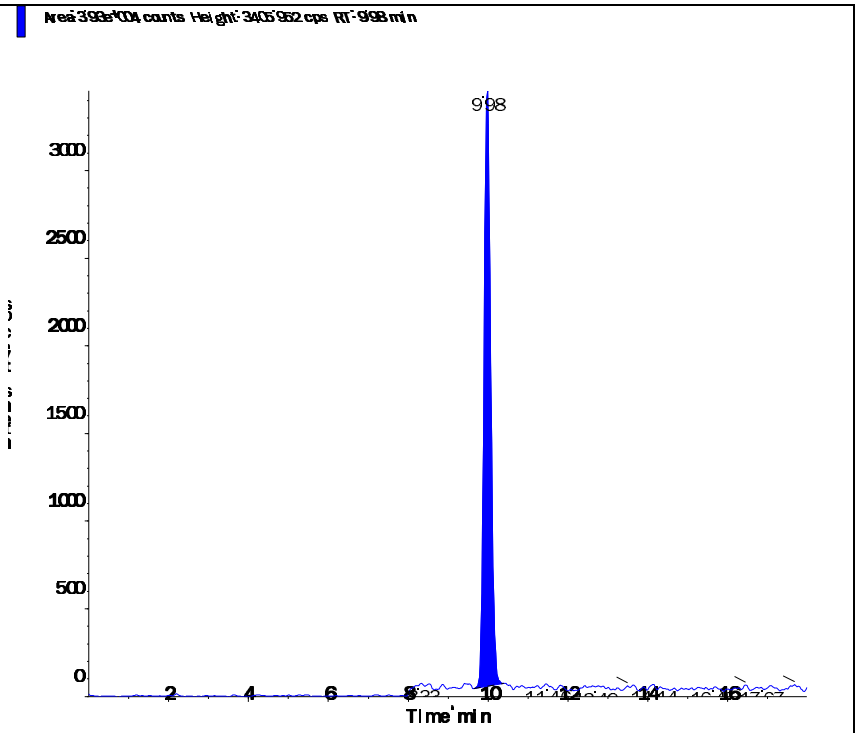
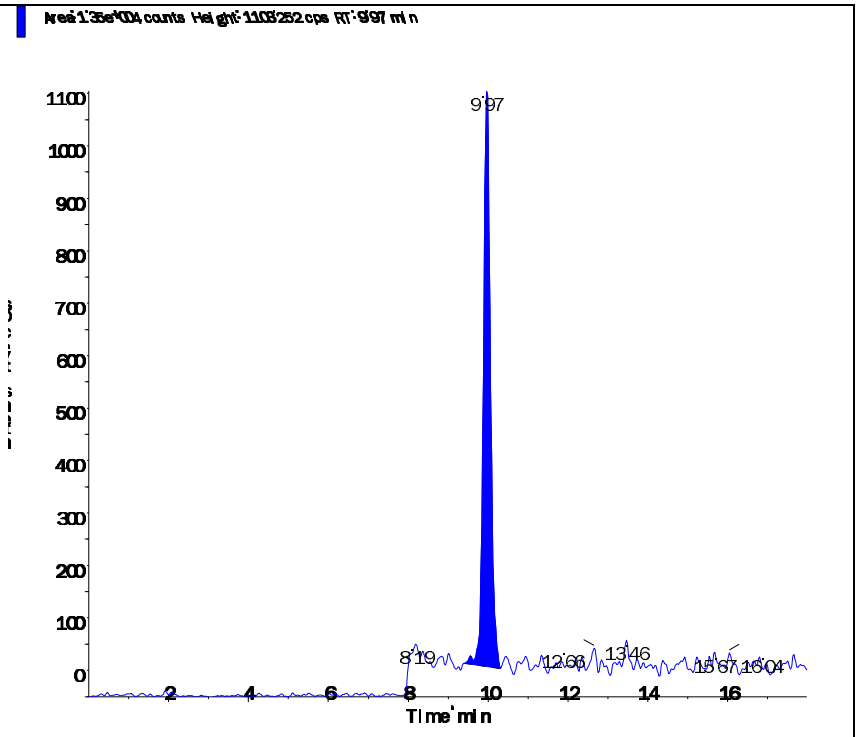
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.98 (9.94) min 0.196 ng/ml 0.073 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.97 (9.92) min 0.209 ng/ml 0.025 (Unknown)



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Data File	LM33652.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 11:25:58 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

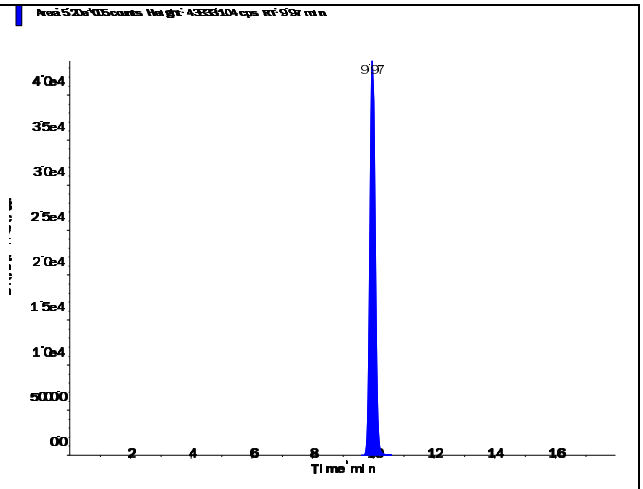
Sample Name	WG559292-11 MRL (0.2ug/L)	**Injection Vial**	53.00
Data File	LM33652.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 11:25:58 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-11	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.200e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.680e+04	9.98	N/A	0.19
Perchlorate conf	1.230e+04	9.97	N/A	0.197

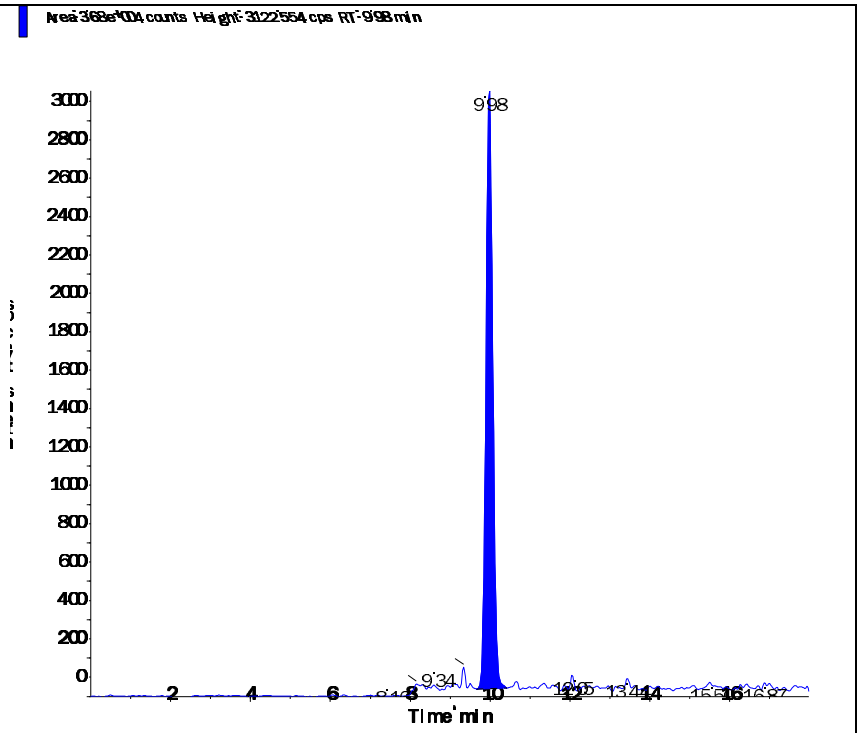
O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



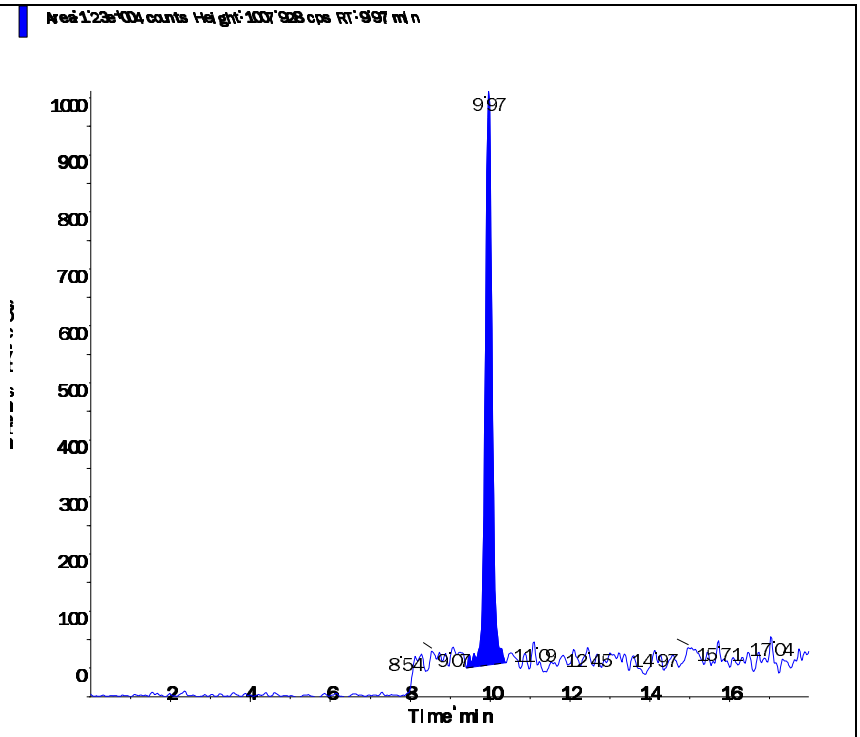
Perchlorate (98.8/83.3 amu)

RT (Exp. RT):	9.98 (9.94) min
Calculated conc:	0.19 ng/ml
Area Ratio:	0.071
Sample Type:	(Unknown)



Perchlorate conf (100.8/85.2 amu)

RT (Exp. RT):	9.97 (9.92) min
Calculated conc:	0.197 ng/ml
Area Ratio:	0.024
Sample Type:	(Unknown)



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Data File	LM33610.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 10:10:37 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

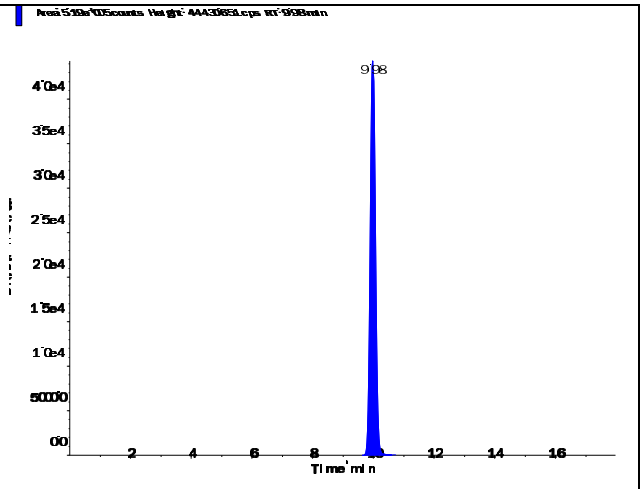
Sample Name	WG559291-08 CCB	**Injection Vial**	51.00
Data File	LM33610.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 10:10:37 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-08	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.190e+05	9.98	5.00	-

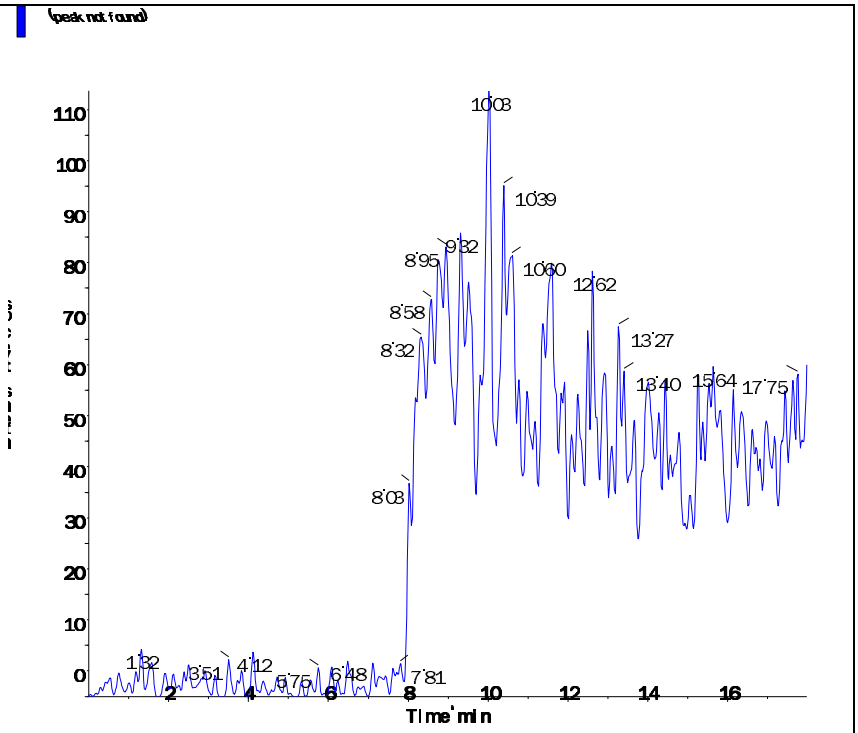
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	9.590e+02	10.00	N/A	0.0025

O18LP (Internal Standard)

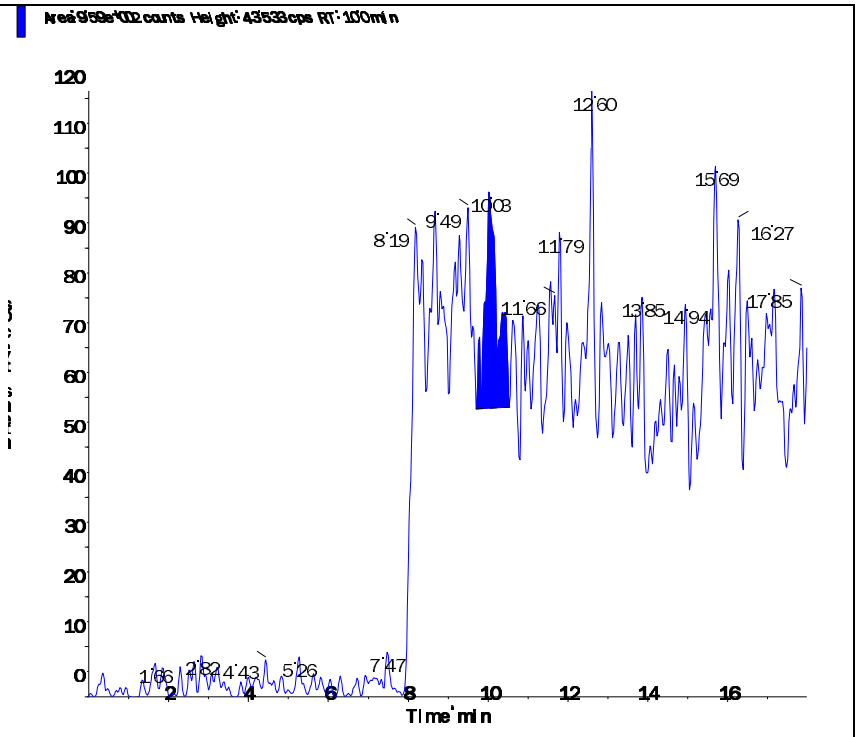
RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	0.00 (9.94) min No Peak ng/ml 0.00 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	10.00 (9.92) min 0.0025 ng/ml 0.002 (Unknown)



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Created with Analyst Reporter
Printed: 3/3/2016 2:37 PM

Data File	LM33624.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 2:35:46 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

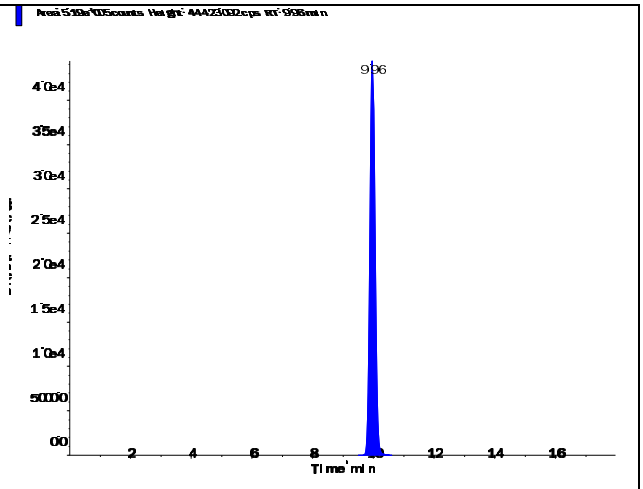
Sample Name	WG559291-10 CCB	**Injection Vial**	51.00
Data File	LM33624.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 2:35:46 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-10	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

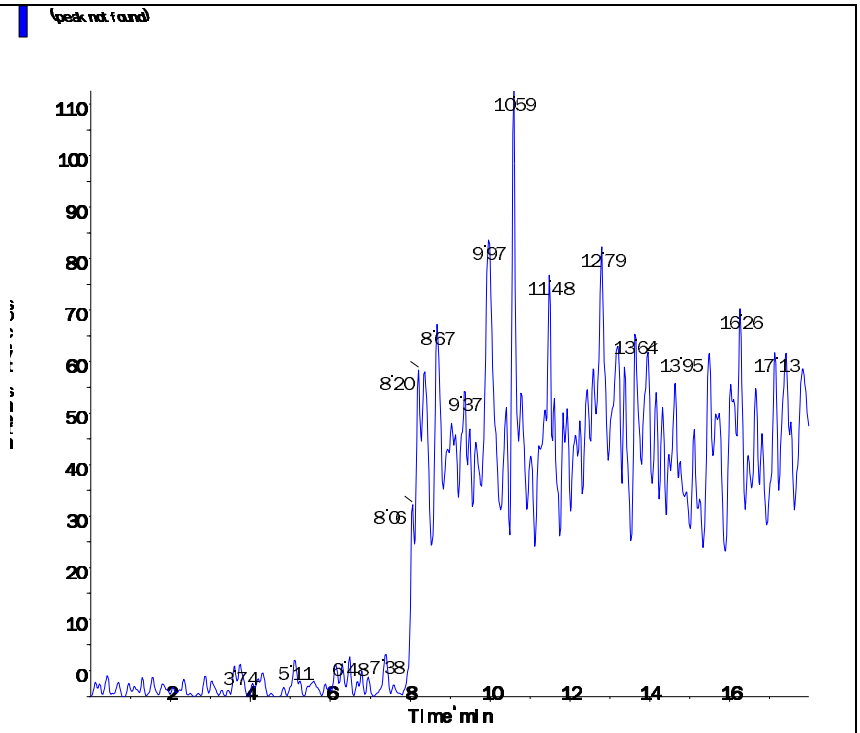
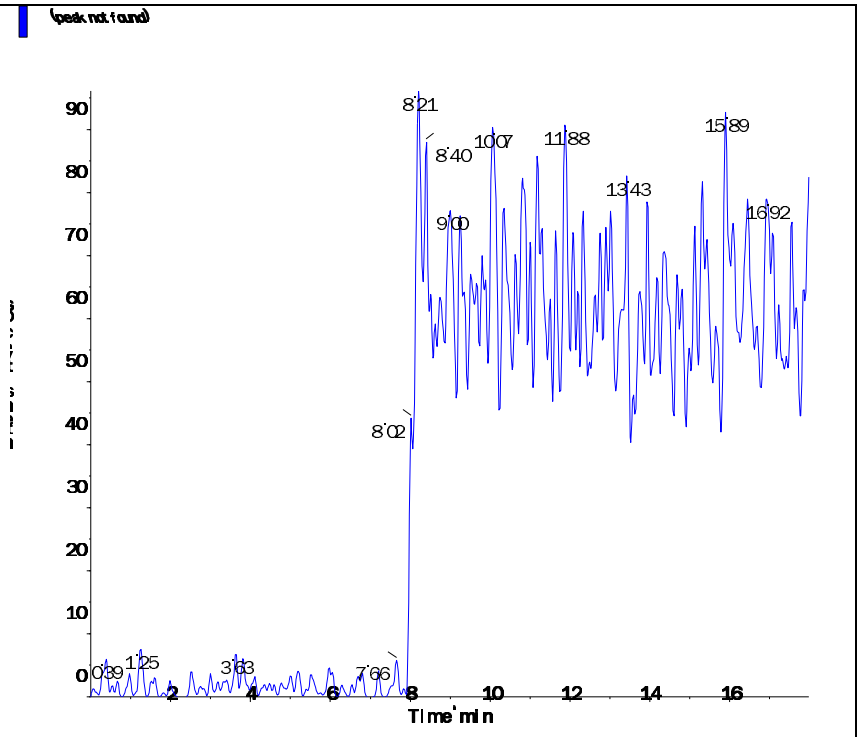
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.190e+05	9.96	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	0.000e+00	0.00	N/A	No Peak

O18LP (Internal Standard)

RT (Exp. RT): 9.96(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 0.00 (9.94) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 0.00 (9.92) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	

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Created with Analyst Reporter
Printed: 3/3/2016 2:42 PM

Data File	LM33637.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 6:41:58 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

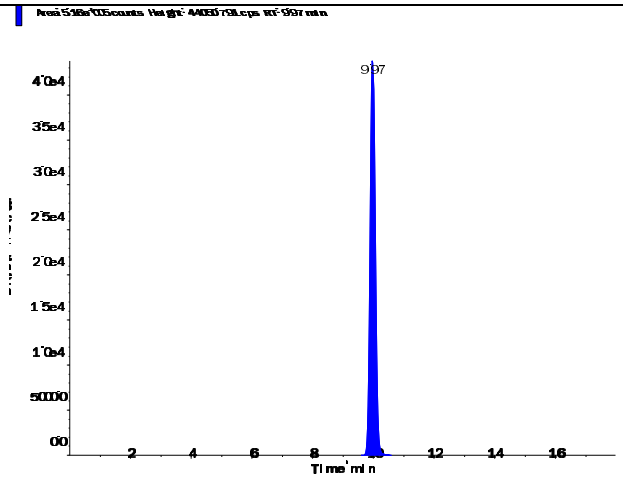
Sample Name	WG559291-12 CCB	**Injection Vial**	51.00
Data File	LM33637.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 6:41:58 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-12	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

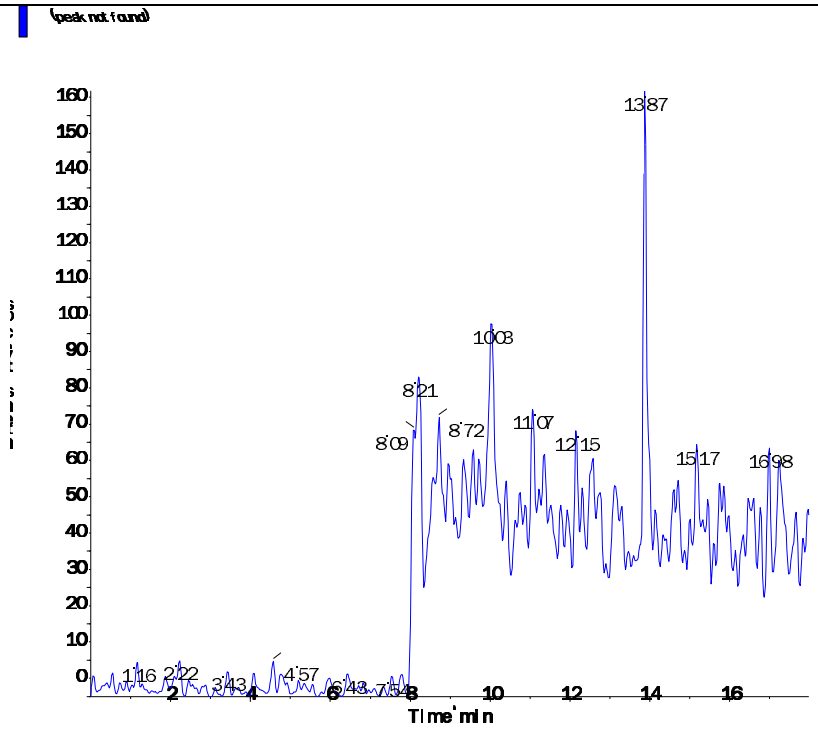
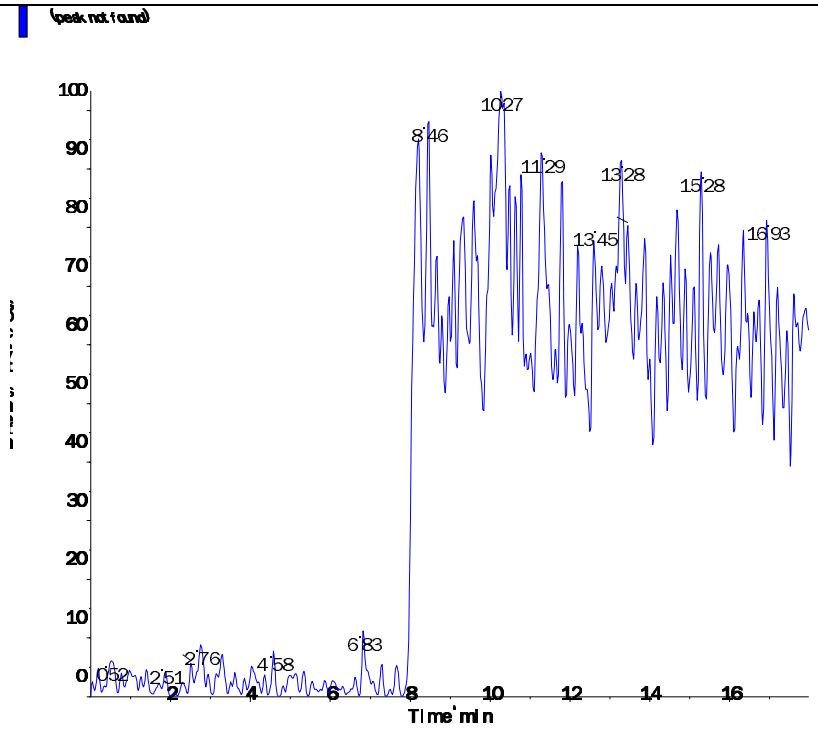
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.160e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	0.000e+00	0.00	N/A	No Peak

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 0.00 (9.94) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 0.00 (9.92) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	

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Printed: 3/3/2016 2:44 PM

Data File	LM33644.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 8:54:31 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

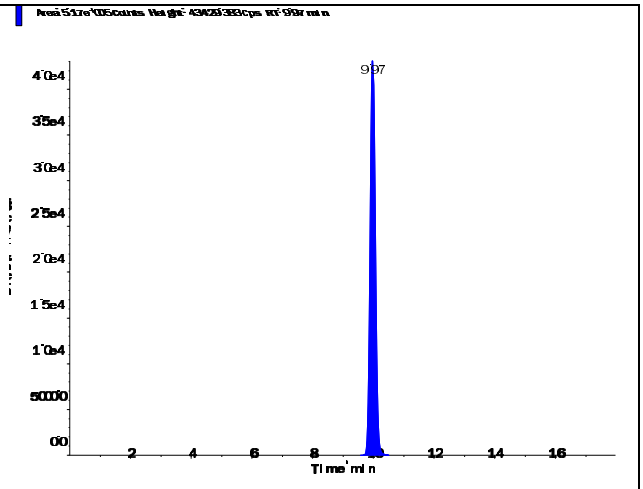
Sample Name	WG559291-14 CCB	**Injection Vial**	51.00
Data File	LM33644.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 8:54:31 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-14	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.170e+05	9.97	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	6.560e+02	9.95	N/A	< 0

O18LP (Internal Standard)

RT (Exp. RT): 9.97(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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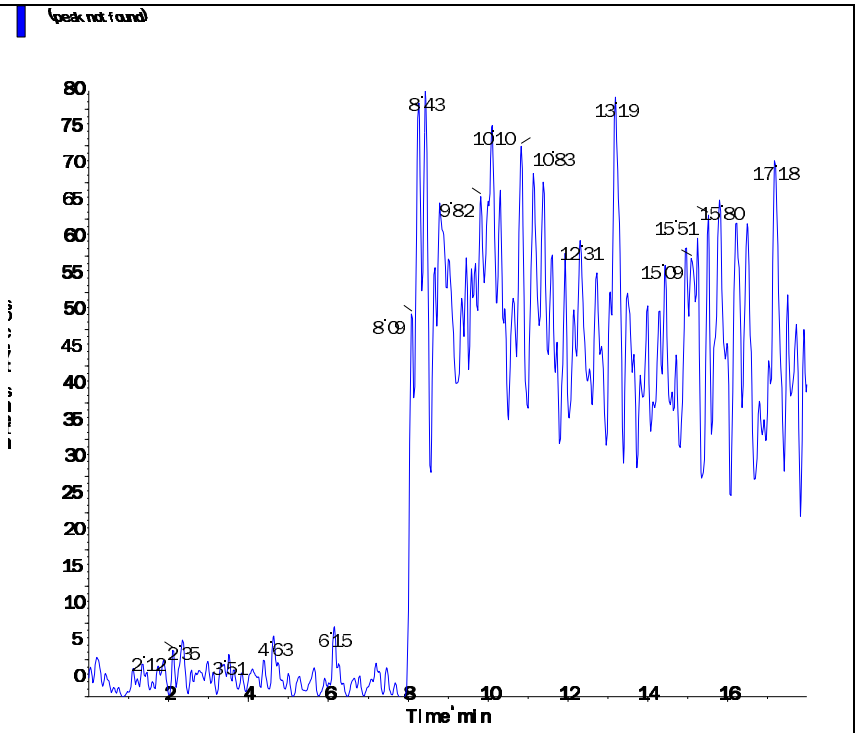
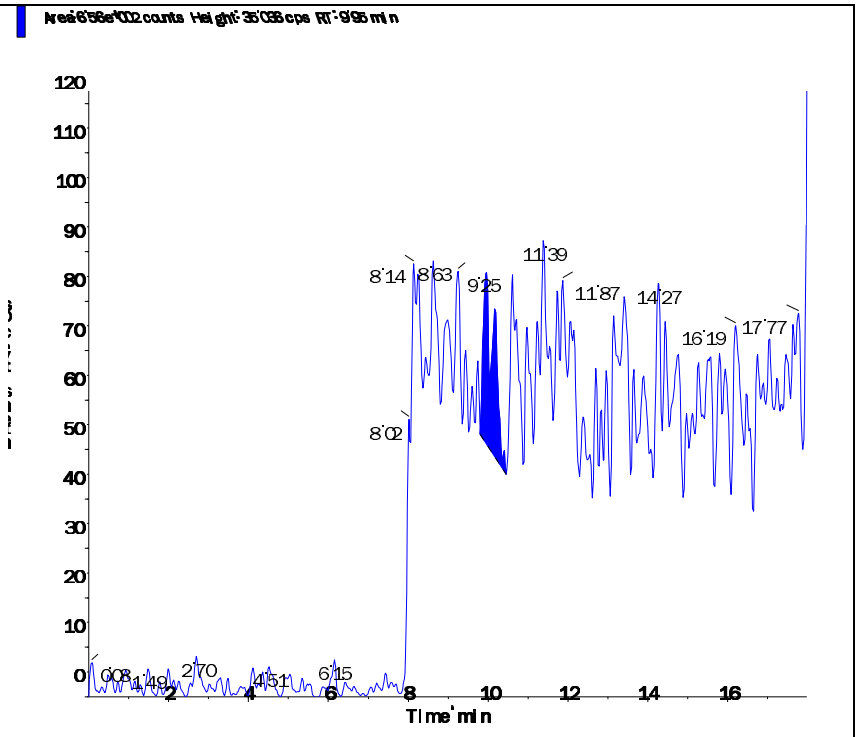
Created with Analyst Reporter
Printed: 3/3/2016 2:44 PM

Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 0.00 (9.94) min No Peak ng/ml 0.00 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 9.95 (9.92) min < 0 ng/ml 0.001 (Unknown)



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Created with Analyst Reporter
Printed: 3/3/2016 2:47 PM

Data File	LM33653.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/3/2016 11:44:54 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

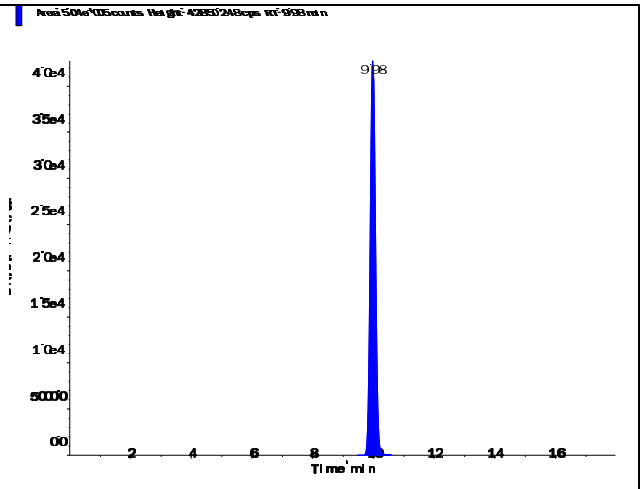
Sample Name	WG559291-16 CCB	**Injection Vial**	51.00
Data File	LM33653.wiff	**Injection Volume**	10.00
Acquisition Date	3/3/2016 11:44:54 AM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559291-16	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.040e+05	9.98	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	0.000e+00	0.00	N/A	No Peak

O18LP (Internal Standard)

RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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Created with Analyst Reporter
Printed: 3/3/2016 2:47 PM

Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	0.00 (9.94) min No Peak ng/ml 0.00 (Unknown)
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	0.00 (9.92) min No Peak ng/ml 0.00 (Unknown)

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Created with Analyst Reporter
Printed: 3/3/2016 2:34 PM

Data File	LM33612.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 10:48:29 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

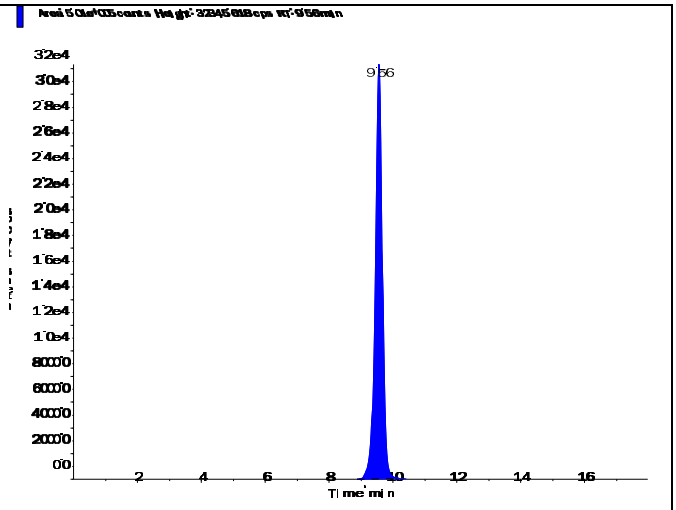
Sample Name	WG559292-01 MCT (0.2ug/L)	**Injection Vial**	26.00
Data File	LM33612.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 10:48:29 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-01	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.010e+05	9.56	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.650e+04	9.57	N/A	0.196
Perchlorate conf	1.200e+04	9.57	N/A	0.20

O18LP (Internal Standard)

RT (Exp. RT): 9.56(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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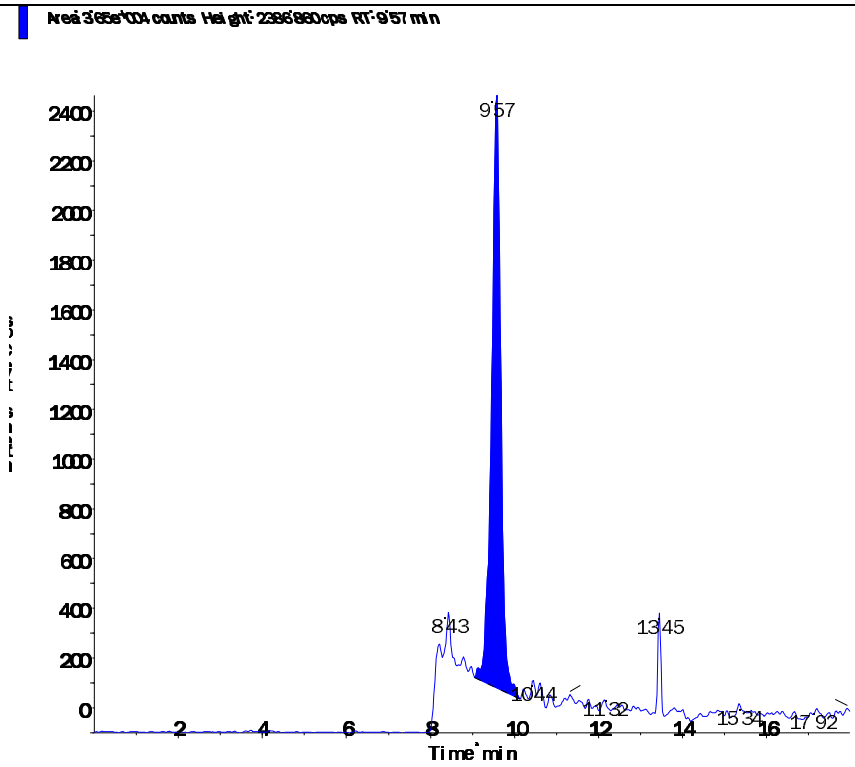
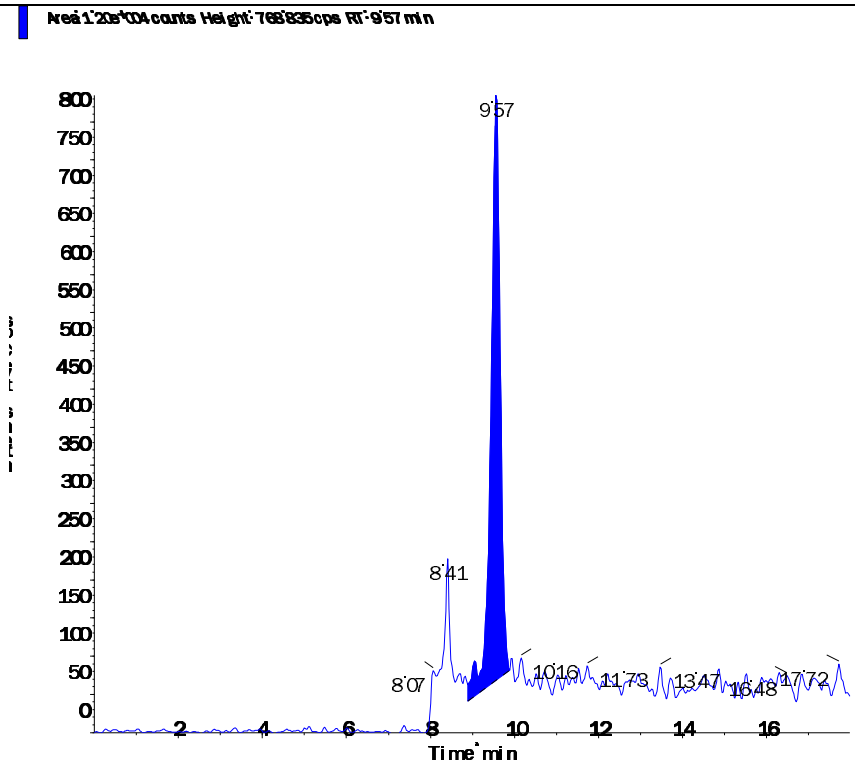
Created with Analyst Reporter
Printed: 3/3/2016 2:34 PM

Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	9.57 (9.94) min 0.196 ng/ml 0.073 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	9.57 (9.92) min 0.20 ng/ml 0.024 (Unknown)



2.1.1.5 Raw QC Data

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Created with Analyst Reporter
Printed: 3/3/2016 2:34 PM

Data File	LM33613.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 11:07:24 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

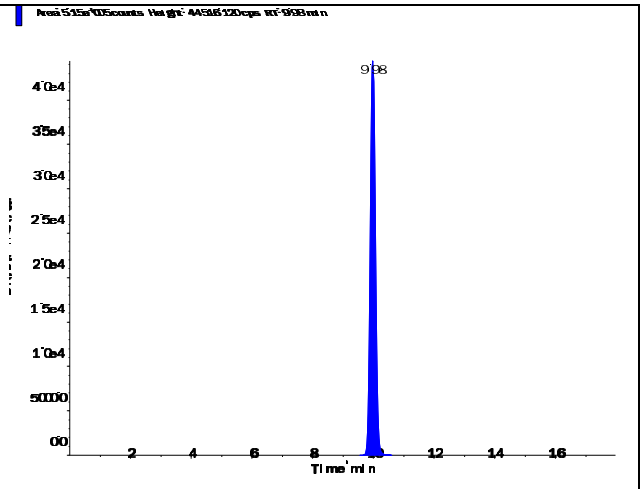
Sample Name	WG559292-02 BLANK	**Injection Vial**	27.00
Data File	LM33613.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 11:07:24 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-02	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.150e+05	9.98	5.00	-

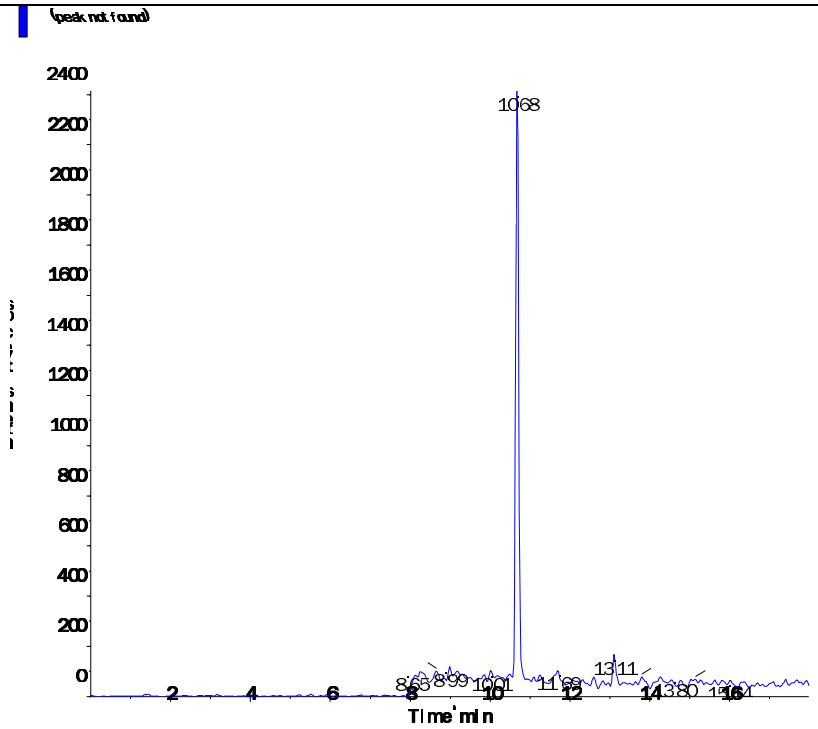
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	7.210e+02	9.93	N/A	< 0

O18LP (Internal Standard)

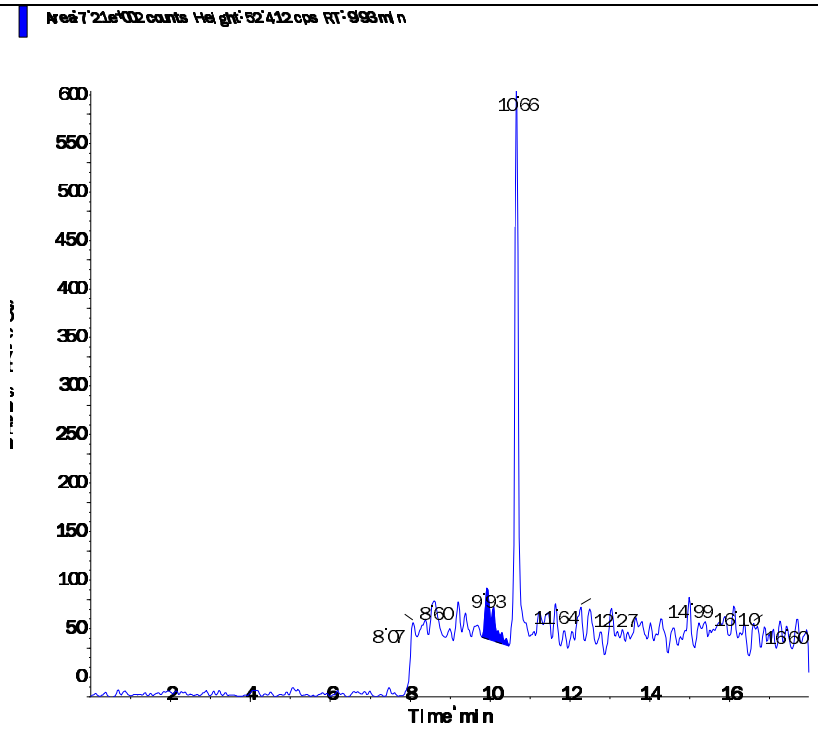
RT (Exp. RT): 9.98(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	0.00 (9.94) min No Peak ng/ml 0.00 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	9.93 (9.92) min < 0 ng/ml 0.001 (Unknown)



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Created with Analyst Reporter
Printed: 3/3/2016 2:34 PM

Data File	LM33614.wiff	**Result Table**	030216_WTD.rdb
Acquisition Date	3/2/2016 11:26:22 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

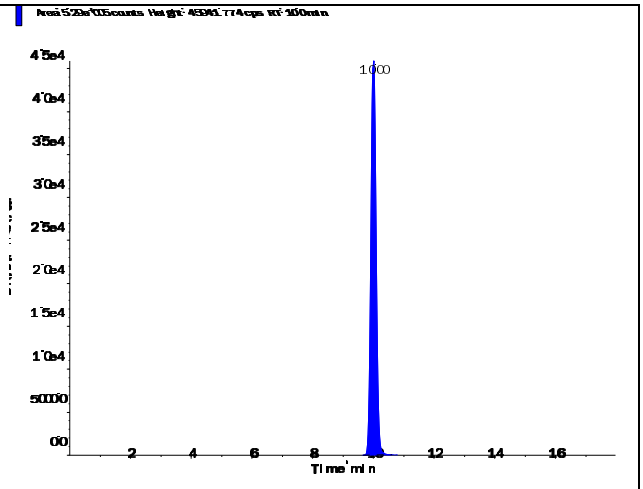
Sample Name	WG559292-03 LCS (0.2ug/L)	**Injection Vial**	28.00
Data File	LM33614.wiff	**Injection Volume**	10.00
Acquisition Date	3/2/2016 11:26:22 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	030216_WTD.rdb
Sample ID	WG559292-03	**Dilution Factor**	1.00
Sample Comment	1,1 STD72685	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	5.290e+05	10.00	5.00	-

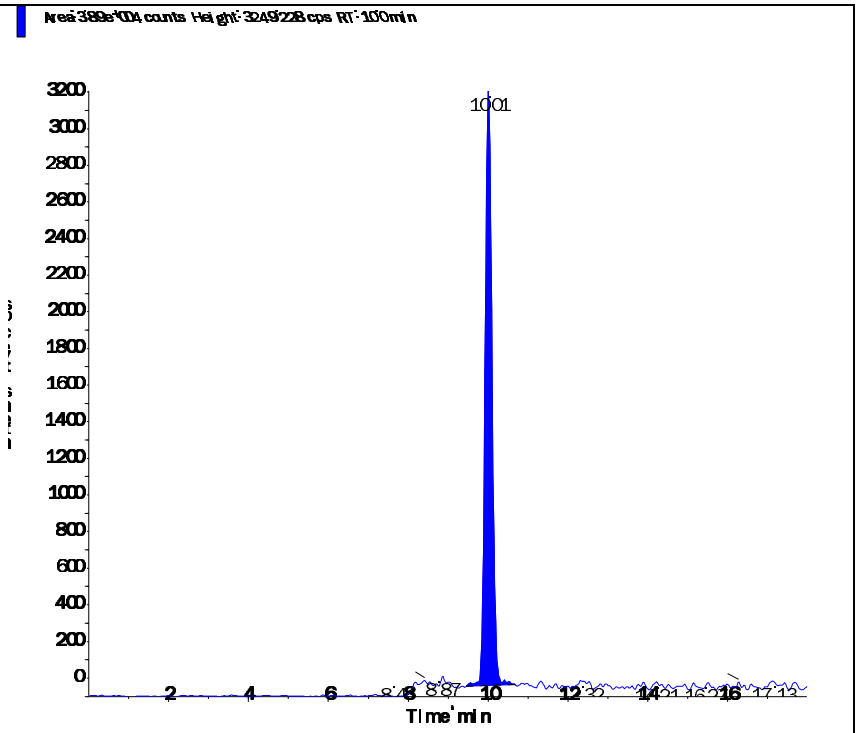
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.890e+04	10.00	N/A	0.198
Perchlorate conf	1.200e+04	9.99	N/A	0.187

O18LP (Internal Standard)

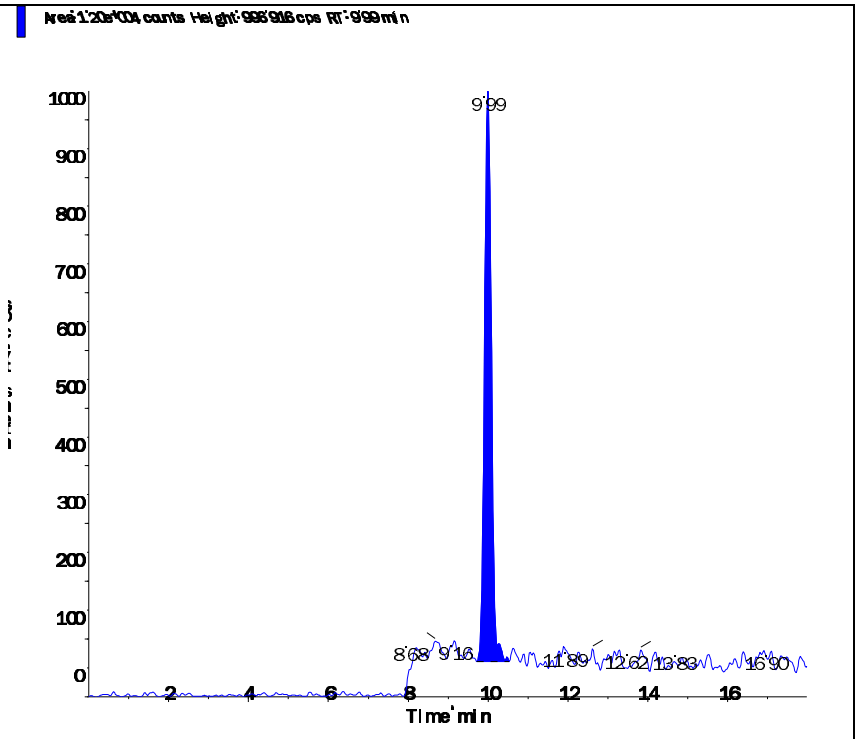
RT (Exp. RT): 10.00(9.94) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	10.00 (9.94) min 0.198 ng/ml 0.074 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	9.99 (9.92) min 0.187 ng/ml 0.023 (Unknown)



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
March 7, 2016

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001 – BIO-CHEM TESTING WVDEP 220	002 – REIC Consultants, Inc. WVDEP 060
003 – Sturm Environmental	004 – MICROBAC PITTSBURGH
005 – ES LABORATORIES	006 – ALCOSAN LABORATORIES
007 – ALS LABORATORIES	008 – BENCHMARK LABORATORIES
010 – MICROBAC CHICAGOLAND	AC – AMBER R. CARMICHAEL
ADC – ANTHONY D. CANTER	ADG – APRIL D. GREENE
AED – ALLEN E. DAVIS	ALS – ADRIANE L. STEED
AWE – ANDREW W. ESSIG	AZH – AFTER HOURS
BJO – BRIAN J. OGDEN	BKT – BRENDAN TORRENCE
BLG – BRENDA L. GREENWALT	BRG – BRENDA R. GREGORY
CAA – CASSIE A. AUGENSTEIN	CAF – CHERYL A. FLOWERS
CEB – CHAD E. BARNES	CJR – COURTNEY J. REXROAD
CLC – CHRYS L. CRAWFORD	CLS – CARA L. STRICKLER
CLW – CHARISSA L. WINTERS	CPD – CHAD P. DAVIS
CSH – CHRIS S. HILL	DAK – DEAN A. KETELSEN
DCM – DAVID C. MERCKLE	DEV – DAVID E. VANDENBERG
DIH – DEANNA I. HESSON	DLB – DAVID L. BUMGARNER
DLP – DOROTHY L. PAYNE	DLW – DIANA L. WRIGHT
DSM – DAVID S. MOSSOR	ECL – ERIC C. LAWSON
ENY – EMILY N. YOAK	ERP – ERIN R. PORTER
FJB – FRANCES J. BOLDEN	JBK – JEREMY B. KINNEY
JDH – JUSTIN D. HESSON	JDS – JARED D. SMITH
JJS – JOHN J. STE MARIE	JKP – JACQUELINE K. PARSONS
JLD – JESSICA L. DELONG	JLL – JOHN L. LENT
JMW – JEANA M. WHITE	JTP – JOSHUA T. PEMBERTON
JWR – JOHN W. RICHARDS	JWS – JACK W. SHEAVES
JYH – JI Y. HU	KAJ – KELLIE A. JOHNSON
KAT – KATHY A. TUCKER	KDW – KATHRYN D. WELCH
KEB – KATIE E. BARNES	KHR – KIM H. RHODES
KKB – KERRI K. BUCK	KRA – KATHY R. ALBERTSON
KRB – KAELY R. BECKER	KRP – KATHY R. PARSONS
LEC – LAURA E. CARPENTER	LKN – LINDA K. NEDEFF
LLS – LARRY L. STEPHENS	LSB – LESLIE S. BUCINA
MBK – MORGAN B. KNOWLTON	MDA – MIKE D. ALBERTSON
MDC – MIKE D. COCHRAN	MES – MARY E. SCHILLING
MLB – MEGAN L. BACHE	MMB – MAREN M. BEERY
MRT – MICHELLE R. TAYLOR	MSW – MATT S. WILSON
PDM – PIERCE D. MORRIS	PIT – MICROBAC WARRENDALE
PRL – PAIGE R. LAMB	PSW – PEGGY S. WEBB
QX – QIN XU	RAH – ROY A. HALSTEAD
REK – BOB E. KYER	RLB – BOB BUCHANAN
RM – RAYMOND MALEKE	RNP – RICK N. PETTY
RST – ROBIN S. TURNER	SAV – SARAH A. VANDENBERG
SCB – SARAH C. BOGOLIN	SDC – SHALYN D. CONLEY
SLM – STEPHANIE L. MOSSBURG	SLP – SHERI L. PFALZGRAF
TB – TODD BOYLE	TGF – TIM G. FELTON
TMB – TIFFANY M. BAILEY	TMM – TAMMY M. MORRIS
VC – VICKI COLLIER	WJB – WILL J. BEASLEY
WRR – WESLEY R. RICHARDS	WTD – WADE T. DELONG
XXX – UNAVAILABLE OR SUBCONTRACT	

Microbac Laboratories Inc.
List of Valid Qualifiers
March 07, 2016

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample reciept exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample reciept exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentativlely identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound
TNTC	Too numerous to count

Microbac Laboratories Inc.
List of Valid Qualifiers
March 07, 2016

Qualkey: DOD

TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample reciept exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below

L16021328 / Revision: 0 / 167 total pages

AECOM

Chain of Custody Record

COC Number:

Laboratory:	Microbac POC: Stephanie Mossburg	Project Manager:	Debra Richmann	Mail to:	Linda Raabe
Address:	158 Starlite Drive	Phone/Fax Number:	210-296-2000		112 East Pecan STE. 400
	Marietta, OH 45750	Sampler (print):	Scott Beesinger		San Antonio, TX 78205
Phone:	1-800-373-4071				210-296-2000
Client:	AECOM	Signature:	Scott Beesinger	Fed Ex Airbill No:	
Address:	112 East Pecan Ste. 400				
	San Antonio, TX 78205	pH:		Program:	
Turn Around Time:	STANDARD				
Project Name/Location:	Longhorn				
Project Number:	60256135.0009AA				

Site Name	Sample ID/Location ID	SBD	SED	Date	Time	Comp	Grab	Matrix	Number of Containers	Perchlorate	ERPIMS REQUIRED FIELDS: SA CODE	Cooler ID	LOT CONTROL NUMBERS: ABLOT	EBLOT	TBLOT
Harrison Bayou & Goose Prarie Creek	HBW 7 - 022516			2/25/16	12:40		X	W	1	X					
	HBW 10 - 022516			2/25/16	12:50		X	W	1	X					
	HBW 1 - 022516			2/25/16	13:05		X	W	1	X					
	GPW 3 - 022516			2/25/16	13:20		X	W	1	X					
	GPW 1 - 022516			2/25/16	13:40		X	W	1	X					

Comments: STANDARD TAT

Relinquished by: (Signature)	Scott Beesinger	Date 2/25/16	Time 1500	Received by: (Signature)	Received by: (Signature)	Date / Time	Relinquished by: (Signature)
Relinquished by: (Signature)		Date	Time			Time	Remarks:

Microbac OVD
Received: 02/26/2016 09:41
By: BRENDA GREGORY
221000082487

Brenda Gregory

•Homogenize all composite samples prior to analysis

Manager, Pink QA/QC Manager

Generated: 03/07/2016 10:00

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L16021328
Account: 2551
Project: 2551.096
Samples: 5
Due Date: 08-MAR-2016

Samplenum	Container ID	Products
L16021328-01	706280	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	26-FEB-2016 13:07	CLS		
2	ANALYZ	W1	SEM	01-MAR-2016 14:10	ADC	BRG	
3	STORE	SEM	A1	02-MAR-2016 12:48	BRG	ADC	

Samplenum	Container ID	Products
L16021328-02	706281	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	26-FEB-2016 13:07	CLS		
2	ANALYZ	W1	SEM	01-MAR-2016 14:10	ADC	BRG	
3	STORE	SEM	A1	02-MAR-2016 12:48	BRG	ADC	

Samplenum	Container ID	Products
L16021328-03	706282	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	26-FEB-2016 13:07	CLS		
2	ANALYZ	W1	SEM	01-MAR-2016 14:10	ADC	BRG	
3	STORE	SEM	A1	02-MAR-2016 12:48	BRG	ADC	

Samplenum	Container ID	Products
L16021328-04	706283	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	26-FEB-2016 13:07	CLS		
2	ANALYZ	W1	SEM	01-MAR-2016 14:10	ADC	BRG	
3	STORE	SEM	A1	02-MAR-2016 12:48	BRG	ADC	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L16021328
Account: 2551
Project: 2551.096
Samples: 5
Due Date: 08-MAR-2016

Samplenum	Container ID	Products
L16021328-05	706284	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	26-FEB-2016 13:07	CLS		
2	ANALYZ	W1	SEM	01-MAR-2016 14:10	ADC	BRG	
3	STORE	SEM	A1	02-MAR-2016 12:48	BRG	ADC	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
Total Halide by Bomb Combustion (TX)
Particle Sizing - 200 Mesh (PS200)
Specific Gravity/Density (SPGRAV)
Total Residual Chlorine (CL-TRL)
Total Volatile Solids (all forms) (TVS)
Total Coliform Bacteria (all methods)
Fecal Coliform Bacteria (all methods)
Sulfite (SO3)
Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS
Nitrogen, Ammonia by Method 350.1
Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
Phenolics, Total by Method 420.1
ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
Acetic acid
Butyric acid
Lactic acid
Propionic acid
Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
1-Methylnaphthalene
1,4-Dioxane
Atrazine
Benzaldehyde
Biphenyl
Caprolactam
Hexamethylphosphoramide (HMPA)
Pentachlorobenzene
Pentachloroethane

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALS

OVD MSS0I/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP

SOLID AND HAZARDOUS CHEMICALS

OVD MSV0I/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)

Microbac



Laboratory Report Number: L16050151

Kayla Teague
AECOM Technical Services, Inc.
16000 Dallas Parkway
Dallas, TX 75248

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Stephanie Mossburg – Team Chemist/Data Specialist
(740) 373-4071
Stephanie.Mossburg@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on May 18 2016

David L. Vandenberg

David Vandenberg – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

The following discrepancies were noted:

Discrepancy	Resolution
Sample 50WW13 was canceled per the client's request	
50WW13-050316: 1 of 3 RSK vials has headspace >6mm. CLS 50WW25-050316: 1 of 3 vials for 8260 has headspace >6mm. 1 of 3 RSK vials has headspace >6mm.	Please label these as the "C" vials and proceed. SLM

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00110688	H	5.0		J2317165652	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	All samples were checked for pH and met the standard. Exceptions are noted above under discrepancy. (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	No

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Samples Received

Client ID	Laboratory ID	Date Collected	Date Received
50WW14-050316	L16050151-03	05/03/2016 09:25	05/04/2016 09:48
50WW14FF-050316	L16050151-04	05/03/2016 09:25	05/04/2016 09:48
50WW08-050316	L16050151-05	05/03/2016 10:45	05/04/2016 09:48
50WW08FF-050316	L16050151-06	05/03/2016 10:45	05/04/2016 09:48
50WW18-050316	L16050151-07	05/03/2016 13:10	05/04/2016 09:48
50WW18FF-050316	L16050151-08	05/03/2016 13:10	05/04/2016 09:48
50WW25-050316	L16050151-09	05/03/2016 14:40	05/04/2016 09:48
50WW25FF-050316	L16050151-10	05/03/2016 14:40	05/04/2016 09:48
TRIP BLANK	L16050151-11	05/03/2016 00:01	05/04/2016 09:48

Microbac REPORT L16050151
PREPARED FOR AECOM Technical Services, Inc.
WORK ID:

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1.0 Summary Data

1.1 Narratives

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	8260
Prep Batch Number(s):	568233,568444	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-17 00:00:00		

Laboratory Data Package Cover Page

X	R1	Field chain-of-custody documentation;
X	R2	Sample identification cross-reference;
X	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
X	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
X	R5	Test reports/summary forms for blank samples;
X	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
X	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
X	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
X	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
X	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Sarah Vandenberg	Sarah Vandenberg		2016-05-17 19:12:53

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	8260
Prep Batch Number(s):	568233,568444	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-17 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?	X				
Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	8260
Prep Batch Number(s):	568233,568444	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-17 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	8260
Prep Batch Number(s):	568233,568444	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-17 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?		X			2
Was the ICAL curve verified for each analyte?		X			1
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	8260
Prep Batch Number(s):	568233,568444	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-17 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	8260
Prep Batch Number(s):	568233,568444	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-17 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

1)Dichlorodifluoromethane exceeded the UCL in the ICV analyzed 05/03/2016 on HPMS11.

2)Chloromethane exceeded the UCL in the CCV analyzed 05/10/2016 on HPMS11.

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	RSK175
Prep Batch Number(s):	WG567637, WG567895	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-11 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Sarah Vandenberg	Sarah Vandenberg		2016-05-11 18:40:09

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	RSK175
Prep Batch Number(s):	WG567637, WG567895	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-11 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	RSK175
Prep Batch Number(s):	WG567637, WG567895	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-11 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	RSK175
Prep Batch Number(s):	WG567637, WG567895	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-11 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	RSK175
Prep Batch Number(s):	WG567637, WG567895	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-11 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	RSK175
Prep Batch Number(s):	WG567637, WG567895	**Reviewer Name:**	Sarah Vandenberg
LRC Date:	2016-05-11 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There were no exceptions.

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG567744	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-05-06 00:00:00		

Laboratory Data Package Cover Page

X	R1	Field chain-of-custody documentation;
X	R2	Sample identification cross-reference;
X	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
X	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
X	R5	Test reports/summary forms for blank samples;
X	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
X	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
X	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
X	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
X	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2016-05-06 18:58:41

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG567744	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-05-06 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG567744	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-05-06 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG567744	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-05-06 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG567744	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-05-06 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG567744	**Reviewer Name:**	Eric Lawson
LRC Date:	2016-05-06 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6010
Prep Batch Number(s):	WG567644	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Maren Beery	Maren Beery	Metals Supervisor	2016-05-12 19:15:09

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6010
Prep Batch Number(s):	WG567644	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports	X				
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6010
Prep Batch Number(s):	WG567644	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6010
Prep Batch Number(s):	WG567644	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?					
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?	X				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6010
Prep Batch Number(s):	WG567644	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6010
Prep Batch Number(s):	WG567644	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6020
Prep Batch Number(s):	WG567607	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Maren Beery	Maren Beery	Metals Supervisor	2016-05-12 19:11:04

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6020
Prep Batch Number(s):	WG567607	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports	X				
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				ER#1
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6020
Prep Batch Number(s):	WG567607	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6020
Prep Batch Number(s):	WG567607	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?					
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?	X				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
Method detection limit (MDL) studies					

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6020
Prep Batch Number(s):	WG567607	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	6020
Prep Batch Number(s):	WG567607	**Reviewer Name:**	Maren Beery
LRC Date:	2016-05-12 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

ER#1 - Client sample 04 required dilution analysis in order to obtain a result for manganese within the calibration range.

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	9056
Prep Batch Number(s):	WG567455	**Reviewer Name:**	Adriane Steed
LRC Date:	2016-05-05 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Adriane Steed			2016-05-05 16:47:43

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	9056
Prep Batch Number(s):	WG567455	**Reviewer Name:**	Adriane Steed
LRC Date:	2016-05-05 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	9056
Prep Batch Number(s):	WG567455	**Reviewer Name:**	Adriane Steed
LRC Date:	2016-05-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					1
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	9056
Prep Batch Number(s):	WG567455	**Reviewer Name:**	Adriane Steed
LRC Date:	2016-05-05 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?			X		
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	9056
Prep Batch Number(s):	WG567455	**Reviewer Name:**	Adriane Steed
LRC Date:	2016-05-05 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	9056
Prep Batch Number(s):	WG567455	**Reviewer Name:**	Adriane Steed
LRC Date:	2016-05-05 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

1. Fractions (-01, -03, -05, -07, -09) were analyzed at dilutions due to their high analyte concentrations (Cl and/or SO4) which were over 200 ppm and exceeding the upper limit of the calibration range. Any sample that has a single anion load greater than 200 ppm (or a total anion load greater than 400 ppm) will be diluted in order to prevent damage to the IC from repeated overloading of the analytical column and oversaturation of the suppressor membranes.

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	ALK-COLOR
Prep Batch Number(s):	WG567701	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson	Deanna Hesson	Conventional Lab Supervisor	2016-05-13 18:42:37

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	ALK-COLOR
Prep Batch Number(s):	WG567701	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	ALK-COLOR
Prep Batch Number(s):	WG567701	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	ALK-COLOR
Prep Batch Number(s):	WG567701	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	ALK-COLOR
Prep Batch Number(s):	WG567701	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	ALK-COLOR
Prep Batch Number(s):	WG567701	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	PHOS
Prep Batch Number(s):	WG568658	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson	Deanna Hesson	Conventional Lab Supervisor	2016-05-13 18:43:16

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	PHOS
Prep Batch Number(s):	WG568658	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	PHOS
Prep Batch Number(s):	WG568658	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	PHOS
Prep Batch Number(s):	WG568658	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	PHOS
Prep Batch Number(s):	WG568658	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	PHOS
Prep Batch Number(s):	WG568658	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	S
Prep Batch Number(s):	WG567923	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson	Deanna Hesson	Conventional Lab Supervisor	2016-05-13 18:44:21

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	S
Prep Batch Number(s):	WG567923	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	S
Prep Batch Number(s):	WG567923	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	S
Prep Batch Number(s):	WG567923	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?			X		
Were percent differences for each analyte within the method-required QC limits?			X		
Was the ICAL curve verified for each analyte?			X		
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	S
Prep Batch Number(s):	WG567923	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	S
Prep Batch Number(s):	WG567923	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	TOC
Prep Batch Number(s):	WG568224	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson	Deanna Hesson	Conventional Lab Supervisor	2016-05-13 18:43:47

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	TOC
Prep Batch Number(s):	WG568224	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	TOC
Prep Batch Number(s):	WG568224	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	TOC
Prep Batch Number(s):	WG568224	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	TOC
Prep Batch Number(s):	WG568224	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

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Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L16050151
Project Name:		**Method:**	TOC
Prep Batch Number(s):	WG568224	**Reviewer Name:**	Deanna Hesson
LRC Date:	2016-05-13 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

1.2 Certificate of Analysis

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW14-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/10/2016 23:30
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	11M11739
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	1.41		1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	1.75		1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	106	85	115	
1,2-Dichloroethane-d4	97.6	70	120	
Toluene-d8	101	85	120	
4-Bromofluorobenzene	103	75	120	

Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW14-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567637	**Analyst:**	JDS	**Run Date:**	05/05/2016 15:02
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	16G49851
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Methane	74-82-8	2.83	J	5.00	2.00	1.00
ethene	74-85-1	2.00	U	5.00	2.00	1.00
ethane	74-84-0	2.00	U	5.00	2.00	1.00

J	Estimated value ; the analyte concentration was less than the LOQ.
J	Estimated value ; the analyte concentration was greater than the highest standard
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW14-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567895	**Analyst:**	JDS	**Run Date:**	05/06/2016 17:53
Collect Date:	05/03/2016 09:25	**Dilution:**	10	**File ID:**	16G49861
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Carbon Dioxide	124-38-9	990000		100000	50000	25000

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	50WW14-050316	**Prep Method:**	6850	**Prep Date:**	05/05/2016 17:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	05/03/2016 17:18
Workgroup #:	WG567744	**Analyst:**	JWR	**Run Date:**	05/05/2016 21:33
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	1LM.LM34778
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.470		0.400	0.200	0.100

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	IC1
Client ID:	50WW14-050316	**Prep Method:**	9056	**Prep Date:**	05/04/2016 15:00
Matrix:	Water	**Analytical Method:**	9056	**Cal Date:**	04/29/2016 12:41
Workgroup #:	WG567559	**Analyst:**	AED	**Run Date:**	05/04/2016 20:24
Collect Date:	05/03/2016 09:25	**Dilution:**	3	**File ID:**	I1_050416-36
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrate	14797-55-8	0.600	U	1.20	0.600	0.300
Nitrite	14797-65-0	0.378	J	1.20	0.600	0.300

J	Estimated value ; the analyte concentration was less than the LOQ.
J	Estimated value ; the analyte concentration was greater than the highest standard
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	IC1
Client ID:	50WW14-050316	**Prep Method:**	9056	**Prep Date:**	05/04/2016 15:00
Matrix:	Water	**Analytical Method:**	9056	**Cal Date:**	04/29/2016 12:41
Workgroup #:	WG567559	**Analyst:**	AED	**Run Date:**	05/04/2016 20:41
Collect Date:	05/03/2016 09:25	**Dilution:**	50	**File ID:**	I1_050416-37
Sample Tag:	DL02	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	377		20.0	10.0	5.00
Sulfate	14808-79-8	339		100	50.0	25.0

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM
Client ID:	50WW14-050316	**Prep Method:**	310.2	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	310.2	**Cal Date:**	05/05/2016 14:54
Workgroup #:	WG567701	**Analyst:**	DCM	**Run Date:**	05/05/2016 14:59
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	SC160505005.016
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Alkalinity, Total (as CaCO3)	11-43-8	249		40.0	20.0	10.0

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM2
Client ID:	50WW14-050316	**Prep Method:**	365.4	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	365.4	**Cal Date:**	05/13/2016 10:44
Workgroup #:	WG568658	**Analyst:**	DCM	**Run Date:**	05/13/2016 10:53
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	S2160513002.018
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Phosphorus, Total	7723-14-0	1.84		0.400	0.200	0.100

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	BURET
Client ID:	50WW14-050316	**Prep Method:**	SM4500-S-(-2)-F-2000	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	SM4500-S-(-2)-F-2000	**Cal Date:**	
Workgroup #:	WG567923	**Analyst:**	TB	**Run Date:**	05/06/2016 17:15
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	ET.1605061715-05
Sample Tag:		**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfide	18496-25-8	1.00	U	2.00	1.00	0.500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	TOC-VWP
Client ID:	50WW14-050316	**Prep Method:**	415.1	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	415.1	**Cal Date:**	10/30/2015 17:00
Workgroup #:	WG568224	**Analyst:**	DCM	**Run Date:**	05/11/2016 09:08
Collect Date:	05/03/2016 09:25	**Dilution:**	10	**File ID:**	TC05102016.023
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	71.3		20.0	10.0	5.00

Certificate of Analysis

Sample #:	L16050151-04	**PrePrep Method:**	N/A	**Instrument:**	ICP-THERMO3
Client ID:	50WW14FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 10:26
Matrix:	Water	**Analytical Method:**	6010C	**Cal Date:**	05/05/2016 10:51
Workgroup #:	WG567684	**Analyst:**	KKB	**Run Date:**	05/05/2016 19:19
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	T3.050516.191912
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Iron, Dissolved	7439-89-6	9.56		0.200	0.100	0.0500

Certificate of Analysis

Sample #:	L16050151-04	**PrePrep Method:**	N/A	**Instrument:**	ICP-MS2
Client ID:	50WW14FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 08:56
Matrix:	Water	**Analytical Method:**	6020A	**Cal Date:**	05/05/2016 11:10
Workgroup #:	WG567700	**Analyst:**	JYH	**Run Date:**	05/05/2016 17:36
Collect Date:	05/03/2016 09:25	**Dilution:**	50	**File ID:**	NI.050516.173606
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Manganese, Dissolved	7439-96-5	0.436		0.200	0.100	0.0500

Certificate of Analysis

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW08-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/11/2016 01:06
Collect Date:	05/03/2016 10:45	**Dilution:**	1	**File ID:**	11M11742
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.439	J	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.222	J	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.977	J	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	3.23		1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	0.812	J	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	48.1		1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	1.66		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	442	J	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.374	J	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	103	85	115	
1,2-Dichloroethane-d4	94.2	70	120	
Toluene-d8	101	85	120	
4-Bromofluorobenzene	99.3	75	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
J	Estimated value ; the analyte concentration was greater than the highest standard

Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW08-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568444	**Analyst:**	JDS	**Run Date:**	05/11/2016 19:49
Collect Date:	05/03/2016 10:45	**Dilution:**	5	**File ID:**	11M11778
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Trichloroethene	79-01-6	383		5.00	2.50	1.25

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	93.1	85	115	
1,2-Dichloroethane-d4	80.7	70	120	
Toluene-d8	96.6	85	120	
4-Bromofluorobenzene	101	75	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW08-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567637	**Analyst:**	JDS	**Run Date:**	05/05/2016 15:14
Collect Date:	05/03/2016 10:45	**Dilution:**	1	**File ID:**	16G49852
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Methane	74-82-8	2.07	J	5.00	2.00	1.00
ethene	74-85-1	2.00	U	5.00	2.00	1.00
ethane	74-84-0	2.00	U	5.00	2.00	1.00

J	Estimated value ; the analyte concentration was less than the LOQ.
J	Estimated value ; the analyte concentration was greater than the highest standard
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW08-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567895	**Analyst:**	JDS	**Run Date:**	05/06/2016 18:05
Collect Date:	05/03/2016 10:45	**Dilution:**	5	**File ID:**	16G49862
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Carbon Dioxide	124-38-9	427000		50000	25000	12500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	50WW08-050316	**Prep Method:**	6850	**Prep Date:**	05/05/2016 17:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	05/03/2016 17:18
Workgroup #:	WG567744	**Analyst:**	JWR	**Run Date:**	05/05/2016 22:48
Collect Date:	05/03/2016 10:45	**Dilution:**	50	**File ID:**	1LM.LM34782
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	146		20.0	10.0	5.00

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	IC1
Client ID:	50WW08-050316	**Prep Method:**	9056	**Prep Date:**	05/04/2016 15:00
Matrix:	Water	**Analytical Method:**	9056	**Cal Date:**	04/29/2016 12:41
Workgroup #:	WG567559	**Analyst:**	AED	**Run Date:**	05/04/2016 20:59
Collect Date:	05/03/2016 10:45	**Dilution:**	3	**File ID:**	I1_050416-38
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrate	14797-55-8	0.600	U	1.20	0.600	0.300
Nitrite	14797-65-0	0.414	J	1.20	0.600	0.300
Sulfate	14808-79-8	342		6.00	3.00	1.50

J	Estimated value ; the analyte concentration was less than the LOQ.
J	Estimated value ; the analyte concentration was greater than the highest standard
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	IC1
Client ID:	50WW08-050316	**Prep Method:**	9056	**Prep Date:**	05/04/2016 15:00
Matrix:	Water	**Analytical Method:**	9056	**Cal Date:**	04/29/2016 12:41
Workgroup #:	WG567559	**Analyst:**	AED	**Run Date:**	05/04/2016 21:52
Collect Date:	05/03/2016 10:45	**Dilution:**	50	**File ID:**	I1_050416-41
Sample Tag:	DL02	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	352		20.0	10.0	5.00

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM
Client ID:	50WW08-050316	**Prep Method:**	310.2	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	310.2	**Cal Date:**	05/05/2016 14:54
Workgroup #:	WG567701	**Analyst:**	DCM	**Run Date:**	05/05/2016 14:59
Collect Date:	05/03/2016 10:45	**Dilution:**	2	**File ID:**	SC160505005.017
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Alkalinity, Total (as CaCO3)	11-43-8	416		80.0	40.0	20.0

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM2
Client ID:	50WW08-050316	**Prep Method:**	365.4	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	365.4	**Cal Date:**	05/13/2016 10:44
Workgroup #:	WG568658	**Analyst:**	DCM	**Run Date:**	05/13/2016 10:54
Collect Date:	05/03/2016 10:45	**Dilution:**	1	**File ID:**	S2160513002.021
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Phosphorus, Total	7723-14-0	0.172	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	BURET
Client ID:	50WW08-050316	**Prep Method:**	SM4500-S-(-2)-F-2000	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	SM4500-S-(-2)-F-2000	**Cal Date:**	
Workgroup #:	WG567923	**Analyst:**	TB	**Run Date:**	05/06/2016 17:15
Collect Date:	05/03/2016 10:45	**Dilution:**	1	**File ID:**	ET.1605061715-06
Sample Tag:		**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfide	18496-25-8	1.00	U	2.00	1.00	0.500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	TOC-VWP
Client ID:	50WW08-050316	**Prep Method:**	415.1	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	415.1	**Cal Date:**	10/30/2015 17:00
Workgroup #:	WG568224	**Analyst:**	DCM	**Run Date:**	05/10/2016 16:39
Collect Date:	05/03/2016 10:45	**Dilution:**	5	**File ID:**	TC05102016.009
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	28.6		10.0	5.00	2.50

Certificate of Analysis

Sample #:	L16050151-06	**PrePrep Method:**	N/A	**Instrument:**	ICP-THERMO3
Client ID:	50WW08FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 10:26
Matrix:	Water	**Analytical Method:**	6010C	**Cal Date:**	05/05/2016 10:51
Workgroup #:	WG567684	**Analyst:**	KKB	**Run Date:**	05/05/2016 19:23
Collect Date:	05/03/2016 10:45	**Dilution:**	1	**File ID:**	T3.050516.192306
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Iron, Dissolved	7439-89-6	0.100	U	0.200	0.100	0.0500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-06	**PrePrep Method:**	N/A	**Instrument:**	ICP-MS2
Client ID:	50WW08FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 08:56
Matrix:	Water	**Analytical Method:**	6020A	**Cal Date:**	05/05/2016 11:10
Workgroup #:	WG567700	**Analyst:**	JYH	**Run Date:**	05/05/2016 16:48
Collect Date:	05/03/2016 10:45	**Dilution:**	1	**File ID:**	NI.050516.164810
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Manganese, Dissolved	7439-96-5	0.0268		0.00400	0.00200	0.00100

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW18-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/11/2016 00:34
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	11M11741
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250

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Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500

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Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	106	85	115	
1,2-Dichloroethane-d4	97.1	70	120	
Toluene-d8	99.4	85	120	
4-Bromofluorobenzene	101	75	120	

Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW18-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567637	**Analyst:**	JDS	**Run Date:**	05/05/2016 15:26
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	16G49853
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Methane	74-82-8	2.00	U	5.00	2.00	1.00
ethene	74-85-1	2.00	U	5.00	2.00	1.00
ethane	74-84-0	2.00	U	5.00	2.00	1.00

J	Estimated value ; the analyte concentration was greater than the highest standard
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW18-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567895	**Analyst:**	JDS	**Run Date:**	05/06/2016 18:16
Collect Date:	05/03/2016 13:10	**Dilution:**	5	**File ID:**	16G49863
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Carbon Dioxide	124-38-9	465000		50000	25000	12500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	50WW18-050316	**Prep Method:**	6850	**Prep Date:**	05/05/2016 17:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	05/03/2016 17:18
Workgroup #:	WG567744	**Analyst:**	JWR	**Run Date:**	05/05/2016 23:07
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	1LM.LM34783
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	IC1
Client ID:	50WW18-050316	**Prep Method:**	9056	**Prep Date:**	05/04/2016 15:00
Matrix:	Water	**Analytical Method:**	9056	**Cal Date:**	04/29/2016 12:41
Workgroup #:	WG567559	**Analyst:**	AED	**Run Date:**	05/05/2016 08:33
Collect Date:	05/03/2016 13:10	**Dilution:**	5	**File ID:**	I1_050416-56
Sample Tag:	DL03	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrate	14797-55-8	1.00	U	2.00	1.00	0.500
Nitrite	14797-65-0	0.985	J	2.00	1.00	0.500

J	Estimated value ; the analyte concentration was less than the LOQ.
J	Estimated value ; the analyte concentration was greater than the highest standard
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	IC1
Client ID:	50WW18-050316	**Prep Method:**	9056	**Prep Date:**	05/04/2016 15:00
Matrix:	Water	**Analytical Method:**	9056	**Cal Date:**	04/29/2016 12:41
Workgroup #:	WG567559	**Analyst:**	AED	**Run Date:**	05/04/2016 22:28
Collect Date:	05/03/2016 13:10	**Dilution:**	50	**File ID:**	I1_050416-43
Sample Tag:	DL02	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	738		20.0	10.0	5.00
Sulfate	14808-79-8	150		100	50.0	25.0

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM
Client ID:	50WW18-050316	**Prep Method:**	310.2	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	310.2	**Cal Date:**	05/05/2016 14:54
Workgroup #:	WG567701	**Analyst:**	DCM	**Run Date:**	05/05/2016 15:00
Collect Date:	05/03/2016 13:10	**Dilution:**	2	**File ID:**	SC160505005.018
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Alkalinity, Total (as CaCO3)	11-43-8	356		80.0	40.0	20.0

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM2
Client ID:	50WW18-050316	**Prep Method:**	365.4	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	365.4	**Cal Date:**	05/13/2016 10:44
Workgroup #:	WG568658	**Analyst:**	DCM	**Run Date:**	05/13/2016 10:55
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	S2160513002.022
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Phosphorus, Total	7723-14-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	BURET
Client ID:	50WW18-050316	**Prep Method:**	SM4500-S-(-2)-F-2000	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	SM4500-S-(-2)-F-2000	**Cal Date:**	
Workgroup #:	WG567923	**Analyst:**	TB	**Run Date:**	05/06/2016 17:15
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	ET.1605061715-07
Sample Tag:		**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfide	18496-25-8	1.00	U	2.00	1.00	0.500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	TOC-VWP
Client ID:	50WW18-050316	**Prep Method:**	415.1	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	415.1	**Cal Date:**	10/30/2015 17:00
Workgroup #:	WG568224	**Analyst:**	DCM	**Run Date:**	05/10/2016 17:01
Collect Date:	05/03/2016 13:10	**Dilution:**	5	**File ID:**	TC05102016.010
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	20.6		10.0	5.00	2.50

Certificate of Analysis

Sample #:	L16050151-08	**PrePrep Method:**	N/A	**Instrument:**	ICP-THERMO3
Client ID:	50WW18FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 10:26
Matrix:	Water	**Analytical Method:**	6010C	**Cal Date:**	05/05/2016 10:51
Workgroup #:	WG567684	**Analyst:**	KKB	**Run Date:**	05/05/2016 19:27
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	T3.050516.192700
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Iron, Dissolved	7439-89-6	0.100	U	0.200	0.100	0.0500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-08	**PrePrep Method:**	N/A	**Instrument:**	ICP-MS2
Client ID:	50WW18FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 08:56
Matrix:	Water	**Analytical Method:**	6020A	**Cal Date:**	05/05/2016 11:10
Workgroup #:	WG567700	**Analyst:**	JYH	**Run Date:**	05/05/2016 16:51
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	NI.050516.165121
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Manganese, Dissolved	7439-96-5	0.0117		0.00400	0.00200	0.00100

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW25-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/11/2016 00:02
Collect Date:	05/03/2016 14:40	**Dilution:**	1	**File ID:**	11M11740
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250

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Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	98.7	85	115	
1,2-Dichloroethane-d4	90.8	70	120	
Toluene-d8	97.1	85	120	
4-Bromofluorobenzene	97.1	75	120	

Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW25-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567637	**Analyst:**	JDS	**Run Date:**	05/05/2016 15:37
Collect Date:	05/03/2016 14:40	**Dilution:**	1	**File ID:**	16G49854
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Methane	74-82-8	3.41	J	5.00	2.00	1.00
ethene	74-85-1	2.00	U	5.00	2.00	1.00
ethane	74-84-0	2.00	U	5.00	2.00	1.00

J	Estimated value ; the analyte concentration was less than the LOQ.
J	Estimated value ; the analyte concentration was greater than the highest standard
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	HP16
Client ID:	50WW25-050316	**Prep Method:**	5021	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	RSK175	**Cal Date:**	03/25/2016 12:34
Workgroup #:	WG567895	**Analyst:**	JDS	**Run Date:**	05/06/2016 18:28
Collect Date:	05/03/2016 14:40	**Dilution:**	20	**File ID:**	16G49864
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Carbon Dioxide	124-38-9	1360000		200000	100000	50000

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	50WW25-050316	**Prep Method:**	6850	**Prep Date:**	05/05/2016 17:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	05/03/2016 17:18
Workgroup #:	WG567744	**Analyst:**	JWR	**Run Date:**	05/05/2016 23:26
Collect Date:	05/03/2016 14:40	**Dilution:**	10	**File ID:**	1LM.LM34784
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	96.6		4.00	2.00	1.00

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	IC1
Client ID:	50WW25-050316	**Prep Method:**	9056	**Prep Date:**	05/04/2016 15:00
Matrix:	Water	**Analytical Method:**	9056	**Cal Date:**	04/29/2016 12:41
Workgroup #:	WG567559	**Analyst:**	AED	**Run Date:**	05/04/2016 22:45
Collect Date:	05/03/2016 14:40	**Dilution:**	2	**File ID:**	I1_050416-44
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	20.3		0.800	0.400	0.200
Nitrate	14797-55-8	0.400	U	0.800	0.400	0.200
Nitrite	14797-65-0	0.400	U	0.800	0.400	0.200
Sulfate	14808-79-8	63.1		4.00	2.00	1.00

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM
Client ID:	50WW25-050316	**Prep Method:**	310.2	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	310.2	**Cal Date:**	05/05/2016 14:54
Workgroup #:	WG567701	**Analyst:**	DCM	**Run Date:**	05/05/2016 15:01
Collect Date:	05/03/2016 14:40	**Dilution:**	2	**File ID:**	SC160505005.019
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Alkalinity, Total (as CaCO3)	11-43-8	483		80.0	40.0	20.0

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	SMARTCHEM2
Client ID:	50WW25-050316	**Prep Method:**	365.4	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	365.4	**Cal Date:**	05/13/2016 10:44
Workgroup #:	WG568658	**Analyst:**	DCM	**Run Date:**	05/13/2016 10:56
Collect Date:	05/03/2016 14:40	**Dilution:**	1	**File ID:**	S2160513002.023
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Phosphorus, Total	7723-14-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	BURET
Client ID:	50WW25-050316	**Prep Method:**	SM4500-S-(-2)-F-2000	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	SM4500-S-(-2)-F-2000	**Cal Date:**	
Workgroup #:	WG567923	**Analyst:**	TB	**Run Date:**	05/06/2016 17:15
Collect Date:	05/03/2016 14:40	**Dilution:**	1	**File ID:**	ET.1605061715-08
Sample Tag:		**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfide	18496-25-8	1.00	U	2.00	1.00	0.500

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	TOC-VWP
Client ID:	50WW25-050316	**Prep Method:**	415.1	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	415.1	**Cal Date:**	10/30/2015 17:00
Workgroup #:	WG568224	**Analyst:**	DCM	**Run Date:**	05/11/2016 09:29
Collect Date:	05/03/2016 14:40	**Dilution:**	10	**File ID:**	TC05102016.024
Sample Tag:	DL01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	60.3		20.0	10.0	5.00

Certificate of Analysis

Sample #:	L16050151-10	**PrePrep Method:**	N/A	**Instrument:**	ICP-THERMO3
Client ID:	50WW25FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 10:26
Matrix:	Water	**Analytical Method:**	6010C	**Cal Date:**	05/05/2016 10:51
Workgroup #:	WG567684	**Analyst:**	KKB	**Run Date:**	05/05/2016 19:30
Collect Date:	05/03/2016 14:40	**Dilution:**	1	**File ID:**	T3.050516.193053
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Iron, Dissolved	7439-89-6	0.539		0.200	0.100	0.0500

Certificate of Analysis

Sample #:	L16050151-10	**PrePrep Method:**	N/A	**Instrument:**	ICP-MS2
Client ID:	50WW25FF-050316	**Prep Method:**	3015	**Prep Date:**	05/05/2016 08:56
Matrix:	Water	**Analytical Method:**	6020A	**Cal Date:**	05/05/2016 11:10
Workgroup #:	WG567700	**Analyst:**	JYH	**Run Date:**	05/05/2016 16:54
Collect Date:	05/03/2016 14:40	**Dilution:**	1	**File ID:**	NI.050516.165433
Sample Tag:	01	**Units:**	mg/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Manganese, Dissolved	7439-96-5	0.0541		0.00400	0.00200	0.00100

Certificate of Analysis

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Sample #:	L16050151-11	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	TRIP BLANK	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/10/2016 22:58
Collect Date:	05/03/2016 00:01	**Dilution:**	1	**File ID:**	11M11738
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	103	85	115	
1,2-Dichloroethane-d4	96.1	70	120	
Toluene-d8	101	85	120	
4-Bromofluorobenzene	102	75	120	

Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

2.0 Full Sample Data Package

2.1 Volatiles Data

2.1.1 Volatiles GCMS Data (8260)

2.1.1.1 Summary Data

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-03	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW14-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/10/2016 23:30
Collect Date:	05/03/2016 09:25	**Dilution:**	1	**File ID:**	11M11739
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	1.41		1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	1.75		1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	106	85	115	
1,2-Dichloroethane-d4	97.6	70	120	
Toluene-d8	101	85	120	
4-Bromofluorobenzene	103	75	120	

Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW08-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/11/2016 01:06
Collect Date:	05/03/2016 10:45	**Dilution:**	1	**File ID:**	11M11742
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.439	J	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.222	J	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.977	J	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	3.23		1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	0.812	J	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	48.1		1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	1.66		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	442	J	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.374	J	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	103	85	115	
1,2-Dichloroethane-d4	94.2	70	120	
Toluene-d8	101	85	120	
4-Bromofluorobenzene	99.3	75	120	

J	Estimated value ; the analyte concentration was less than the LOQ.

J	Estimated value ; the analyte concentration was greater than the highest standard
Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-05	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW08-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568444	**Analyst:**	JDS	**Run Date:**	05/11/2016 19:49
Collect Date:	05/03/2016 10:45	**Dilution:**	5	**File ID:**	11M11778
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Trichloroethene	79-01-6	383		5.00	2.50	1.25

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	93.1	85	115	
1,2-Dichloroethane-d4	80.7	70	120	
Toluene-d8	96.6	85	120	
4-Bromofluorobenzene	101	75	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-07	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW18-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/11/2016 00:34
Collect Date:	05/03/2016 13:10	**Dilution:**	1	**File ID:**	11M11741
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	106	85	115	
1,2-Dichloroethane-d4	97.1	70	120	
Toluene-d8	99.4	85	120	
4-Bromofluorobenzene	101	75	120	

Q	One or more quality control criteria failed. See narrative.

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-09	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	50WW25-050316	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/11/2016 00:02
Collect Date:	05/03/2016 14:40	**Dilution:**	1	**File ID:**	11M11740
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	98.7	85	115	
1,2-Dichloroethane-d4	90.8	70	120	
Toluene-d8	97.1	85	120	
4-Bromofluorobenzene	97.1	75	120	

Q	One or more quality control criteria failed. See narrative.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L16050151-11	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	TRIP BLANK	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	05/03/2016 21:37
Workgroup #:	WG568233	**Analyst:**	JDS	**Run Date:**	05/10/2016 22:58
Collect Date:	05/03/2016 00:01	**Dilution:**	1	**File ID:**	11M11738
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	1.00	0.250	0.125
Bromobenzene	108-86-1	0.250	U	1.00	0.250	0.125
Bromochloromethane	74-97-5	0.400	U	1.00	0.400	0.200
Bromodichloromethane	75-27-4	0.500	U	1.00	0.500	0.250
Bromoform	75-25-2	1.00	U	2.00	1.00	0.500
Bromomethane	74-83-9	1.00	U	2.00	1.00	0.500
2-Butanone	78-93-3	5.00	U	10.0	5.00	2.50
n-Butylbenzene	104-51-8	0.500	U	1.00	0.500	0.250
sec-Butylbenzene	135-98-8	0.500	U	1.00	0.500	0.250
tert-Butylbenzene	98-06-6	0.500	U	1.00	0.500	0.250
Carbon disulfide	75-15-0	1.00	U	2.00	1.00	0.500
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chlorobenzene	108-90-7	0.250	U	1.00	0.250	0.125
Chlorodibromomethane	124-48-1	0.500	U	1.00	0.500	0.250
Chloroethane	75-00-3	1.00	U	2.00	1.00	0.500
Chloroform	67-66-3	0.250	U	1.00	0.250	0.125
Chloromethane	74-87-3	1.00	Q	2.00	1.00	0.500
2-Chlorotoluene	95-49-8	0.250	U	1.00	0.250	0.125
4-Chlorotoluene	106-43-4	0.500	U	1.00	0.500	0.250
1,2-Dibromo-3-chloropropane	96-12-8	2.00	U	5.00	2.00	1.00
1,2-Dibromoethane	106-93-4	0.500	U	1.00	0.500	0.250
Dibromomethane	74-95-3	0.500	U	1.00	0.500	0.250
1,2-Dichlorobenzene	95-50-1	0.250	U	1.00	0.250	0.125
1,3-Dichlorobenzene	541-73-1	0.500	U	1.00	0.500	0.250
1,4-Dichlorobenzene	106-46-7	0.250	U	1.00	0.250	0.125
Dichlorodifluoromethane	75-71-8	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	1.00	0.250	0.125
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
1,2-Dichloropropane	78-87-5	0.400	U	1.00	0.400	0.200
1,3-Dichloropropane	142-28-9	0.400	U	1.00	0.400	0.200
2,2-Dichloropropane	594-20-7	0.500	U	1.00	0.500	0.250
cis-1,3-Dichloropropene	10061-01-5	0.500	U	1.00	0.500	0.250
trans-1,3-Dichloropropene	10061-02-6	1.00	U	2.00	1.00	0.500
1,1-Dichloropropene	563-58-6	0.500	U	1.00	0.500	0.250
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
2-Hexanone	591-78-6	5.00	U	10.0	5.00	2.50
Hexachlorobutadiene	87-68-3	0.500	U	1.00	0.500	0.250
Isopropylbenzene	98-82-8	0.500	U	1.00	0.500	0.250
p-Isopropyltoluene	99-87-6	0.500	U	1.00	0.500	0.250
4-Methyl-2-pentanone	108-10-1	5.00	U	10.0	5.00	2.50
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
Naphthalene	91-20-3	0.400	U	1.00	0.400	0.200
n-Propylbenzene	103-65-1	0.250	U	1.00	0.250	0.125
Styrene	100-42-5	0.250	U	1.00	0.250	0.125
1,1,1,2-Tetrachloroethane	630-20-6	0.500	U	1.00	0.500	0.250
1,1,2,2-Tetrachloroethane	79-34-5	0.400	U	1.00	0.400	0.200
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
1,2,3-Trichlorobenzene	87-61-6	0.300	U	1.00	0.300	0.150
1,2,4-Trichlorobenzene	120-82-1	0.400	U	1.00	0.400	0.200
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Trichlorofluoromethane	75-69-4	0.500	U	1.00	0.500	0.250
1,2,3-Trichloropropane	96-18-4	1.00	U	2.00	1.00	0.500
1,2,4-Trimethylbenzene	95-63-6	0.500	U	1.00	0.500	0.250
1,3,5-Trimethylbenzene	108-67-8	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
m-,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500

Surrogate	Recovery	Lower Limit	Upper Limit	Q
Dibromofluoromethane	103	85	115	
1,2-Dichloroethane-d4	96.1	70	120	
Toluene-d8	101	85	120	
4-Bromofluorobenzene	102	75	120	

Q	One or more quality control criteria failed. See narrative.

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L16050151
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Stephanie Mossburg

2.1.1.2 QC Summary Data

Example 8260 Calculations

1.0 Calculating the Response Factor (RF) from the initial calibration (ICAL) data:

RF = [(Ax) (Cis)] / [(Ais) (Cx)]

	Example
where:	
Ax = Area of the characteristic ion for the compound being measured:	3399156
Cis = Concentration of the specific internal standard (ug/mL)	25
Ais = Area of the characteristic ion of the specific internal standard	846471
Cx = Concentration of the compound in the standard being measured (ug/mL)	100
RF = Calculated Response Factor	**1.0039**

2.0 Calculating the concentration (C) of a compound in water using the average RF: *

Cx = [(Ax) (Cis) (Vn)(D)] / [(Ais) (RF) (Vs)]

	Example
where:	
Ax = Area of the characteristic ion for the compound being measured	**3122498**
Cis = Concentration of the specific internal standard (ug/L)	**25**
D = Dilution factor for sample as a multiplier (10x = 10)	**1**
Ais = Area of the characteristic ion of the specific internal standard	**611048**
RF = Average RF from the ICAL	**1.004**
Vs = Purge volume of sample (mL)	**10**
Vn = Nominal purge volume of sample (mL) (10.0 mL)	**10**
Cx = Concentration of the compound in the sample being measured (ug/L)	**127.2428**

3.0 Calculating the concentration (C) of a compound in soil using the average RF: *

Cx = [(Ax) (Cis) (Wn)(D)] / [(Ais) (RF) (Ws)]

	Example
where:	
Ax = Area of the characteristic ion for the compound being measured	**3122498**
Cis = Concentration of the specific internal standard (ug/L)	**25**
D = Dilution factor for sample as a multiplier (10x = 10)	**1**
Ais = Area of the characteristic ion of the specific internal standard	**611048**
RF = Average RF from the ICAL	**1.004**
Ws = Weight of sample purged (g)	**5**
Wn = Nominal purge weight (g) (5.0 g)	**5**
Cx = Concentration of the compound in the sample being measured (ug/L)	**127.2428**
Dry weight correction:	
Percent solids (PCT_S)	**50**
Cd = (Cx) (100)/PCT_S	**254.4856**

* Concentrations appearing on the instrument quantitation reports are on-column results and do not take into account initial volume, final volume, and the dilution factor.

4.0 Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, y = mx + b

y = response ratio = response of analyte / response of IS = Ax/Ais

x = amount ratio = concentration analyte/concentration internal standard = Cx / Cis

m = slope from curve = 0.213

b = intercept from curve = - 0.00642

Step 2: Calculate y from Quantitation Report

y = 86550/593147 = 0.1459

Step 3: Solve for x

x = (y - b)/m = [(0.1459 -(- 0.00642)]/ 0.213 = 0.7152

Step 4: Solve for analyte concentration Cx

Cx = Cis (x) = (25.0)(0.7152) = 17.88

Example Spreadsheet Calculation:

Slope from curve, m:	**0.213**
Intercept from curve, b:	**-0.00642**
Area of analyte, Ax:	**86550**
Area of Internal Standard , Ais:	**593147**
Concentration of IS, Cis	**25.00**
Response Ratio:	**0.145917**
Amount Ratio:	**0.715195**
Concentration:	**17.87988**
Units of Internal Standard:	**ug/L**

5.0 Concentration from Quadratic Regression

Step 1 - Retrieve Curve Data from Plot, y = Ax^2 + Bx + C
Where:
Ax^2 + Bx + (C - y) = 0
A, B, C = constants from the ICAL quadratic regression
y = Response ratio = Area of analyte/Area of internal standard (IS)
x = Amount ratio = Concentration of analyte/concentration of IS

Step 2: Calculate y from Quantitation Report

y = Ax/Ais

Step 3: Solve for x using the quadratic formula
Ax^2 + Bx + C - y = 0

$$x = \frac{b \pm \sqrt{\left(b^2 - 4a(c - y)\right)}}{2a}$$ (Two possible solutions)

Step 4: Solve for analyte concentration Cx

Cx = (Cis)(Amount ratio)

Example Spreadsheet Calculation:

Value of A from plot:	**-0.00629**	
Value of B from plot:	**0.511**	
Value of C from plot:	**-0.0276**	
Area of unknown from quantitation report:	**293821**	
Area of IS from quantiation report:	**784848**	
Response ratio, y:	**0.374367**	
C - y:	**-0.40197**	
Root 1 - Computed amount ratio , X1:	**80.44567**	
Root 2 - Computed amount ratio , X2:	**0.794396**	use this solution
Concentration of IS, Cis:	**25.00**	
Concentration of analyte, Cx:	**19.86**	ug/L

MICROBAC®

TCLP Volatile

Analyst(s): CPD
Date: 5/10/16
Filter Lot #: 9697607

Agitator Speed 30 ± 2 rpm ☑

Analyst / Date		Analyst / Date	
CPD	5/10/16	CPD	5/11/16
Time On	Temp On °C	Time Off	Temp Off °C
1533	22.7	0812	21.9

ZHE	Sample #	Pressure √	PSI ON	PSI OFF	Method	Fluid #	Matrix*	%Solid	Size Reduction Yes	Size Reduction No	Int. Wt. (g)	Fluid Vol. (mL)
A												
B												
C												
D												
E												
F												
G												
H												
I	05-0380-05	✓	10	10	1311	FI-176	S	100		✓	25.45	509
J												
K												
L												
M												
N												
O												
P												
Q	05-0427-01	✓	10	10	1311	FI-176	S	100		✓	25.16	503
R	-03	✓	〃	〃	〃	〃	〃	〃		✓	25.05	501
S	05-0457-01	✓	〃	〃	〃	〃	〃	〃		✓	25.02	500
NA	05-0427-02	NA	NA	NA	1311	FIL	W	<0.5	NA	NA	40	40
〃	-04	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃
〃	-05	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃
NA	FBILI	NA	NA	NA	1311	FI-176	NA	NA	NA	NA	40	40

CPD 5/10/16

CPD 5/10/16

CPD 5/10/16

*Matrix Code = (S-solid) (SS-sand, soil or sludge) (P-paint) (O-organic) (W-water or waste)

Comments: SX 05-0380-05 strong odor.

Peer Review By: Allie Alfred 5/11/16

Analyst(s): APD
Date: 5/5/16
Filter Lot #: 9697607

Agitator Speed 30 ± 2 rpm ☑

Analyst / Date		Analyst / Date	
APD	5/5/16	BG 5/6/16	
Time On	Temp On °C	Time Off	Temp Off °C
1540	22.0	0813	22.2

ZHE	Sample #	Pressure √	PSI ON	PSI OFF	Method	Fluid #	Matrix*	%Solid	Size Reduction Yes	Size Reduction No	Int. Wt. (g)	Fluid Vol. (mL)
A												
B												
C												
D												
E												
F												
G												
H												
I												
J												
K												
L												
M	05-0172-01	✓	10	10	1311	FI-175	S	100		✓	25.23	500
N	05-0175-01	✓	"	"	"	"	"	"		✓	25.70	500
O	05-0190-01	✓	"	"	"	"	"	"		✓	25.02	500
P	-02	✓	"	"	"	"	"	"		✓	25.13	500
Q												
R												
S												
NA	FBIK1	NA	NA	NA	311	FI-175	NA	NA	NA	NA	40	40

BG 5/6/16 BG 5/6/16 BG 5/6/16

*Matrix Code = (S-solid) (SS-sand, soil or sludge) (P-paint) (O-organic) (W-water or waste)

omments:

Peer Review By: