LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 15

2019

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Department of the Army
Longhorn Army Ammunition Plant

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

VOLUME 15

2019

A. Title: Report – Final Remedial Design / Remedial Action Work Plan LHAAP-03 Former Waste Collection Pad, Building 722-P Paint Shop
Author(s): Department of the Army
Recipient: Environmental Protection Agency and Texas Commission on Environmental Quality
Date: July 10, 2019
Date Stamp: 00933748 – 00933895

B. Title: Report – Draft Final 2018 Remedial Action Operation Report, Landfill 12 (LHAAP-12)
Author(s): Department of the Army
Recipient: Environmental Protection Agency and Texas Commission on Environmental Quality
Date: July 11, 2019
Bate Stamp: 00933896 – 00934207

C. Title: Minutes – Final Minutes, Monthly Managers' Meeting, June 20, 2019
Author(s): Department of the Army
Recipient: All Parties
Date: July 15, 2019
Date Stamp: 00934208 – 00934222

D. Title: Report – Quarterly Evaluation Report, 1st Quarter (January–March) 2019, Groundwater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, July 2019
Author(s): Bhate Environmental Associates, Inc.
Recipient: U.S. Army Corps of Engineers, Tulsa District
Date: July 19, 2019
Bate Stamp: 00934223 – 00935045

From: Foss, William A.
Sent: Tuesday, January 28, 2020 4:39 PM
To: Watson, Susan
Cc: Mena, Kim
Subject: FW: June 2019 Draft Final LHAAP-03 RD/RAWP

TCEQ and EPA Approvals for the LHAAP-03 RD/RAWP below. EPA July 2, TCEQ July 10.

WILLIAM A. FOSS, PG
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From: April Palmie <april.palmie@tceq.texas.gov>
Sent: Wednesday, July 10, 2019 2:36 PM
To: Mayer, Richard <mayer.richard@epa.gov>; Foss, William A. <William.Foss@aptim.com>
Cc: Williams, Aaron K SWF @SWT (Aaron.K.Williams@usace.army.mil) <Aaron.K.Williams@usace.army.mil>; Zeiler, Rose M CIV USARMY HQDA ACSIM (US) <rose.m.zeiler.civ@mail.mil>; Smith, Richard P SWT (Richard.P.Smith@usace.army.mil) <Richard.P.Smith@usace.army.mil>; Amanda.r.sherman3.civ@mail.mil; paul_bruckwicki@fws.gov; Kim Nemmers (knemmers@bhate.com) <knemmers@bhate.com>; Srivastav, Praveen <Praveen.Srivastav@aptim.com>; Becher, Kent <kdbecher@usgs.gov>; Harrison, Dorelle <harrison.dorelle@epa.gov>; Tzhone, Stephen <tzhone.stephen@epa.gov>
Subject: RE: June 2019 Draft Final LHAAP-03 RD/RAWP

EXTERNAL SENDER

Good afternoon. TCEQ has also reviewed the June 2019 Draft Final LHAAP-03 RD/RAWP and the RTCs and accepts the document.

Thank you,

April

From: Mayer, Richard <mayer.richard@epa.gov>
Sent: Tuesday, July 2, 2019 1:25 PM
To: Foss, William A. <William.Foss@aptim.com>; April Palmie <april.palmie@tceq.texas.gov>
Cc: Williams, Aaron K SWF @SWT (Aaron.K.Williams@usace.army.mil) <Aaron.K.Williams@usace.army.mil>; Zeiler, Rose

M CIV USARMY HQDA ACSIM (US) <rose.m.zeiler.civ@mail.mil>; Smith, Richard P SWT (Richard.P.Smith@usace.army.mil) <Richard.P.Smith@usace.army.mil>; Amanda.r.sherman3.civ@mail.mil; paul_bruckwicki@fws.gov; Kim Nemmers (knemmers@bhate.com) <knemmers@bhate.com>; Srivastav, Praveen <Praveen.Srivastav@aptim.com>; Becher, Kent <kdbecher@usgs.gov>; Harrison, Dorelle <harrison.dorelle@epa.gov>; Tzhone, Stephen <tzhone.stephen@epa.gov>
Subject: RE: June 2019 Draft Final LHAAP-03 RD/RAWP

Good Afternoon Bill, EPA has reviewed the June 2019 Draft Final LHAAP-03 RD/RAWP and the RTCs and grants approval. Thank you.

From: Foss, William A. <William.Foss@aptim.com>
Sent: Friday, June 28, 2019 7:23 PM
To: Mayer, Richard <mayer.richard@epa.gov>; April Palmie <april.palmie@tceq.texas.gov>
Cc: Williams, Aaron K SWF @SWT (Aaron.K.Williams@usace.army.mil) <Aaron.K.Williams@usace.army.mil>; Zeiler, Rose M CIV USARMY HQDA ACSIM (US) <rose.m.zeiler.civ@mail.mil>; Smith, Richard P SWT (Richard.P.Smith@usace.army.mil) <Richard.P.Smith@usace.army.mil>; Amanda.r.sherman3.civ@mail.mil; paul_bruckwicki@fws.gov; Kim Nemmers (knemmers@bhate.com) <knemmers@bhate.com>; Srivastav, Praveen <Praveen.Srivastav@aptim.com>
Subject: 06_2019 Draft Final LHAAP-03 RD/RAWP

Rich and April,

The *Draft Final Remedial Design/Remedial Action Work Plan, LHAAP-03, Former Waste Collection Pad, Building 722-P Paint Shop, Longhorn Army Ammunition Plant* has been uploaded to the portal under Documents/Recent. Hard copies and CDs were sent today via UPS and should be delivered to you Monday. The document includes responses to the EPA comments dated June 3, 2019 and the TCEQ comments dated June 6, 2019 and revisions to reflect the responses. A PDF copy of the document is attached and it can also be accessed directly on the portal via the link below. Please let us know if you have any comments or questions. Thanks!

06_19 DRAFT FINAL LHAAP-03 RD-RAWP

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DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

June 28, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270-2102

Re: Draft Final Remedial Design/Remedial Action Work Plan, LHAAP-03, Former Waste Collection Pad, Building 722-P Paint Shop Longhorn Army Ammunition Plant, Karnack, Texas, June 2019

Dear Mr. Mayer,

One hard copy and one compact disc (CD) of the above-referenced document is being transmitted to you for your records. The document includes revisions based upon the Environmental Protection Agency's (EPA) comments on the Draft version received on June 3, 2019, and Texas Commission on Environmental Quality's (TCEQ) comments received on June 6, 2019. In accordance with 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 with this Draft Final.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, 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)
R. Smith, USACE, Tulsa District, OK (Electronic only)

A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 hard copy and 1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

June 28, 2019

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 Remedial Design/Remedial Action Work Plan, LHAAP-03
Former Waste Collection Pad, Building 722-P Paint Shop
Longhorn Army Ammunition Plant, Karnack, Texas, June 2019

Dear Ms. Palmie,

One hard copy and one compact disc (CD) of the above-referenced document is being transmitted to you for your records. The document includes revisions based upon the Environmental Protection Agency's (EPA) comments on the Draft version received on June 3, 2019, and Texas Commission on Environmental Quality's (TCEQ) comments received on June 6, 2019. In accordance with 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 with this Draft Final.

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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:
R. Mayer, USEPA Region 6, Dallas, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)

R. Smith, USACE, Tulsa District, OK (Electronic only)
A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 hard copy and 1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

Response to Comments on
Draft Remedial Design / Remedial Action Work Plan
LHAAP-03 Former Waste Collection Pad, Building 722-P Paint Shop,
Longhorn Army Ammunition Plant, Karnack, Texas

Document Date: 17 May 2019
Comment Date: 3 June 2019

Reviewer: Mr. Richard Mayer, USEPA
Respondent: Dr. Rose Zeiler

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 ref.	USEPA Comment	C, D, E, or X[1]	Response	A or D[2]
1.	Appendix C	Appendix C titled *Well Completion Log for Monitoring Well 03WW01* appears to be a Well Completion Report. Please correct the title or provide the well completion log information.	C	The Appendix C fly sheet and the list of Appendices have been revised to "State of Texas Well Completion Report for Monitoring Well 03WW01."	

Response to Comments on
Draft Remedial Design / Remedial Action Work Plan
LHAAP-03 Former Waste Collection Pad, Building 722-P Paint Shop,
Longhorn Army Ammunition Plant, Karnack, Texas

Document Date: 17 May 2019
Comment Date: 6 June 2019

Reviewer: Ms. April Palmie, TCEQ
Respondent: Dr. Rose Zeiler

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 ref.	TCEQ Comment	C, D, E, or X[1]	Response	A or D[2]
1.	General	Please revise abbreviated dates. Example on page 1-1, Aug to August.	C	Dates have been revised as requested.	
2.	Pg. 1-2	First paragraph – add TCEQ before Risk Reduction Standard 3	C	Text has been revised as requested.	
3.	Table 1-1	Please make arsenic italic [or bold] and add note from ROD: Applicable RRS3 Industrial Soil MSC equals largest of calculated RRS3 MSC and background values. Italicized [or bold] text indicates value equals background.	C	Table 1-1 has been revised to show the arsenic value in italics and the note from the ROD has been added to the table as requested.	
4.	2.3, 2-2	Correct CLNWR acreage –7,100.	C	Text has been corrected to show the correct acreage.	

Comment No.	Section, Page ref.	TCEQ Comment	C, D, E, or X[1]	Response	A or D[2]
5.	4.3.2, 6.2 and other relevant sections	Consider P&A of 03WW01 before excavation. The well could be replaced, if deemed necessary. After looking at year 4 results for LHAAP-58, it would also be acceptable to P&A 03WW01 and not replace the well.	D	Well 03WW01 is still needed as a performance monitoring well for the LHAAP-58 remedy. We will take appropriate measures to avoid damaging the well but will plug and abandon and replace it if it is damaged during the excavation.	
6.	Figure 4-3	Please revise the blue circle symbol description to "Existing SB results used as sidewall confirmation samples" [or similar] For notes 1 and 2 add reference to Table 4-1.	C	The description of the blue circle symbols has been revised to read "Existing soil boring sample to be used as a sidewall confirmation sample". Reference to Table 4-1 has been added in parentheses in the 1st and 2nd notes.	
7.	Figure 4-4	See note regarding blue circle in previous comment, which also applies to yellow circles for floor samples. Add notes (like Figure 4-3) to describe confirmation sample process and reference to Table 4-1.	C	The descriptions for the blue and yellow symbols have been revised in accordance with the response to Comment #6. The callout to Table 4-1 and description of the new floor sample to be collected were added to the descriptions in parentheses.	

Draft Final

Remedial Design and Remedial Action Work Plan, LHAAP-03 Former Waste Collection Pad, Building 722-P Paint Shop

Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for U.S. Army Corps of Engineers, Tulsa District
Contracting Division
2488 East 81st Street
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Contract No. W9128F-13-D-0012
Task Order No. W9128BV17F0150
Project No. 501032
Rev 0
June 2019

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Acronyms and Abbreviations

AECOM	AECOM Technology Corporation
APTIM	Aptim Federal Services, LLC
ARAR	applicable or relevant and appropriate requirements
BERA	baseline ecological risk assessment
Bhate	Bhate Environmental, Inc.
BRAC	base realignment and closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
CY	cubic yards
FFA	federal facility agreement
ft bgs	feet below ground surface
GPS	global positioning system
GWTP	groundwater treatment plant
IWWP	Installation-Wide Work Plan
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
LUC	land use control
MATOC	Multiple Award Task Order Contract
MCLs	maximum contaminant levels
MEGA	Multiple Environmental Government Acquisition
mg/kg	milligrams per kilogram
MMRP	Military Munitions Response Program
MOA	memorandum of agreement
MSC	medium-specific concentration
NPL	National Priorities List
PPE	personal protective equipment
RAOs	remedial action objectives
RAWP	Remedial Action Work Plan
RD	remedial design
RI/FFS	Remedial Investigation/Focused Feasibility Study
ROD	record of decision
RRS2	Risk Reduction Standard 2

Acronyms and Abbreviations (continued)

RRS3	Risk Reduction Standard 3
SF	square feet
Shaw	Shaw Environmental, Inc.
SOP	standard operating procedure
SVOC	semivolatile organic compound
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
U.S. Army	U.S. Department of the Army
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
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 No. W9128BV17F0150 to conduct environmental restoration of LHAAP-03 at Longhorn Army Ammunition Plant (LHAAP). The Bhate Team is comprised of Bhate and Aptim Federal Services, LLC (APTIM). This Remedial Design (RD) and Remedial Action Work Plan (RAWP) was prepared to describe the design elements selected to implement the remedy for LHAAP-03 described in the Final Record of Decision (ROD) (Bhate 2018a) and the actions necessary to implement them.

1.1 Site Description

LHAAP is approximately 14 miles northeast of Marshall, Texas and approximately 40 miles west of Shreveport, Louisiana (**Figure 1-1**). The installation occupies approximately 1,300 of its former 8,416 acres between State Highway 43 at Karnack, Texas and the western shore of Caddo Lake. The facility can be accessed via State Highways 43 and 134.

LHAAP was placed on the Superfund National Priorities List (NPL) on August 9, 1990. Activities to remediate contamination began in 1990. After its listing on the NPL, the U.S. Department of the Army (U.S. Army), the U.S. Environmental Protection Agency (USEPA), and the Texas Water Commission (now the Texas Commission on Environmental Quality [TCEQ]) entered into a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §120 Federal Facility Agreement (FFA) for remedial activities at LHAAP. The FFA became effective December 30, 1991. LHAAP operated until 1997 when it was placed on inactive status and classified by the U.S. Army Armament, Munitions, and Chemical Command as excess property. LHAAP has been under the administrative control of the Base Realignment and Closure (BRAC) Division of the Army since 2003 and is Defense Environmental Restoration Account funded. The majority of LHAAP has been transferred by the U.S. Army to the U.S. Fish and Wildlife Service (USFWS) for management as the Caddo Lake National Wildlife Refuge (Bhate 2018a).

LHAAP-03 is located approximately 50 feet to the west of former Building 722-P (**Figure 1-2**). Building 722-P was used for paint spraying and polyurethane spray coating of various items. LHAAP-03 was a waste collection site (originally identified as a 16-foot by 15-foot-area) outside of the paint shop at Building 722-P, which was at the Maintenance Shop Area located within the boundary of LHAAP-35A (58) (see **Figures 1-2**).

The ROD identified two chemicals of concern (COCs) for human health in soil, as shown in **Table 1-1**. No chemicals of potential ecological concern were identified. The remedy selected in the ROD included excavation and off-site disposal of soil. The human health cleanup levels were set at concentrations equal to the largest of the calculated TCEQ Risk Reduction Standard 3 (RRS3) industrial soil medium-specific concentrations (MSCs) based on the site-specific soil standard for groundwater protection, and background soil concentration (AECOM 2013a). These cleanup levels are shown in **Table 1-1**.

Table 1-1
Chemicals of Concern and Cleanup Levels for LHAAP-03

Media	Chemicals of Concern (Human Health)	Cleanup Levels [a]
Soil	Arsenic	*5.9 mg/kg*
	Lead	180 mg/kg

Notes:

[a] *Applicable RRS3 Industrial Soil MSC equals largest of the calculated RRS3 MSC and background values. Italicized text indicates the cleanup level equals background*

mg/kg – milligrams per kilogram

1.2 Selected Remedy

The final remedy is identified in the Proposed Plan (AECOM 2013b) that has been reviewed and approved by the regulatory agencies and placed in the Administrative Record file for LHAAP. The Final LHAAP-03 ROD (Bhate 2018a) signed by the Army and USEPA selected excavation and offsite disposal as the remedy for arsenic and lead contaminated soil at LHAAP-03 as summarized in Section 1.4 of the Final ROD. Following remedial action, COC concentrations will be reduced to achieve chemical-specific applicable or relevant and appropriate requirements (ARARs) (based on the commercial/industrial land use scenario). The remaining arsenic and lead concentrations in soil will not pose an unacceptable direct contact risk to humans or ecological receptors at this site. The selected remedy for LHAAP-03 protects groundwater by preventing migration of COCs into groundwater at concentrations that could possibly result in local exceedances of the maximum contaminant levels (MCLs) for arsenic and lead.

The target soil remediation area for LHAAP-03 is contained entirely within the boundaries of a larger site, LHAAP-35A (58). Because LHAAP-03 is small and entirely contained within LHAAP-35A (58) and its land use control (LUC) boundary, the management strategy is to address the LHAAP-03 groundwater remedy and LUCs as being indistinguishable from and included with the LHAAP-35A (58) remedy. This was approved in the Explanation of Significant Differences for the LHAAP-35A (58) ROD (Bhate 2018b).

The final remedy addresses arsenic- and lead-contaminated soil that, based upon testing and modeling, have the potential to result in local groundwater arsenic and lead concentrations exceeding their respective MCLs. The soil cleanup levels selected are protective of the groundwater for arsenic and lead. Surface water runoff to surface water streams is not shown as a pathway for the site, and there is no indication of concentrations at the surface that present an unacceptable risk to human or ecological receptors that could create a risk via that pathway (Bhate 2018a). To address ecological risk, LHAAP-03 was grouped with several other sites as part of the Industrial Sub-Area. The Baseline Ecological Risk Assessment (BERA) (Shaw 2007b) concluded that no unacceptable risk was present in the Industrial Sub-Area; therefore, no further action is needed at LHAAP-03 for the protection of ecological receptors (Bhate 2018a).

Because LHAAP-03 lies wholly within the LUC boundary of LHAAP-35A (58), all LUCs, as well as the non-residential land use notification, applicable to LHAAP-35A (58) will be applicable to LHAAP-03 in the same way and to the same extent (Shaw 2010 & Bhate 2018b). Therefore, the remedy selected for LHAAP-03 does not include any specific provisions for LUCs (Bhate 2018a).

CERCLA Five-Year Reviews specific to LHAAP-03 will be implemented following completion of the soil remedy to evaluate whether the remedy remains protective of human health and the environment. CERCLA Five-Year Reviews for LHAAP-03 will be addressed as part of the remedial action for LHAAP-35A (58). All monitoring and reporting requirements associated with CERCLA five year reviews, will be met under LHAAP-35A (58) (Bhate 2018b).

The ROD identified three areas to be excavated based on previous soil sample exceedances from 2006 through 2008 as the conceptual target remediation areas. The ROD also notes that the excavation extents would be refined as part of the pre-excavation sampling. These areas are described below:

- **Area A.** Approximately 25-feet-wide by 25- to 35-feet-long (approximately 560 square feet [SF]) by 2-feet-deep
- **Area B.** Approximately 5-feet by 5-feet-around 03SB15 (within Area A footprint) by at least 7-feet-deep (bottom excavation depth is not defined)
- **Area C.** Approximately 5-feet by 5-feet-around 03SB11 (within Area A footprint) by 7-feet-deep

1.3 Remedial Action Objectives

The remedial action objective (RAO) developed for LHAAP-03 and outlined in the Final ROD (Bhate 2018a) is to protect human health and the environment by preventing lead and arsenic contaminated soils from potentially leaching into the underlying groundwater. Per the ROD's RAOs, and consistent with the National Contingency Plan, COCs and cleanup levels must be set. These are shown in **Table 1-1**.

1.4 Document Organization

This document is composed of the following sections:

- **Section 1.0:** "Introduction" summarizes the site background, proposed remedy, and RAOs.
- **Section 2.0:** "Site Characteristics" summarizes the geology and hydrogeology of the site, as well as a summary of the nature and extent of contamination.
- **Section 3.0:** "Soil Sampling through November 2018" summarizes the results of the prior samples as well as the samples collected in November 2018 as part of the pre-excavation sampling as described in the ROD that form the basis for the design elements described in subsequent sections.
- **Section 4.0:** "Soil Excavation Remedial Design" describes the design basis for the planned excavation of contaminated soil.
- **Section 5.0:** "Remedial Action Work Plan" describes the tasks to implement the design for soil excavation.
- **Section 6.0:** "Schedule" provides a list of activities and anticipated durations for the work plan tasks.
- **Section 7.0:** "References" provides citations for the documents used as references.

This work plan also includes the following appendices supporting the main text:

- **Appendix A** includes the Analytical Data Reports for the November 2018 soil samples collected.
- **Appendix B** includes the Sample Collection Logs from the November 2018 soil sample collection event.
- **Appendix C** includes the State of Texas Well Completion Report for monitoring well 03WW01.

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1.5 Deviations from the Installation-Wide Work Plan

There is a planned deviation from the Final Installation-Wide Work Plan (IWWP) (Bhate 2018c), Section 3.8.3, Verification of Excavation Limits. The IWWP indicates that verifications samples shall be collected from every 1,000 SF of excavation floor and from each wall. The largest planned excavation for LHAAP-03 is 300 SF, and the smallest is 36 SF. Because of the small excavation areas and shallow depths, the resulting exposed surface area is expected to be less than 400 SF. Therefore, it is proposed to verify the excavation limits both laterally and vertically with one composite confirmation sample. Each wall and floor will not be individually tested. See **Section 4.4** of this document for more details of the planned confirmation sampling.

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2.0 SITE CHARACTERISTICS

2.1 Geology and Hydrogeology

The subsurface geology at LHAAP consists primarily of a thin veneer of Quaternary alluvium overlying Tertiary age formations of the Wilcox and Midway Groups. The Wilcox Group underlies most of the LHAAP installation (Jacobs 2001). The thickness of the Wilcox Group varies from 350 feet in the northwest corner of the installation to 130 feet along the eastern side near Caddo Lake. This formation consists of interbedded fine-to medium-grained sand, silt, and clay. The shallow soils at LHAAP-03 include interbedded layers of silty clays and sands (Shaw 2007a).

2.2 Nature and Extent of Contamination

From 2006 through 2008, soil samples were collected at LHAAP-03 soil operable unit at depths ranging from surface (0 to 0.5 feet below ground surface [ft bgs]) to 15 ft bgs. The collected samples were analyzed for metals, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). The analytical results were compared to TCEQ Risk Reduction Standard 2 (RRS2) and RRS3 MSCs (Title 30 Texas Administrative Code [TAC] Chapter 335) corresponding to commercial/industrial land-use. The RRS2 and RRS3 MSCs are risk-based values developed to protect human health and groundwater resources that are protective at a target risk level of 1×10^{-6} for carcinogens and a target hazard quotient of 1 for non-carcinogens, as described in the *Final Remedial Investigation – Focused Feasibility Study* (AECOM 2013a).

Arsenic and lead were detected in one or more samples from borings 03SB01 through 03SB15, and 03SB17 at concentrations exceeding their respective RRS2 MSCs. These data indicated that there is a potential for the metals-contaminated soil to contaminate the groundwater (Shaw 2009). RRS3 MSCs were developed using the soil attenuation model, according to the TCEQ Risk Reduction Rules (30 TAC §335 and updates), included in the Remedial Investigation/Focused Feasibility Study (RI/FFS), Appendix B (AECOM 2013a).

The calculated 95 percent upper confidence limits (UCLs) of the mean concentrations in soil for arsenic and lead were compared to their respective calculated RRS3 MSCs. This comparison indicated that arsenic and lead exceeded their respective applicable RRS3 industrial soil MSCs and they were identified as COCs in soil. **Section 3.0** discusses the sample results and location in more detail.

2.3 Current and Future Land Use

LHAAP is located near the unincorporated community of Karnack, Texas. Karnack is a rural community with a population of approximately 775 people. The incorporated community of Uncertain, Texas, approximate population 205, is located to the northeast of LHAAP on the edge of Caddo Lake and is a resort area and an access point to Caddo Lake. The industries in the surrounding area consist of agriculture, timber, oil and natural gas production, and recreation.

LHAAP has been an industrial facility since 1942. Production activities and associated waste management activities continued until the facility was determined to be in excess of the U.S. Army's needs in 1997. The plant area has been relatively dormant since that time. LHAAP is surrounded by a fence (except on the border with Caddo Lake) with an access gate that is locked after daylight hours, which restricts public access. The fence now represents the National Wildlife Refuge boundary. The public can access most of the facility during the day, with additional fencing and signage restricting access from some environmental sites.

The reasonably anticipated future use of LHAAP-03 is part of a national wildlife refuge. This anticipated future use is based on a Memorandum of Agreement (MOA) (U.S. Army 2004) between the USFWS and the U.S. Army. That MOA documents the transfer process of the LHAAP acreage to USFWS to become the Caddo Lake National Wildlife Refuge and will be used to facilitate a future transfer of LHAAP-03. Presently the Caddo Lake National Wildlife Refuge occupies approximately 7,100 acres of the 8,416-acre former installation. In accordance with the National Wildlife Refuge System Administration Act of 1966 and its amendments (16 USC 668dd), the land will remain as a national wildlife refuge unless there is a change brought about by an act of Congress, or the land is part of an exchange authorized by the Secretary of the Interior. Neither of these events terminating LHAAP-03's use as a wildlife refuge are reasonably foreseeable (Bhate 2018a).

2.4 Current and Future Surface Water Use

There is no surface water body present within LHAAP-03. Land at LHAAP-03 is relatively flat; water from heavy rains would eventually drain to the southern branch of Goose Prairie Creek, approximately 800 feet to the southwest. Goose Prairie Creek flows into Caddo Lake. Caddo Lake is a large recreational area that covers 51 square miles and has a mean depth of 6 feet. The watershed of the lake encompasses approximately 2,700 square miles. It is used extensively for fishing and boating and provides drinking water supply for multiple cities/towns. The anticipated future uses of surface water are the same as current uses.

2.5 Current and Future Groundwater Use

Groundwater in the drinking water aquifer (250 to 430 ft bgs) near LHAAP is currently used as a drinking water source. The drinking water aquifer should not be confused with the "deep zone" groundwater, which extends only to a depth of approximately 151 ft bgs. The deep zone groundwater and the drinking water aquifer are distinct from each other, and there is no connectivity between the contaminated zone and the drinking water aquifer. There are six active water supply wells near LHAAP that are completed in the drinking water aquifer (**Figure 1-2**).

Groundwater under LHAAP-03 is indistinguishable from and is included with the site wide LHAAP-35A (58) groundwater (Bhate 2018a).

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3.0 PRE-EXCAVATION SOIL SAMPLING

Pre-excavation sampling was conducted prior to preparation of the RD/RAWP to better define the excavation limits and to pre-characterize the waste for offsite disposal of the soil. The intent was to define the limits of the excavation based on the samples with concentrations below the cleanup levels and to use the results as confirmation samples. The sampling approach was outlined in the *Technical Memorandum – Pre-Excavation Sampling at LHAAP-03 Former Waste Collection Pad Building, 722-P Paint Shop, Longhorn Army Ammunition Plant, Karnack, Texas* (Bhate 2018d) and was approved by the regulators in October 2018. Soil samples were collected on November 29, 2018 at pre-determined locations and intervals as described in the Pre-Excavation Sampling Technical Memorandum (Bhate 2018d). Analytical results from the November 2018 pre-excavation sampling were all below the RRS3 MSCs. Because of the low concentrations, a pre-excavation waste characterization sample analysis was not performed. The analytical data from the November 2018 sampling event is provided in **Table 3-1** and shown on **Figure 3-1**. Analytical data reports are included as **Appendix A**, and Sample Collection Logs are provided as **Appendix B**.

The data from November 2018 was used along with the prior data from 2006 through 2008 to re-evaluate the excavation areas shown in the ROD. The 2006 through 2008 and the ROD excavation areas are shown on **Figure 3-1**. Results that exceeded the RRS3 MSC are yellow highlighted on **Figure 3-1**. The 2006 through 2008 sampling had been conducted at seventeen locations. The area sampled from 2006 through 2008 covered approximately 2,100 SF (or less than 1/10th of an acre) and identified an area of approximately 560 SF for remediation (Bhate 2018a). Samples were collected from 0 to 0.5 ft bgs, 3 to 4 ft bgs, and 5 to 7 ft bgs at each location except at 03SB11, which also had deeper intervals collected at 9 to 10 ft bgs and 14 to 15 ft bgs. At several of the locations, arsenic and lead concentrations were below the RRS3 MSCs in all sampled intervals. The maximum detected concentrations of arsenic and lead in soil were 32.7 and 6,760 milligrams per kilogram (mg/kg), respectively, in boring 03SB11 at the 6 to 7 ft bgs interval during the 2006 sampling event. The deeper interval samples were below the RRS3 MSC.

A groundwater monitoring well (03WW01) was installed at location 03SB11, where deeper intervals were sampled. Concentrations at depths below the 0 to 0.5 ft bgs interval exceeded the RRS3 MSC at only one other location, 03SB15, where just arsenic was detected above the RRS3 MSC. At 03SB15, the arsenic concentration at 6 to 7 ft bgs was 7.62 mg/kg, just above the RRS3 MSC of 5.9 mg/kg. Data from the November 2018 sampling did not indicate any other locations with deeper contamination. **Figure 3-1** shows the November 2018 and the prior 2006 through 2008 sample results.

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4.0 SOIL EXCAVATION REMEDIAL DESIGN

The design elements of the excavation are provided in the following sections. The details of the implementation of the design are included in **Section 7.0**.

4.1 Design Criteria

The soil design criteria define the goals to be achieved and are based on the RAOs of protection of human and ecological receptors from contaminated soil and the protection of human health by preventing further potential degradation of groundwater. The ROD identified COCs for the soil to groundwater pathway as shown in **Table 1-1**. The design for soil includes excavation of the contaminated soil until the cleanup levels are attained or groundwater is encountered. If the contamination is present at or below groundwater level, excavation will be terminated at the depth where saturated conditions are encountered.

4.2 Performance Objective

The performance objective is to remove the contaminated soil above the RRS3 MSCs. For areas that are not already defined by existing samples, confirmation samples will be collected and analyzed for the COCs after excavation to verify the contaminated soils were removed and cleanup levels were attained. Soil concentrations in few surface soil samples and a couple of subsurface samples exceeded the RRS3 MSC. The surface area locations (0 to 2 ft bgs) are shown on **Figure 4-1** and the subsurface locations (6 to 7 ft bgs) are shown on **Figure 4-2**.

4.3 Excavation Areas

The proposed excavation areas to address the soil to groundwater pathway are shown on **Figures 4-1** and **4-2**. The excavation depths anticipated to remove the contaminated soil at various locations within the footprint of LHAAP-03 are 1 or 8 ft bgs. The groundwater elevation typically is approximately 25 ft bgs and is not expected to be encountered during excavation.

4.3.1 Excavation Area Sample Summary

Excavation Area A (Areas A1 and A2)

Review of all results indicate that the majority of the contamination is in the 0 to 0.5 foot bgs interval with concentrations of lead and arsenic above the RRS3. The individual sample locations with lead and arsenic concentrations exceeding their respective RRS3 MSC values are shown with yellow highlighting on **Figure 3-1**. Additional samples were collected in November 2018 along the perimeter and within the target remedial Area A described in the ROD (**Figure 4-1**). The results from the 2018 and historic samples were used to define the lateral extent of the excavations.

For Area A1, there were 9 sample locations within 4 feet of the Area A1 excavation perimeter that were below the RRS3 MSC and are proposed to be used to indicate that the 0 to 1 foot bgs excavation side walls are clean. The excavation floor of Area A1 will have a confirmation sample collected.

For Area A2, the excavation is small in both width and depth (~140 cubic feet). Because the excavation area is so small, only one composite will be collected for the entire excavation. A composite sample consisting of a grab from each sidewall and the floor will used for the confirmation sample for this 1-foot excavation area. This is a deviation from the IWWP sampling protocol as described in **Section 1.5**.

Excavation Areas B and C

Two soil borings, 03SB15 and 03SB11, with samples collected at deeper intervals from 2006 through 2008 had prior results above the RRS3 MSC. The ROD identified remediation to be conducted around these two areas with refinements based on the pre-excavation sampling (Bhate 2018a). The November 2018 samples collected from 0 through 9 ft bgs around these two areas confirms that these were isolated occurrences.

For Area B, a sample collected from 03SB15 in 2007 had arsenic slightly above the RRS3 MSC at only the 6 to 7 ft bgs interval. Three samples were collected in November 2018 at distances from 4 to 7 feet away from the 03SB15 location at intervals from 0 to 2 ft bgs, 3 to 4 ft bgs, 6 to 7 ft bgs, and one from 8 to 9 ft bgs. **Figure 4-2** shows the proximity of the results that make the reconfigured triangular Area B. None of the arsenic or lead results from the November 2018 samples had results above the RRS3 MSC. The triangular area shown on **Figure 4-2** will be excavated to a depth of 8 feet, and the three sample results defining the corners of the triangle will be used to define the horizontal limits of the excavation and a confirmation sample will be collected from the floor of the excavation.

For Area C, 03SB11 collected in 2007 had the highest concentrations of arsenic and lead detected at LHAAP-03 at the 6- to7-foot-interval. In 2008, during the installation of 03WW01 adjacent to 03SB11, additional soil samples were collected at 8 to 9 ft bgs and 14 to 15 ft bgs and did not have any RRS3 MSC exceedances. In November 2018, samples were collected approximately 4 feet to the northwest and southeast of 03SB11 at 0 to 2, 3 to 4, and 6 to7 ft bgs intervals (**Figure 4-2**). None of the 2018 sample results were above the RRS3 MSCs. Because the two samples were so close to 03SB11, the excavation at Area C will be approximately 8-feet by 8-feet-horizontally. The results from the 2008 sample from 8 to 9 ft bgs are being used to define the vertical limit of the excavation to 8 ft bgs and will be used as the floor confirmation sample. The two 2018 sample results from 6 to 7 ft bgs will also be used as the confirmation samples for the side walls.

Because the excavation is so small, an effort will be made to keep the monitoring well, 03WW01, in place. The screened interval of the well is below 18 ft bgs and the annular space was sealed with cement from 0 to 16 ft bgs. The 03WW01 State of Texas Well Completion Report is included in **Appendix C**.

4.3.2 Excavation Depth and Extent

Approximately 40 in-place cubic yards (CY) of soil will be excavated from Areas A, B, and C. The excavation areas proposed after the pre-excavation sampling are as follows:

- **Area A.** This area was split into two subareas from the ROD Area A—Area A1 and Area A2 as shown on **Figure 4-1**.
  - For Area A1, the excavation area was developed by surrounding the locations that were above the RRS3 MSC at 0 to 0.5 ft bgs and extending the horizontal limit to within 5 feet of sample locations that had results below the RRS3 MSCs at 0 to 0.5 ft bgs or 0 to 2 ft bgs. An initial excavation depth of 1 foot is planned since none of the 0 to 2 ft bgs November 2018 samples were above the RRS3 MSC.
  - For Area A2, the contamination appears to be isolated at 0 to 0.5 ft bgs, and a small excavation is planned around it. The estimated horizontal area is depicted on **Figure 4-1**, and the initial vertical excavation depth is 1 foot bgs.
- **Area B.** This area was defined in the ROD as a 5-feet-wide by 5-feet-deep by 7-feet-deep excavation. The area has been redefined by the sample results to a triangular area, as shown on **Figure 4-2**. The area will be excavated to a depth of 8 feet.
- **Area C.** This area has remained unchanged from the ROD and will be excavated as an 8-foot by 8-foot-square excavation approximately 8-feet-deep centered around monitoring well 03WW01. Because the excavation is small, and the vertical limit is known, an effort will be made to save monitoring well 03WW01 and not abandon it initially. The grout seal around the well extends down to 16 feet bgs and should remain intact and protected with careful excavation around the well. However, if it is damaged during excavation, the well will be plugged and abandoned and reinstalled by a Texas licensed well driller.

4.4 Confirmation Sampling

Confirmation samples will be collected to define the final excavation limits. If contamination is present in a confirmation sample, the excavation limits will be extended in increments of 1 foot vertically and horizontally until confirmation samples are below the RRS3 MSC.

The IWWP (Bhate 2018c) indicates that each confirmation sample will be a 5-point composite soil sample collected from every 1,000 SF of the excavation floor area and of each sidewall. However, a deviation from the 5-point composite methodology is proposed to allow the use of existing soil samples to define the excavation limits. Because of the small excavation areas and the abundance of samples with results below the RRS3 MSC in the small area at LHAAP-03, the use of existing samples and a deviation to the IWWP has been proposed for confirmation sampling. For excavations where the limits were set by existing samples below the RRS3 MSC, no additional confirmation samples will be collected. For small excavations, a single composite sample representing the walls and floor will be collected. **Figure 4-3** shows the existing sample locations and intervals to be used for confirmation samples for the 1-foot excavation areas, and **Figure 4-4** shows the existing 1ocations to be used for the Areas B and C excavations. **Table 4-1** summarizes the samples (existing and proposed) to be used for excavation confirmation.

The following proposed sampling procedure for small excavation areas (less than 200 SF of floor area and sidewall height of less than 10 feet) is a deviation from the IWWP. It is proposed to collect a single 5-point composite sample from such excavations by collecting a grab sample from each of the four sidewalls and the floor. This alternate sampling will be conducted at Area A2. If the composite sample result is above the cleanup levels, then additional grab samples may be collected from each wall to determine which direction to overexcavate. If no additional sampling is conducted prior to over excavation, each wall and the floor will be overexcavated by 1 foot. The Area A1 excavation floor sampling will be performed in accordance with the IWWP.

4.5 Waste Characterization and Disposal

The excavated soil will be disposed at an off-site landfill. Waste characterization samples will be collected at a rate of one sample for every 1,000 CY of excavated soil to characterize the waste. It is anticipated that soil will be classified as non-hazardous. Samples will be analyzed for the analytes required by the selected waste disposal facility.

4.6 Backfill and Site Restoration

Following the receipt of clean confirmation samples for a given excavation area, clean fill dirt will be placed in the excavation and compacted with the backhoe/excavator bucket to prevent settling. The fill dirt will be suitable for future vegetation growth. Borrow source material will be considered clean if VOCs and metals are below the TCEQ RRS2 MSCs for industrial use. It is estimated that less than 100 CY of fill dirt will be brought on site. Borrow source samples will be collected at a rate of one per 1,000 CY of borrow soil. The site will be reseeded with a native grass and wildflower mix with guidance from USFWS.

4.7 Other Design Considerations

Several of the bridges at LHAAP have weight limits. Routes for trucks filled with waste soil as well as for trucks bringing clean soil from borrow sources will be selected with coordination from USFWS to avoid the bridges if possible. Additional gates may need to be unlocked to allow access to and from LHAAP from another gate besides the main gate in Karnack to avoid bridges where weight limits may be exceeded with loaded trucks.

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5.0 LAND USE CONTROL PLAN

LHAAP-03 lies wholly within the LUC boundary of LHAAP-35A (58) (see **Figure 1-2**). All LUCs, as well as the non-residential notification, applicable to LHAAP-35A (58) will be applicable to LHAAP-03 in the same way and to the same extent. Therefore, the remedy selected in the ROD does not include specific provisions for LUCs (Bhate 2018a).

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6.0 REMEDIAL ACTION WORK PLAN

6.1 Field Activities

This section describes the remedial action field activities planned at the LHAAP-03. Prior to initiation of the field activities performed as part of this RD/RAWP, the regulators will be notified at least 10 days in advance. Site-specific activities are described in associated subsections. The field activities to be conducted under this Work Plan are outlined below:

- Mobilization and Site Setup
- Surveying
- Soil Excavation and Disposal
- Confirmation Soil Sampling
- Backfilling and Site Restoration
- Waste Management
- Decontamination
- Site Restoration

In general, the field activities will be conducted in accordance with the IWWP for LHAAP (Bhate 2018c).

6.1.1 Mobilization and Site Setup

Prior to the mobilization of subcontractors to LHAAP sites, work locations for overhead and ground level accessibility will be evaluated. In areas that have excessive vegetation and/or tree growth, a backhoe or other appropriate earthmoving equipment will be used to clear the areas to allow equipment access. After coordinating with underground utility locators for utility clearances, excavation locations and areas that require surface soil removal will be located and staked. Utility location and clearance for intrusive activities will be conducted in accordance with Section 3.1 of the IWWP (Bhate 2018c).

Appropriate personnel, subcontractors, and equipment necessary to perform specific task(s) will be mobilized to the site. A permanent decontamination station is located at the on-site LHAAP-18/24 groundwater treatment plant (GWTP) and can accommodate large equipment. Temporary decontamination pads will be constructed as needed at approved on-site locations to decontaminate equipment and prevent cross-contamination between sites. Wash water will be contained and transported to the GWTP for disposal when necessary.

Improvement of the site access road using gravel or other materials to reduce the slopes may be performed to allow trucks and heavy equipment to enter and exit the site safely. USFWS will be consulted regarding any improvements to minimize impact to the surrounding terrain to the degree possible.

6.1.2 Surveying

During the excavation, the locations of soil confirmation samples and limits of excavation will be surveyed using global positioning system (GPS) equipment. Use of GPS equipment will be coordinated with USACE in accordance with Section 3.3 of the IWWP (Bhate 2018c). A professional land surveyor licensed in the State of Texas will survey the final horizontal excavation limits. After backfilling is complete, the new vertical elevation of the top of casing for 03WW01 (or 03WW01R if replaced) will be surveyed based on the North American Vertical Datum of 1988 to the nearest 0.01 foot.

6.1.3 Soil Excavation and Disposal

The limits and plans for excavation are described in **Section 4.0** of this Plan. Excavation of the soil generally consists of preparing the site, excavating the soil, transporting and disposing the soil, collecting confirmation samples, surveying the excavation limits, backfilling, and restoring the site. Excavations performed under this remedial action are expected to be less than one acre in size and are not subject to the storm water pollution prevention requirements of Chapter 26 of the Texas Water Code and TCEQ General Permit TXR15000. However, best practices (silt fencing, berms, etc.) will be used where appropriate to prevent excess runoff of sediment from the excavation and stockpile areas.

6.1.3.1 Site Preparation

The areas to initially be excavated will be established prior to mobilization of the excavation personnel. A GPS will be used to delineate and mark the excavation areas shown on **Figures 4-1** and **4-2**. The potential limits of excavation will then be physically marked with survey stakes, pin flags, paint, or other appropriate marking. Clearing of the vegetation in the excavation area will largely be conducted using conventional equipment. A temporary decontamination station may be constructed on site as needed.

An area between the site and the existing roads to the north and east will be cleared for construction of a temporary soil staging/stock pile area. This will allow the transport vehicles to stay on the road during loading activities. A temporary staging area consisting of berm with polyethylene sheeting will be constructed for stockpiling soil prior to collecting waste characterization samples and off-site transport and disposal.

6.1.3.2 Excavation and Soil Handling

After the initial excavation limits are established, excavation will begin. Vertical excavation will stop if groundwater is encountered. Areas B and C with an excavation depth of more than 4 feet will not be benched and no personnel will enter these excavations. All activities will be conducted from the surface. See **Section 6.2** below for monitoring well excavation or abandonment and reinstallation for the well located within excavation Area C.

The excavated soil will be stockpiled in the designated area. Composite samples will be collected from the stockpiled material at a rate of 1 sample per 1,000 CY and analyzed for the necessary analytes to obtain acceptance at the selected disposal facility. Each composite sample will consist of equal parts of five samples collected at evenly spaced locations within the stockpile.

The fully-characterized excavation stockpile soil will be placed into transport trailers or dump trucks for immediate transport from the site to the disposal facility. Licensed transporters will be used to haul the excavated soil to the pre-approved landfill for non-hazardous disposal. The excavated soil may be staged on plastic sheeting adjacent to the excavation while awaiting loading. The excavated soil stockpile will be protected from rainfall runoff and erosion by covering it with plastic sheeting. As an alternative to stockpiles, roll-off boxes may be supplied by the landfill and used in place of the stockpiles.

Loading of trucks will be coordinated with USFWS to ensure that load ratings for bridges along the haul route out of the refuge (if any) are not exceeded.

6.1.3.3 Confirmation Soil Sampling

After the initial excavation, confirmation samples will be collected from the sidewalls and floor of the excavation in the areas where existing samples are not available for use as confirmation samples. The confirmation samples will be tested for the contaminants. Excavation will continue until concentrations in the soil are less than the site-specific cleanup levels.

As described in **Section 4.4**, in small areas a composite wall/floor sample may deviate from the IWWP and will be collected by combining discrete samples collected from each of the four walls and the floor. GPS coordinates of each discrete sample location that comprises the composite confirmation sample will be collected. Vertical wall height will be manually measured and recorded. Each sample location will be numbered sequentially in order of collection, labelled on a map, and identified using the following nomenclature:

03WFXXX-ZZ-MMDDYY or 03FLXXX-ZZ-MMDDYY

The number 03 represents the site (LHAAP-03); WF indicates that it is small excavation with composite of both the wall and floor, WL indicates a sidewall sample, while FL indicates a floor sample; XXX represents the unique sample number; ZZ indicates excavation sidewall height or the average depth below ground surface of the excavation floor; and MMDDYY is the date of sample collection.

If contaminants are detected above their cleanup levels during the confirmation sampling, the area will be over-excavated. In the case of the small excavation where a wall and floor composite sample is collected, the excavation will be overexcavated approximately one foot deeper and sideways on all walls. This will continue until confirmation samples demonstrate the contaminants remaining in the soil are below their cleanup level or until groundwater is encountered.

Even though not expected, in the event that groundwater is encountered, and a floor sample cannot be collected, a linear 5-point composite sample will be collected from each excavation sidewall just above the groundwater interface to represent the floor area above the groundwater. If the linear 5-point composite sidewall sample is above the cleanup level, then additional excavation of the sidewall will be conducted to the groundwater interface depth, and over-excavation step outs and confirmation sampling would continue until the confirmation sample results are below the cleanup levels. The confirmation samples will confirm that the vadose zone soil identified as exceeding the cleanup levels would be removed.

6.1.3.4 Backfilling and Site Restoration

The backfill operations will proceed after excavation confirmation samples are clean for a definable area. For Area C, the excavations will be immediately backfilled to maintain the structural integrity of monitoring well 03WW01. The excavation areas will be backfilled with fill material that is certified to meet the site-specific cleanup levels. The backfill will be placed in 1-foot lifts to allow proper compaction with a backhoe/excavator bucket. After backfilling is complete, the area will be graded, with a mound approximately one foot above finished grade to promote positive drainage and allow for some soil settling without creating a depression. The top six inches will have a soil that will be suitable for vegetative growth. The well pad for 03WW01 (or 03WW01R if replaced), the protective casing with lock, and pipe bollards will be installed. The well identification will be clearly marked. The surface will be reseeded with a native grass and wildflower seed mixture selected in coordination with USFWS.

6.2 Monitoring Well Excavation or Abandonment and Installation

Monitoring well 03WW01 is in the 8-foot depth excavation area. The well pad will be broken up and removed along with the pipe bollards prior to initiating excavation. The protective well

casing will also be removed. The grout plug above the bentonite seal will remain in place. The excavation will extend down to 8 feet taking care to not impact the cement around the pipe. Supports may be placed around the well stickup during excavation if needed for support. A portion of the area will be excavated to 8 feet and will be immediately backfilled. Hand tools may be used to scrape any dirt from the cement near the 6 to 7 ft bgs area. A physical barrier (such as polyethylene sheeting) will be placed against the cut wall of the excavation prior to backfilling. The next portion of the excavation will remove the soil up to the barrier and will remove the physical barrier ensuring that contaminated soil was removed from Area C. Hand compaction may be conducted around the well taking care to not damage the well.

If the structural integrity of the well is damaged, the well will be abandoned by pulling out the well casing (or overdrilling if the casing cannot be removed) prior to grouting the borehole. If this fails, the well casing will be grouted in place and the portion extending into the excavation will be cut at least 2 ft bgs. Once the excavation is backfilled, a new well, 03WW01R, will be installed adjacent to the location and screened with the same interval to replace 03WW01. If needed, the well abandonment will be conducted in accordance with Section 3.9 of the IWWP, and the shallow well installation with stick up completion and its development will be completed in accordance with Section 3.2 of the IWWP (Bhate 2018c). The State of Texas Well Completion Report for 03WW01 is included in **Appendix C**.

6.3 Waste Management

Wastes generated during the project are anticipated to include waste water, soil, personal protective equipment (PPE), sampling equipment, and miscellaneous trash. These wastes will be managed in accordance with Section 3.7 of the IWWP (Bhate 2018c).

6.4 Decontamination

Decontamination of equipment will be performed in accordance with Standard Operating Procedure (SOP) A1 in Appendix A of the IWWP (Bhate 2018c).

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7.0 POST-REMEDIAL MONITORING AND REPORTING

7.1 Remedial Action Completion Report

A Remedial Action Completion Report will be submitted upon completion of the excavation, confirmation sampling, backfilling, and waste disposal to document the activities performed to complete the remedial action.

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8.0 SCHEDULE

Table 8-1 shows the estimated duration for each major site activity and timeline. Weather and unknown site conditions could affect this schedule.

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Tables

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

Location Code			03SB18		03SB19						03SB20					
Sample ID			03SB18-0.0-2.0		03SB19-0.0-2.0		03SB19-3.0-4.0		03SB19-6.0-7.0		03SB20-0.0-2.0		03SB20-0.0-2.0-FD		03SB20-3.0-4.0	
Sample Date			11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
Sample Interval Depth (ft bgs)			0 - 2		0 - 2		3 - 4		6 - 7		0 - 2		0 - 2		3 - 4	
Sample Purpose			REG		REG		REG		REG		REG		FD		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																
Arsenic	mg/kg	5.9	1.56		2.63		1.14		2.99		1.54		4.05		3.9	
Lead	mg/kg	180	6.15		9.52		7.89		5.71		8.26		11.3		16.3	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

		Location Code	03SB21				03SB22								03SB23			
		Sample ID	03SB21-0.0-2.0		03SB21-3.0-4.0		03SB22-0.0-2.0		03SB22-3.0-4.0		03SB22-3.0-4.0-FD		03SB22-6.0-7.0		03SB23-0.0-2.0		03SB23-3.0-4.0	
		Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
		Sample Interval Depth (ft bgs)	0 - 2		3 - 4		0 - 2		3 - 4		3 - 4		6 - 7		0 - 2		3 - 4	
		Sample Purpose	REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																		
Arsenic	mg/kg	5.9	1.74	J	0.974		1.79		4.61		0.709		2.63		1.93		4.16	
Lead	mg/kg	180	10.2		4.97		9.07		8.66		6.26		7.62		12.3		7.12	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

		Location Code	03SB24		03SB25		03SB26							
		Sample ID	03SB24-0.0-2.0		03SB25-0.0-2.0		03SB26-0.0-2.0		03SB26-0.0-2.0-FD		03SB26-3.0-4.0		03SB26-6.0-7.0	
		Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
		Sample Interval Depth (ft bgs)	0 - 2		0 - 2		0 - 2		0 - 2		3 - 4		6 - 7	
		Sample Purpose	REG		REG		REG		FD		REG		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS														
Arsenic	mg/kg	5.9	1.66		1.42		5.83		1.92		0.74		2.94	
Lead	mg/kg	180	14.3		8.02		8.6		8.38		4.14		6.96	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

Location Code			03SB27								03SB28					
Sample ID			03SB27-0.0-2.0		03SB27-3.0-4.0		03SB27-6.0-7.0		03SB27-8.0-9.0		03SB28-0.0-2.0		03SB28-3.0-4.0		03SB28-6.0-7.0	
Sample Date			11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
Sample Interval Depth (ft bgs)			0 - 2		3 - 4		6 - 7		8 - 9		0 - 2		3 - 4		6 - 7	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																
Arsenic	mg/kg	5.9	1.41		2.84		5.02		2.33		1.59		0.565		1.6	
Lead	mg/kg	180	8.66		7.36		7.29		4.67		8.27		5.29		5.96	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 4-1
Proposed Excavation Sampling Summary

Excavation Area	Excavation Depth (feet)	Estimated Total Volume (CY)	Estimated Floor Area (square feet)	Existing Sidewall Samples	Existing Floor Samples	Estimated Additional Samples Required
A1	1	12	300	03SB18, 03SB12, 03SB25, 03SB24, 03SB23, 03SB28, 03SB27, 03SB15, 03SB26	None	1 floor
A2	1	1	25	None	None	1 composite of four sidewalls and floor
B	8	8	25	03SB15, 03SB19, 03SB26	None	1 floor
C	8	19	64	03SB22 and 03SB28	03SB11 sample intervals 9-10 ft bgs and 14-15 feet bgs	None
	Estimated Total Volume (CY)	40			Total # Samples to be Collected	2 floor and 1 composite for small excavation

Notes:

bgs - below ground surface

CY - cubic yards

Table 8-1
Schedule for Major Site Activities

Activities	Duration
Site Preparation and Mobilization	5
Utility Clearance	1
Excavation	3
Waste Characterization and Confirmation Sampling (includes analysis)	5
Loading Stockpiled Soil, T&D, Over-excavation, Confirmation Sampling	5
Site Backfill and Restoration	2
If needed, well replacement	1
Well pad construction and bollard replacement	1
Surveying (Excavation limits and well pad/top of casing)	1
Demobilization	2
Total number of days:	26

Figures

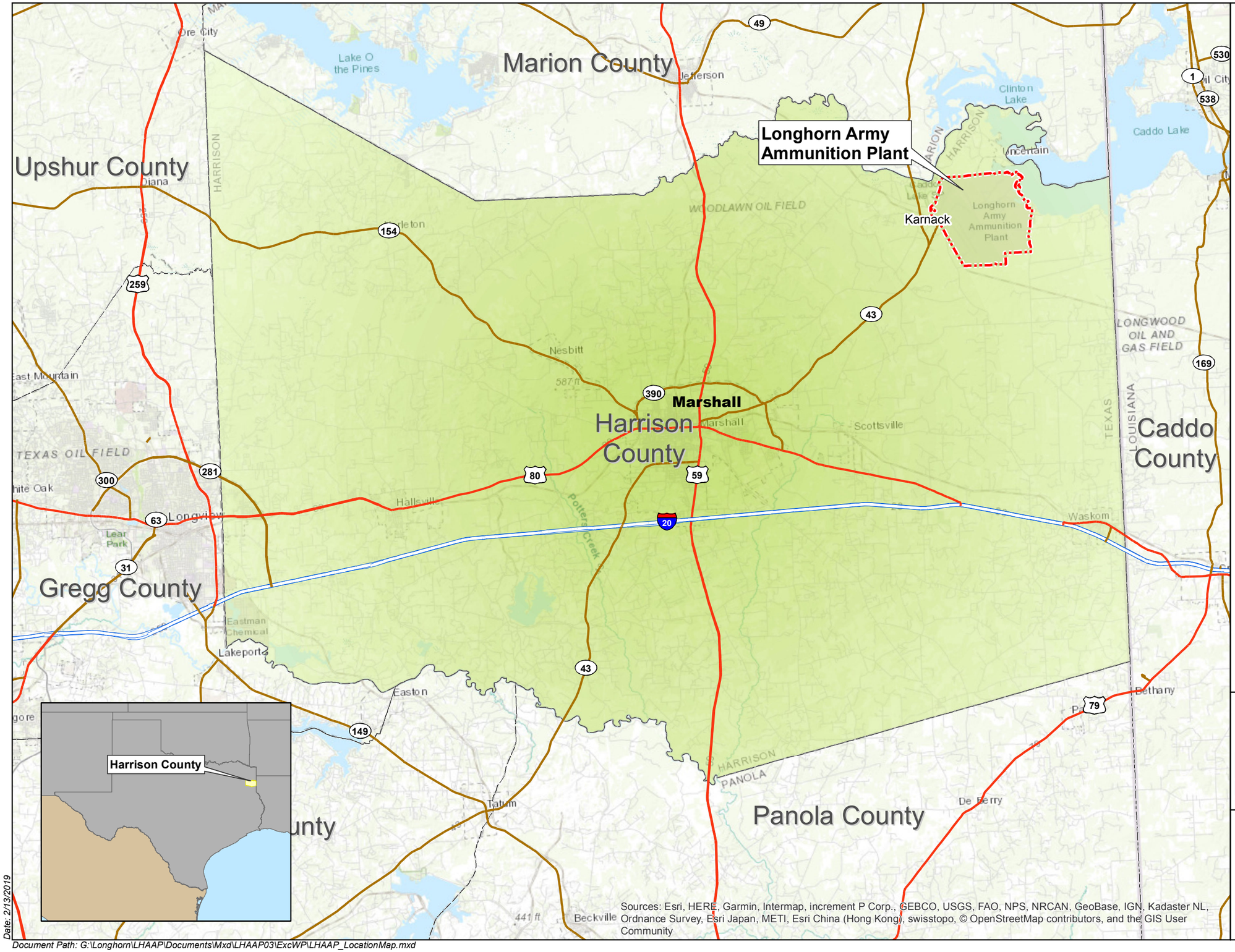

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Figure 1-1

LHAAP Location Map
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/13/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP_LocationMap.mxd

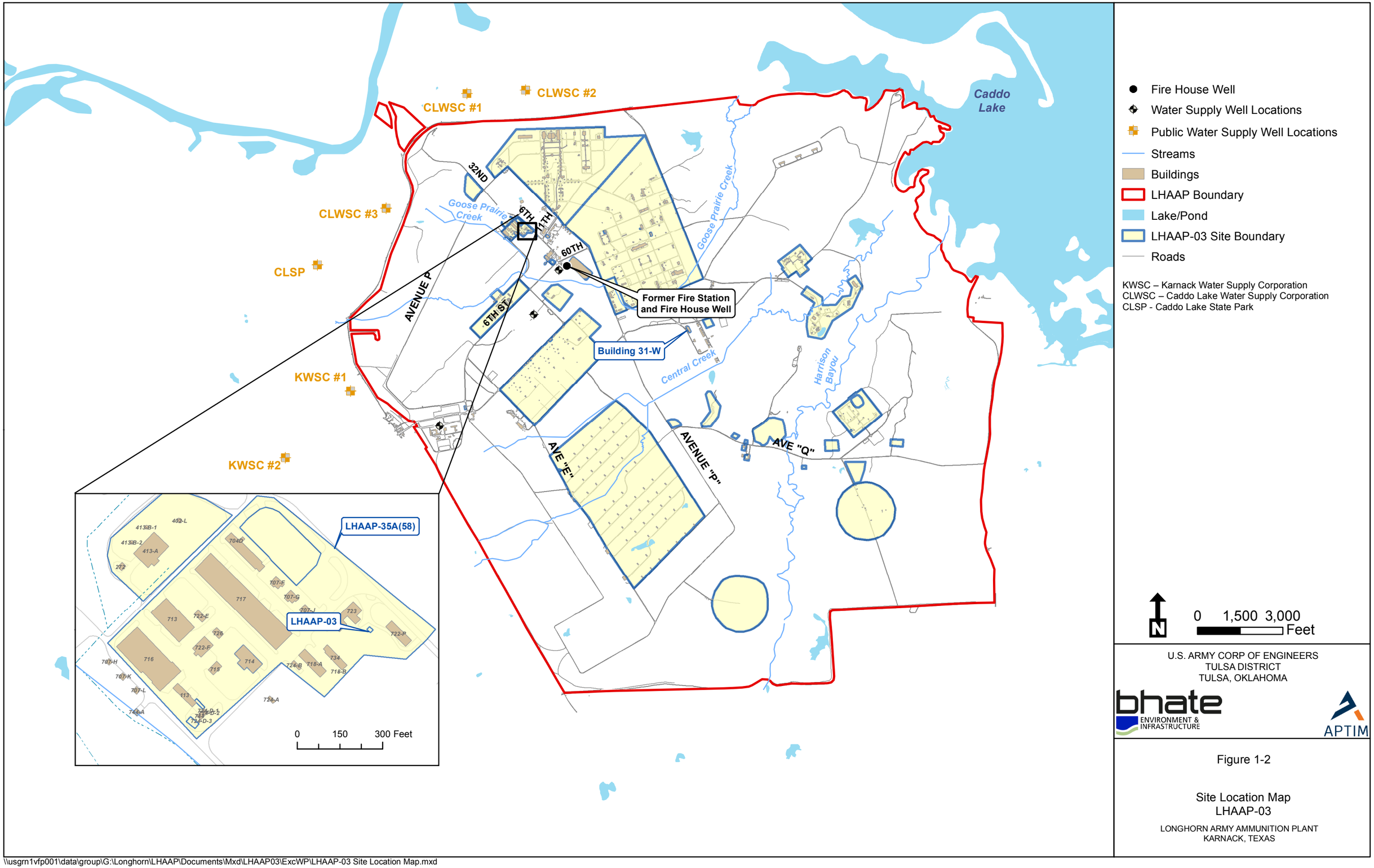

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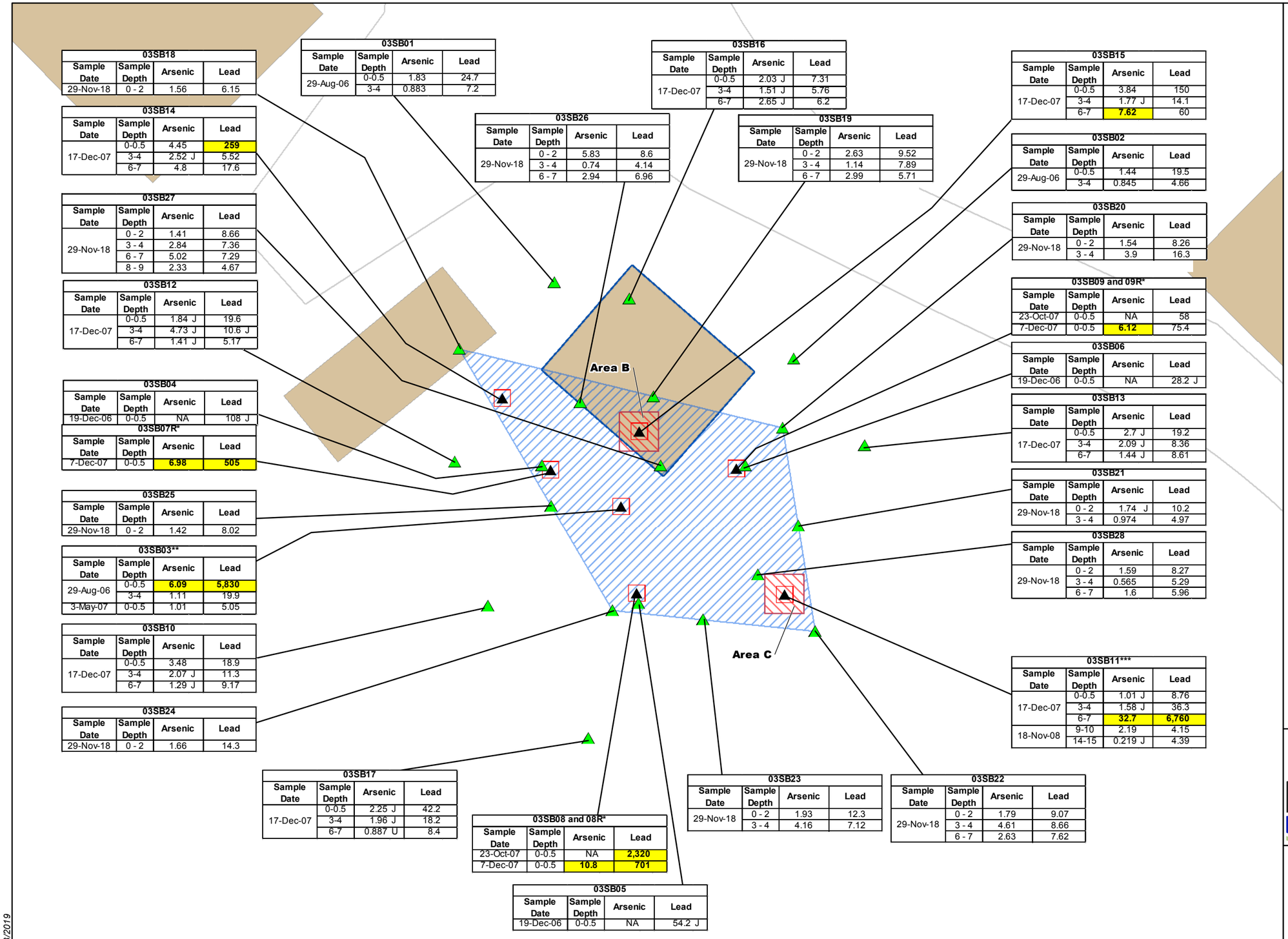
Figure 1-2

Site Location Map
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

\\usgrn1vfp001\data\group\G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP-03 Site Location Map.mxd



03SB18

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.56	6.15

03SB14

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	4.45	259
	3-4	2.52 J	5.52
	6-7	4.8	17.6

03SB27

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.41	8.66
	3 - 4	2.84	7.36
	6 - 7	5.02	7.29
	8 - 9	2.33	4.67

03SB12

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	1.84 J	19.6
	3-4	4.73 J	10.6 J
	6-7	1.41 J	5.17

03SB04

Sample Date	Sample Depth	Arsenic	Lead
19-Dec-06	0-0.5	NA	108 J

03SB07R*

Sample Date	Sample Depth	Arsenic	Lead
7-Dec-07	0-0.5	6.98	505

03SB25

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.42	8.02

03SB03**

Sample Date	Sample Depth	Arsenic	Lead
29-Aug-06	0-0.5	6.09	5,830
	3-4	1.11	19.9
3-May-07	0-0.5	1.01	5.05

03SB10

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	3.48	18.9
	3-4	2.07 J	11.3
	6-7	1.29 J	9.17

03SB24

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.66	14.3

03SB01

Sample Date	Sample Depth	Arsenic	Lead
29-Aug-06	0-0.5	1.83	24.7
	3-4	0.883	7.2

03SB26

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	5.83	8.6
	3 - 4	0.74	4.14
	6 - 7	2.94	6.96

03SB16

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	2.03 J	7.31
	3-4	1.51 J	5.76
	6-7	2.65 J	6.2

03SB19

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	2.63	9.52
	3 - 4	1.14	7.89
	6 - 7	2.99	5.71

03SB15

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	3.84	150
	3-4	1.77 J	14.1
	6-7	7.62	60

03SB02

Sample Date	Sample Depth	Arsenic	Lead
29-Aug-06	0-0.5	1.44	19.5
	3-4	0.845	4.66

03SB20

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.54	8.26
	3 - 4	3.9	16.3

03SB09 and 09R*

Sample Date	Sample Depth	Arsenic	Lead
23-Oct-07	0-0.5	NA	58
7-Dec-07	0-0.5	6.12	75.4

03SB06

Sample Date	Sample Depth	Arsenic	Lead
19-Dec-06	0-0.5	NA	28.2 J

03SB13

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	2.7 J	19.2
	3-4	2.09 J	8.36
	6-7	1.44 J	8.61

03SB21

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.74 J	10.2
	3 - 4	0.974	4.97

03SB28

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.59	8.27
	3 - 4	0.565	5.29
	6 - 7	1.6	5.96

03SB11***

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	1.01 J	8.76
	3-4	1.58 J	36.3
	6-7	32.7	6,760
18-Nov-08	9-10	2.19	4.15
	14-15	0.219 J	4.39

03SB17

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	2.25 J	42.2
	3-4	1.96 J	18.2
	6-7	0.887 U	8.4

03SB08 and 08R*

Sample Date	Sample Depth	Arsenic	Lead
23-Oct-07	0-0.5	NA	2,320
7-Dec-07	0-0.5	10.8	701

03SB05

Sample Date	Sample Depth	Arsenic	Lead
19-Dec-06	0-0.5	NA	54.2 J

03SB23

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.93	12.3
	3 - 4	4.16	7.12

03SB22

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.79	9.07
	3 - 4	4.61	8.66
	6 - 7	2.63	7.62

Soil Boring

Above Cleanup Level

Soil Boring All Sampled Intervals below Cleanup Level

Target Remediation Area B and Area C from ROD (Excavation Depth to 7 feet bgs)

Target Remediation Area A from ROD (Excavation Depth to 2 feet bgs)

Roads

Fomer Buildings/Structures

Site Boundary

Note:
1. Excavation depths and areas indicated are from the ROD Record of Decision.
2. All units in milligrams per kilogram (mg/kg)
3. J - Estimated concentration
U - Below detection limit
NA - Parameter not analyzed
4. bgs - below ground surface
5. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations
6. Yellow highlighting indicates results exceeding RRS3 MSCs
7. * Resample of the same location at a later date. Note that the original result from 03SB07 was rejected.
8. ** An additional sample called 03SB03-01-Total was collected in May 2007 from the original sample 03SB03-01 location and subjected to both total and the Synthetic Precipitation Leaching Procedure analyses
9. *** In Nov 2008, a soil boring was offset from the original boring location, additional samples were collected at deeper intervals, and well 03WW01 was installed in Nov 2008.

Parameter	Units	RRS3 MSCs
Arsenic	mg/kg	5.9
Lead	mg/kg	180

N

0 5 10 Feet

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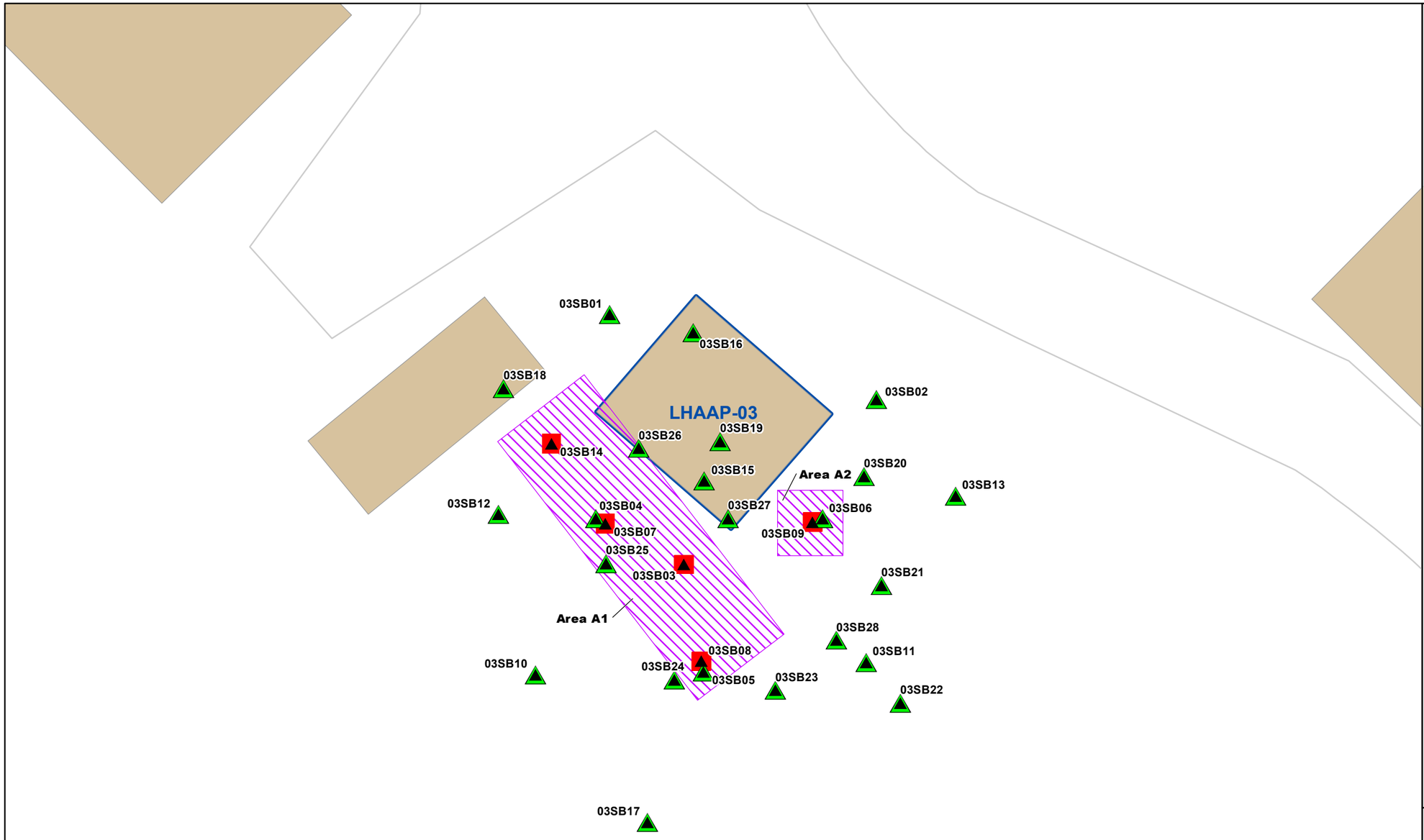
Figure 3-1

Soil Boring Locations and Results
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_SoilBoring_Result.mxd



Soil Boring

0-0.5 or 0-2 foot bgs
Sample below RRS3 MSC

0-0.5 foot deep soil contamination
above RRS3 MSC to be removed

1 ft Excavation Depth

Roads

Buildings

Site Boundary

Note:
1. bgs - below ground surface
2. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations

N

0 5 10 Feet

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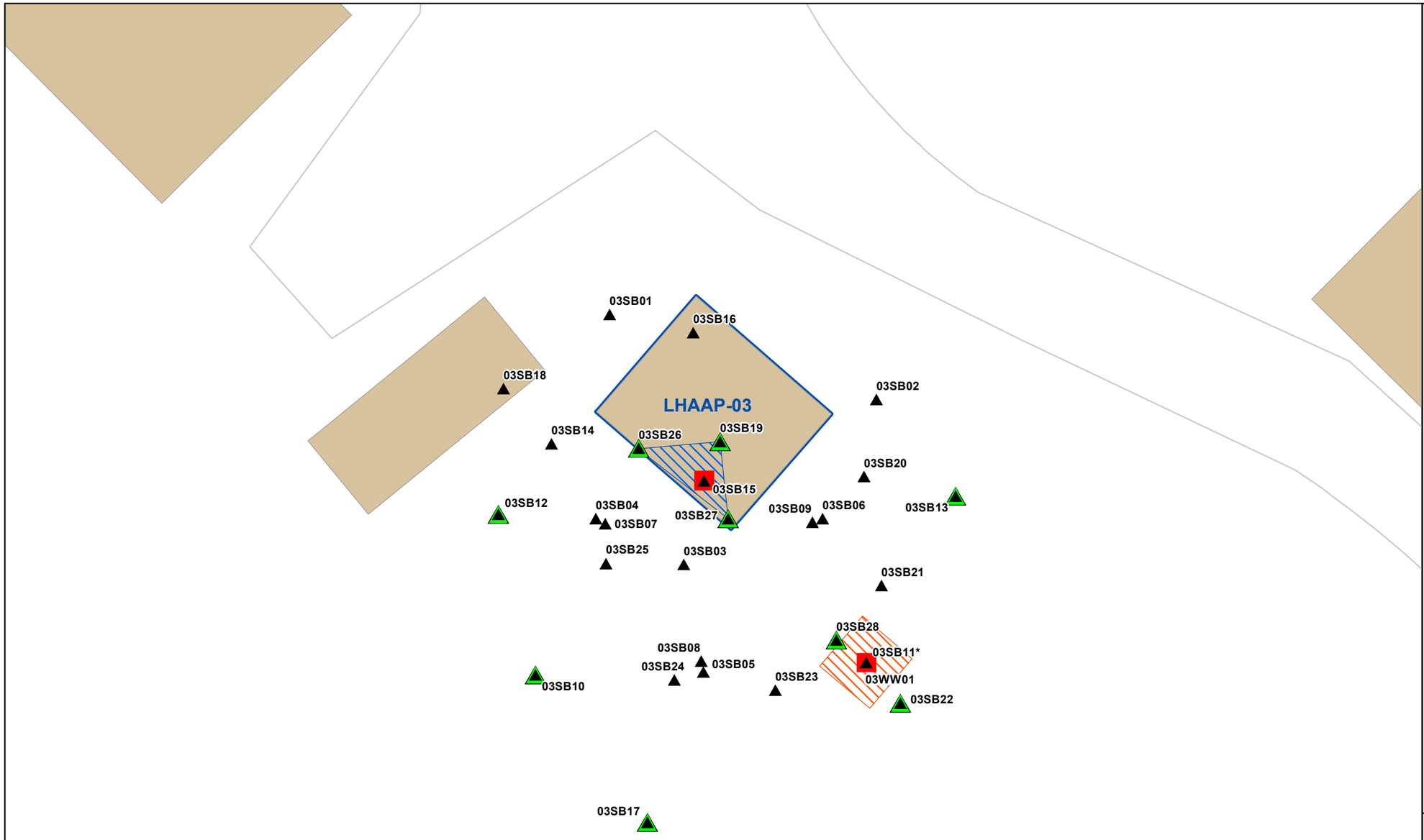
Figure 4-1

Proposed 1-Foot Excavation Areas
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_Prop_TwoFeet_ExcavationArea.mxd



6-7 foot deep soil contamination above RRS3 MSC to be removed

Below Cleanup Level at 6-7 ft bgs

Soil Boring not Sampled at 6-7 ft bgs

Area B (Excavation 8 feet bgs)

Area C (Excavation 8 feet bgs)

Shallow Monitoring Well

Roads

Former Buildings/Structures

Site Boundary

Note:
1. bgs - below ground surface
2. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations

* 03SB11 sample intervals from 9-10 feet bgs and 14-15 feet bgs were below RRS3 MSC

N

0 5 10 Feet

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Figure 4-2

Proposed 8-Foot Excavation Area
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_Prop_EightFeet_ExcavationArea.mxd

03SB18			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.56	6.15

03SB26			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	5.83	8.6

03SB15			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2.5	3.84	150

03SB27			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.41	8.66

03SB12			
Sample Date	Sample Depth	Arsenic	Lead
17-Nov-07	0 - 0.5	1.84 J	19.6
	3 - 4	4.73 J	10.6 J

03SB25			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.42	8.02

03SB28			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.59	8.27

03SB24			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.66	14.3

03SB23			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.93	12.3
	3 - 4	4.16	7.12

03SB01 03SB16 03SB02 03SB14 Area A2 03SB20 03SB13 03SB06 03SB04 03SB07 03SB09 03SB03 03SB21 Area A1 03SB08 03SB10 03SB11 03SB05 03SB22 03SB17

- Soil Boring
- Existing Soil Boring Sample to be Used as a Sidewall Confirmation Sample
- Above Cleanup Level
- Initial Excavation Depth 1-Foot
- Roads
- Former Buildings/Structures
- Site Boundary

Note:
1. A composite floor confirmation sample will be collected for Area A1 (See **Table 4-1**).
2. A single composite confirmation sample will be collected for Area A2 with a grab from each sidewall and floor (See **Table 4-1)**.
3. All units in milligrams per kilogram (mg/kg)
4. J - Estimated concentration
   U - Below detection limit
   NA - Parameter not analyzed
5. bgs - below ground surface

Parameter	Units	RRS3 MSCs
Arsenic	mg/kg	5.9
Lead	mg/kg	180

N

0 5 10 Feet

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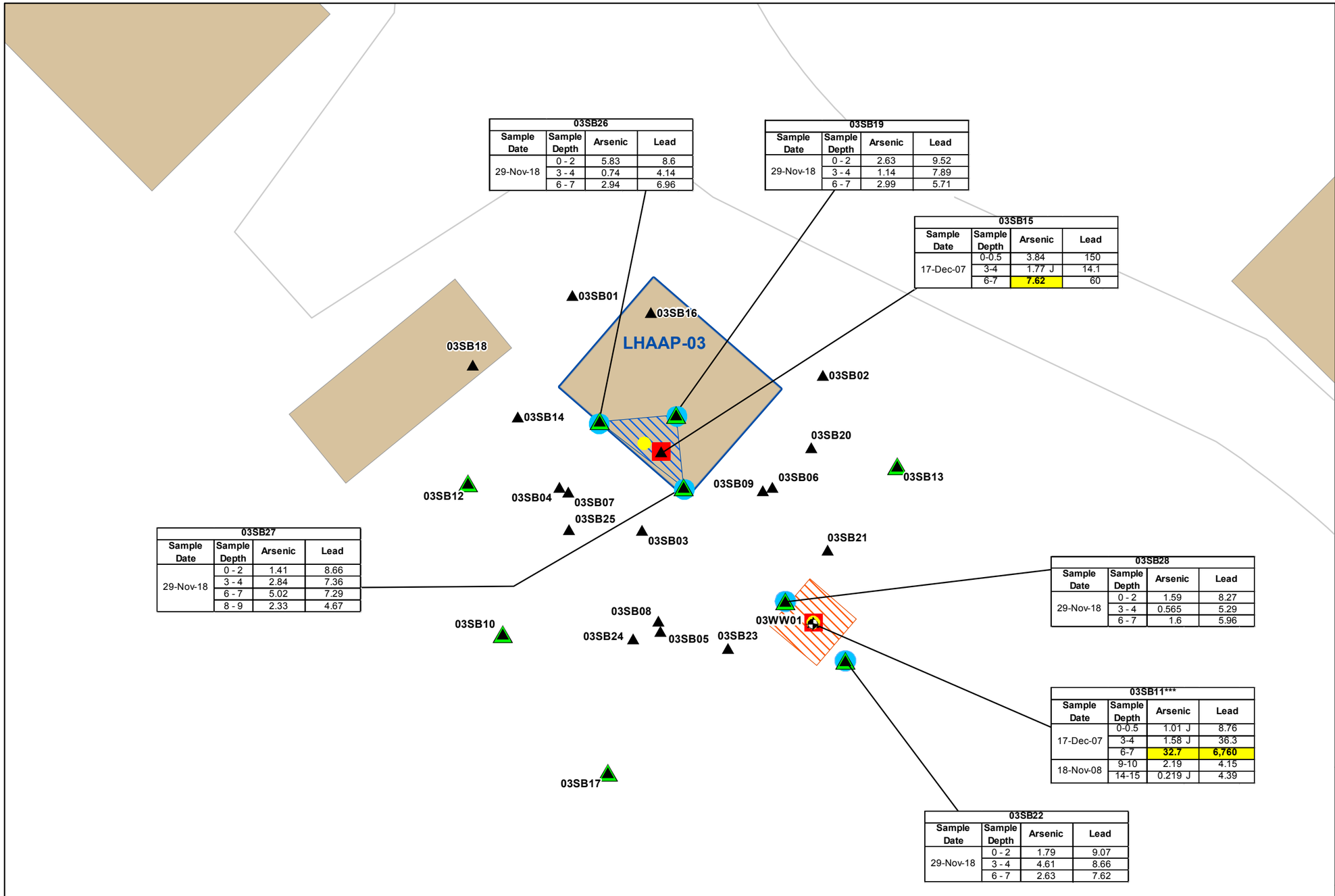
Figure 4-3

Proposed Confirmation Samples
1-Foot Excavation Areas
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/9/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_ProposedConfirmationSamples_2ftexc.mxd



03SB26			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	5.83	8.6
	3 - 4	0.74	4.14
	6 - 7	2.94	6.96

03SB19			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	2.63	9.52
	3 - 4	1.14	7.89
	6 - 7	2.99	5.71

03SB15			
Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	3.84	150
	3-4	1.77 J	14.1
	6-7	**7.62**	60

03SB27			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.41	8.66
	3 - 4	2.84	7.36
	6 - 7	5.02	7.29
	8 - 9	2.33	4.67

03SB28			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.59	8.27
	3 - 4	0.565	5.29
	6 - 7	1.6	5.96

03SB11***			
Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	1.01 J	8.76
	3-4	1.58 J	36.3
	6-7	**32.7**	**6,760**
18-Nov-08	9-10	2.19	4.15
	14-15	0.219 J	4.39

03SB22			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.79	9.07
	3 - 4	4.61	8.66
	6 - 7	2.63	7.62

- Shallow Monitoring Well
- Soil Boring
- Below Cleanup Level at 6-7 ft bgs
- 6-7 foot deep soil contamination above RRS3 MSC
- Existing Soil Boring Sample to be Used as a Sidewall Confirmation Sample (See **Table 4-1**)
- Floor Confirmation Sample (Existing soil boring sample for Area C and new location to be collected for Area B) (See **Table 4-1**)

8 ft Excavation Limit

- Area B (8-foot excavation)
- Area C (8-foot excavation)
- Roads
- Buildings
- Site Boundary

Note:
1. Excavation depths indicated are from the Record of Decision.
2. All units in milligrams per kilogram (mg/kg)
3. J - Estimated concentration
U - Below detection limit
NA - Parameter not analyzed
4. bgs - below ground surface
5. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations
6. Yellow highlighting indicates results exceeding RRS3 MSCs
7. *** In Nov 2008, a soil boring was offset from the original boring location, additional samples were collected at deeper intervals, and well 03WW01 was installed in Nov 2008.

Parameter	Units	RRS3 MSCs
Arsenic	mg/kg	5.9
Lead	mg/kg	180

N

0 5 10 Feet

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Figure 4-4

Proposed Confirmation Samples
8-Foot Excavation Areas B and C
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_ProposedConfirmationSamples_8ftExc.mxd

Appendix A

Analytical Data Reports from November 2018 Soil Samples

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

December 18, 2018

Susan Huang
Aptim Environmental & Infrastucture, Inc.
2500 City West Blvd., Suite 1700
Houston, TX 77042

Work Order: **HS18120004**

Laboratory Results for: **Longhorn Army Ammunition Plant LHAAP-03**

Dear Susan,

ALS Environmental received 36 sample(s) on Nov 30, 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 Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Work Order: HS18120004

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120004-01	03SB18-0.0-2.0	Soil		29-Nov-2018 10:00	30-Nov-2018 09:40	☐
HS18120004-02	03SB19-0.0-2.0	Soil		29-Nov-2018 10:18	30-Nov-2018 09:40	☐
HS18120004-03	03SB19-3.0-4.0	Soil		29-Nov-2018 10:20	30-Nov-2018 09:40	☐
HS18120004-04	03SB19-6.0-7.0	Soil		29-Nov-2018 10:24	30-Nov-2018 09:40	☐
HS18120004-05	03SB19-8.0-9.0	Soil		29-Nov-2018 10:26	30-Nov-2018 09:40	☑
HS18120004-06	03SB20-0.0-2.0	Soil		29-Nov-2018 10:30	30-Nov-2018 09:40	☐
HS18120004-07	03SB20-0.0-2.0-FD	Soil		29-Nov-2018 10:30	30-Nov-2018 09:40	☐
HS18120004-08	03SB20-3.0-4.0	Soil		29-Nov-2018 10:35	30-Nov-2018 09:40	☐
HS18120004-09	03SB20-6.0-7.0	Soil		29-Nov-2018 10:38	30-Nov-2018 09:40	☑
HS18120004-10	03SB21-0.0-2.0	Soil		29-Nov-2018 10:45	30-Nov-2018 09:40	☐
HS18120004-11	03SB21-3.0-4.0	Soil		29-Nov-2018 10:50	30-Nov-2018 09:40	☐
HS18120004-12	03SB21-6.0-7.0	Soil		29-Nov-2018 10:55	30-Nov-2018 09:40	☑
HS18120004-13	03SB22-0.0-2.0	Soil		29-Nov-2018 11:05	30-Nov-2018 09:40	☐
HS18120004-14	03SB22-3.0-4.0	Soil		29-Nov-2018 11:10	30-Nov-2018 09:40	☐
HS18120004-15	03SB22-3.0-4.0-FD	Soil		29-Nov-2018 11:10	30-Nov-2018 09:40	☐
HS18120004-16	03SB22-6.0-7.0	Soil		29-Nov-2018 11:13	30-Nov-2018 09:40	☐
HS18120004-17	03SB22-8.0-9.0	Soil		29-Nov-2018 11:15	30-Nov-2018 09:40	☑
HS18120004-18	03SB23-0.0-2.0	Soil		29-Nov-2018 11:30	30-Nov-2018 09:40	☐
HS18120004-19	03SB23-3.0-4.0	Soil		29-Nov-2018 11:33	30-Nov-2018 09:40	☐
HS18120004-20	03SB23-6.0-7.0	Soil		29-Nov-2018 11:35	30-Nov-2018 09:40	☑
HS18120004-21	03SB24-0.0-2.0	Soil		29-Nov-2018 11:45	30-Nov-2018 09:40	☐
HS18120004-22	03SB25-0.0-2.0	Soil		29-Nov-2018 11:40	30-Nov-2018 09:40	☐
HS18120004-23	03SB26-0.0-2.0	Soil		29-Nov-2018 10:05	30-Nov-2018 09:40	☐
HS18120004-24	03SB26-0.0-2.0-FD	Soil		29-Nov-2018 10:05	30-Nov-2018 09:40	☐
HS18120004-25	03SB26-3.0-4.0	Soil		29-Nov-2018 10:10	30-Nov-2018 09:40	☐
HS18120004-26	03SB26-6.0-7.0	Soil		29-Nov-2018 10:13	30-Nov-2018 09:40	☐

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Work Order: HS18120004

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120004-27	03SB26-8.0-9.0	Soil		29-Nov-2018 10:15	30-Nov-2018 09:40	☑
HS18120004-28	03SB27-0.0-2.0	Soil		29-Nov-2018 11:55	30-Nov-2018 09:40	☐
HS18120004-29	03SB27-3.0-4.0	Soil		29-Nov-2018 12:00	30-Nov-2018 09:40	☐
HS18120004-30	03SB27-6.0-7.0	Soil		29-Nov-2018 12:05	30-Nov-2018 09:40	☐
HS18120004-31	03SB27-8.0-9.0	Soil		29-Nov-2018 12:08	30-Nov-2018 09:40	☐
HS18120004-32	03SB28-0.0-2.0	Soil		29-Nov-2018 12:15	30-Nov-2018 09:40	☐
HS18120004-33	03SB28-3.0-4.0	Soil		29-Nov-2018 12:18	30-Nov-2018 09:40	☐
HS18120004-34	03SB28-6.0-7.0	Soil		29-Nov-2018 12:20	30-Nov-2018 09:40	☐
HS18120004-35	03SB28-8.0-9.0	Soil		29-Nov-2018 12:24	30-Nov-2018 09:40	☑
HS18120004-36	Trip Blank	Water	ALS-111418-61	29-Nov-2018 00:00	30-Nov-2018 09:40	☑

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc. **CASE NARRATIVE**
Project: Longhorn Army Ammunition Plant LHAAP-03
Work Order: HS18120004

Metals by Method SW6020

Batch ID: 135452

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

Batch ID: 135451

Sample ID: 03SB27-3.0-4.0 (HS18120004-29MS)

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB18-0.0-2.0
Collection Date: 29-Nov-2018 10:00

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-01
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.56**		**0.0661**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 19:53
Lead	**6.15**		**0.0123**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 19:53

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB19-0.0-2.0
Collection Date: 29-Nov-2018 10:18

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-02
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.63**		**0.0645**	**0.0921**	**0.460**	**mg/Kg**	1	14-Dec-2018 19:55
Lead	**9.52**		**0.0120**	**0.0921**	**0.460**	**mg/Kg**	1	14-Dec-2018 19:55

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB19-3.0-4.0
Collection Date: 29-Nov-2018 10:20

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-03
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.14**		**0.0639**	**0.0913**	**0.456**	**mg/Kg**	1	14-Dec-2018 19:58
Lead	**7.89**		**0.0119**	**0.0913**	**0.456**	**mg/Kg**	1	14-Dec-2018 19:58

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB19-6.0-7.0
Collection Date: 29-Nov-2018 10:24

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-04
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.99**		**0.0682**	**0.0975**	**0.487**	**mg/Kg**	1	14-Dec-2018 20:00
Lead	**5.71**		**0.0127**	**0.0975**	**0.487**	**mg/Kg**	1	14-Dec-2018 20:00

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB20-0.0-2.0
Collection Date: 29-Nov-2018 10:30

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-06
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.54**		**0.0684**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 20:02
Lead	**8.26**		**0.0127**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 20:02

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB20-0.0-2.0-FD
Collection Date: 29-Nov-2018 10:30

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-07
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**4.05**		**0.0669**	**0.0955**	**0.478**	**mg/Kg**	1	14-Dec-2018 20:04
Lead	**11.3**		**0.0124**	**0.0955**	**0.478**	**mg/Kg**	1	14-Dec-2018 20:04

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB20-3.0-4.0
Collection Date: 29-Nov-2018 10:35

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-08
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**3.90**		**0.0681**	**0.0973**	**0.486**	**mg/Kg**	1	14-Dec-2018 20:07
Lead	**16.3**		**0.0126**	**0.0973**	**0.486**	**mg/Kg**	1	14-Dec-2018 20:07

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB21-0.0-2.0
Collection Date: 29-Nov-2018 10:45

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-10
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.74**		**0.0642**	**0.0917**	**0.458**	**mg/Kg**	1	14-Dec-2018 20:16
Lead	**10.2**		**0.0119**	**0.0917**	**0.458**	**mg/Kg**	1	14-Dec-2018 20:16

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB21-3.0-4.0
Collection Date: 29-Nov-2018 10:50

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-11
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.974**		**0.0640**	**0.0915**	**0.457**	**mg/Kg**	1	14-Dec-2018 20:27
Lead	**4.97**		**0.0119**	**0.0915**	**0.457**	**mg/Kg**	1	14-Dec-2018 20:27

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB22-0.0-2.0
Collection Date: 29-Nov-2018 11:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-13
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.79**		**0.0660**	**0.0943**	**0.472**	**mg/Kg**	1	14-Dec-2018 20:29
Lead	**9.07**		**0.0123**	**0.0943**	**0.472**	**mg/Kg**	1	14-Dec-2018 20:29

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB22-3.0-4.0
Collection Date: 29-Nov-2018 11:10

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-14
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**4.61**		**0.0665**	**0.0950**	**0.475**	**mg/Kg**	1	14-Dec-2018 20:31
Lead	**8.66**		**0.0124**	**0.0950**	**0.475**	**mg/Kg**	1	14-Dec-2018 20:31

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB22-3.0-4.0-FD
Collection Date: 29-Nov-2018 11:10

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-15
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.709**		**0.0660**	**0.0943**	**0.471**	**mg/Kg**	1	14-Dec-2018 20:33
Lead	**6.26**		**0.0123**	**0.0943**	**0.471**	**mg/Kg**	1	14-Dec-2018 20:33

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB22-6.0-7.0
Collection Date: 29-Nov-2018 11:13

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-16
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.63**		**0.0672**	**0.0959**	**0.480**	**mg/Kg**	1	14-Dec-2018 22:30
Lead	**7.62**		**0.0125**	**0.0959**	**0.480**	**mg/Kg**	1	14-Dec-2018 22:30

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB23-0.0-2.0
Collection Date: 29-Nov-2018 11:30

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-18
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.93**		**0.0648**	**0.0926**	**0.463**	**mg/Kg**	1	14-Dec-2018 22:32
Lead	**12.3**		**0.0120**	**0.0926**	**0.463**	**mg/Kg**	1	14-Dec-2018 22:32

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB23-3.0-4.0
Collection Date: 29-Nov-2018 11:33

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-19
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**4.16**		**0.0645**	**0.0922**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:35
Lead	**7.12**		**0.0120**	**0.0922**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:35

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB24-0.0-2.0
Collection Date: 29-Nov-2018 11:45

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-21
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.66**		**0.0661**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 22:37
Lead	**14.3**		**0.0123**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 22:37

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB25-0.0-2.0
Collection Date: 29-Nov-2018 11:40

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-22
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.42**		**0.0681**	**0.0972**	**0.486**	**mg/Kg**	1	14-Dec-2018 22:39
Lead	**8.02**		**0.0126**	**0.0972**	**0.486**	**mg/Kg**	1	14-Dec-2018 22:39

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-0.0-2.0
Collection Date: 29-Nov-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-23
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**5.83**		**0.0684**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 22:41
Lead	**8.60**		**0.0127**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 22:41

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-0.0-2.0-FD
Collection Date: 29-Nov-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-24
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.92**		**0.0674**	**0.0963**	**0.481**	**mg/Kg**	1	14-Dec-2018 22:44
Lead	**8.38**		**0.0125**	**0.0963**	**0.481**	**mg/Kg**	1	14-Dec-2018 22:44

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-3.0-4.0
Collection Date: 29-Nov-2018 10:10

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-25
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.740**		**0.0646**	**0.0923**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:46
Lead	**4.14**		**0.0120**	**0.0923**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:46

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-6.0-7.0
Collection Date: 29-Nov-2018 10:13

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-26
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.94**		**0.0680**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:26
Lead	**6.96**		**0.0126**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:26

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-0.0-2.0
Collection Date: 29-Nov-2018 11:55

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-28
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.41**		**0.0680**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:29
Lead	**8.66**		**0.0126**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:29

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-3.0-4.0
Collection Date: 29-Nov-2018 12:00

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-29
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.84**		**0.0642**	**0.0917**	**0.459**	**mg/Kg**	1	12-Dec-2018 20:31
Lead	**7.36**		**0.0119**	**0.0917**	**0.459**	**mg/Kg**	1	12-Dec-2018 20:31

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-6.0-7.0
Collection Date: 29-Nov-2018 12:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-30
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**5.02**		**0.0640**	**0.0915**	**0.457**	**mg/Kg**	1	12-Dec-2018 20:42
Lead	**7.29**		**0.0119**	**0.0915**	**0.457**	**mg/Kg**	1	12-Dec-2018 20:42

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-8.0-9.0
Collection Date: 29-Nov-2018 12:08

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-31
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.33**		**0.0660**	**0.0943**	**0.471**	**mg/Kg**	1	12-Dec-2018 20:53
Lead	**4.67**		**0.0123**	**0.0943**	**0.471**	**mg/Kg**	1	12-Dec-2018 20:53

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB28-0.0-2.0
Collection Date: 29-Nov-2018 12:15

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-32
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.59**		**0.0655**	**0.0936**	**0.468**	**mg/Kg**	1	12-Dec-2018 20:55
Lead	**8.27**		**0.0122**	**0.0936**	**0.468**	**mg/Kg**	1	12-Dec-2018 20:55

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB28-3.0-4.0
Collection Date: 29-Nov-2018 12:18

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-33
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.565**		**0.0642**	**0.0917**	**0.458**	**mg/Kg**	1	12-Dec-2018 20:58
Lead	**5.29**		**0.0119**	**0.0917**	**0.458**	**mg/Kg**	1	12-Dec-2018 20:58

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

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB28-6.0-7.0
Collection Date: 29-Nov-2018 12:20

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-34
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.60**		**0.0675**	**0.0965**	**0.482**	**mg/Kg**	1	12-Dec-2018 21:00
Lead	**5.96**		**0.0125**	**0.0965**	**0.482**	**mg/Kg**	1	12-Dec-2018 21:00

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

WEIGHT LOG

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

Batch ID: 135451 **Method:** METALS BY SW6020A **Prep:** 3050_I_LOW

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120004-26	1	0.5149	50 (mL)	97.11
HS18120004-28	1	0.5147	50 (mL)	97.14
HS18120004-29	1	0.545	50 (mL)	91.74
HS18120004-30	1	0.5466	50 (mL)	91.47
HS18120004-31	1	0.5304	50 (mL)	94.27
HS18120004-32	1	0.5343	50 (mL)	93.58
HS18120004-33	1	0.5454	50 (mL)	91.68
HS18120004-34	1	0.5183	50 (mL)	96.47

Batch ID: 135452 **Method:** METALS BY SW6020A **Prep:** 3050_I_LOW

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120004-01	1	0.5298	50 (mL)	94.38
HS18120004-02	1	0.543	50 (mL)	92.08
HS18120004-03	1	0.5479	50 (mL)	91.26
HS18120004-04	1	0.513	50 (mL)	97.47
HS18120004-06	1	0.5116	50 (mL)	97.73
HS18120004-07	1	0.5233	50 (mL)	95.55
HS18120004-08	1	0.514	50 (mL)	97.28
HS18120004-10	1	0.5455	50 (mL)	91.66
HS18120004-11	1	0.5465	50 (mL)	91.49
HS18120004-13	1	0.53	50 (mL)	94.34
HS18120004-14	1	0.5262	50 (mL)	95.02
HS18120004-15	1	0.5305	50 (mL)	94.25
HS18120004-16	1	0.5212	50 (mL)	95.93
HS18120004-18	1	0.54	50 (mL)	92.59
HS18120004-19	1	0.5425	50 (mL)	92.17
HS18120004-21	1	0.5296	50 (mL)	94.41
HS18120004-22	1	0.5143	50 (mL)	97.22
HS18120004-23	1	0.5117	50 (mL)	97.71
HS18120004-24	1	0.5193	50 (mL)	96.28
HS18120004-25	1	0.5419	50 (mL)	92.27

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 135451	**Test Name :** METALS BY SW6020A			**Matrix:** Soil		
HS18120004-26	03SB26-6.0-7.0	29 Nov 2018 10:13		11 Dec 2018 13:27	12 Dec 2018 20:26	1
HS18120004-28	03SB27-0.0-2.0	29 Nov 2018 11:55		11 Dec 2018 13:27	12 Dec 2018 20:29	1
HS18120004-29	03SB27-3.0-4.0	29 Nov 2018 12:00		11 Dec 2018 13:27	12 Dec 2018 20:31	1
HS18120004-30	03SB27-6.0-7.0	29 Nov 2018 12:05		11 Dec 2018 13:27	12 Dec 2018 20:42	1
HS18120004-31	03SB27-8.0-9.0	29 Nov 2018 12:08		11 Dec 2018 13:27	12 Dec 2018 20:53	1
HS18120004-32	03SB28-0.0-2.0	29 Nov 2018 12:15		11 Dec 2018 13:27	12 Dec 2018 20:55	1
HS18120004-33	03SB28-3.0-4.0	29 Nov 2018 12:18		11 Dec 2018 13:27	12 Dec 2018 20:58	1
HS18120004-34	03SB28-6.0-7.0	29 Nov 2018 12:20		11 Dec 2018 13:27	12 Dec 2018 21:00	1
Batch ID 135452	**Test Name :** METALS BY SW6020A			**Matrix:** Soil		
HS18120004-01	03SB18-0.0-2.0	29 Nov 2018 10:00		11 Dec 2018 13:33	14 Dec 2018 19:53	1
HS18120004-02	03SB19-0.0-2.0	29 Nov 2018 10:18		11 Dec 2018 13:33	14 Dec 2018 19:55	1
HS18120004-03	03SB19-3.0-4.0	29 Nov 2018 10:20		11 Dec 2018 13:33	14 Dec 2018 19:58	1
HS18120004-04	03SB19-6.0-7.0	29 Nov 2018 10:24		11 Dec 2018 13:33	14 Dec 2018 20:00	1
HS18120004-06	03SB20-0.0-2.0	29 Nov 2018 10:30		11 Dec 2018 13:33	14 Dec 2018 20:02	1
HS18120004-07	03SB20-0.0-2.0-FD	29 Nov 2018 10:30		11 Dec 2018 13:33	14 Dec 2018 20:04	1
HS18120004-08	03SB20-3.0-4.0	29 Nov 2018 10:35		11 Dec 2018 13:33	14 Dec 2018 20:07	1
HS18120004-10	03SB21-0.0-2.0	29 Nov 2018 10:45		11 Dec 2018 13:33	14 Dec 2018 20:16	1
HS18120004-11	03SB21-3.0-4.0	29 Nov 2018 10:50		11 Dec 2018 13:33	14 Dec 2018 20:27	1
HS18120004-13	03SB22-0.0-2.0	29 Nov 2018 11:05		11 Dec 2018 13:33	14 Dec 2018 20:29	1
HS18120004-14	03SB22-3.0-4.0	29 Nov 2018 11:10		11 Dec 2018 13:33	14 Dec 2018 20:31	1
HS18120004-15	03SB22-3.0-4.0-FD	29 Nov 2018 11:10		11 Dec 2018 13:33	14 Dec 2018 20:33	1
HS18120004-16	03SB22-6.0-7.0	29 Nov 2018 11:13		11 Dec 2018 13:33	14 Dec 2018 22:30	1
HS18120004-18	03SB23-0.0-2.0	29 Nov 2018 11:30		11 Dec 2018 13:33	14 Dec 2018 22:32	1
HS18120004-19	03SB23-3.0-4.0	29 Nov 2018 11:33		11 Dec 2018 13:33	14 Dec 2018 22:35	1
HS18120004-21	03SB24-0.0-2.0	29 Nov 2018 11:45		11 Dec 2018 13:33	14 Dec 2018 22:37	1
HS18120004-22	03SB25-0.0-2.0	29 Nov 2018 11:40		11 Dec 2018 13:33	14 Dec 2018 22:39	1
HS18120004-23	03SB26-0.0-2.0	29 Nov 2018 10:05		11 Dec 2018 13:33	14 Dec 2018 22:41	1
HS18120004-24	03SB26-0.0-2.0-FD	29 Nov 2018 10:05		11 Dec 2018 13:33	14 Dec 2018 22:44	1
HS18120004-25	03SB26-3.0-4.0	29 Nov 2018 10:10		11 Dec 2018 13:33	14 Dec 2018 22:46	1

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135451 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-135451** Units: **mg/Kg** Analysis Date: **12-Dec-2018 19:57**
Client ID: Run ID: **ICPMS04_329054** SeqNo: **4861941** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.100	0.500								U
Lead	0.100	0.500								U

LCS Sample ID: **LCS-135451** Units: **mg/Kg** Analysis Date: **12-Dec-2018 19:59**
Client ID: Run ID: **ICPMS04_329054** SeqNo: **4861942** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	9.119	0.500	10	0	91.2	80 - 120				
Lead	9.458	0.500	10	0	94.6	80 - 120				

MS Sample ID: **HS18120004-29MS** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:35**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861959** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.66	0.462	9.244	2.842	95.4	75 - 125				
Lead	16.52	0.462	9.244	7.362	99.1	75 - 125				

MSD Sample ID: **HS18120004-29MSD** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:38**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861960** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.67	0.464	9.28	2.842	95.1	75 - 125	11.66	0.0452	20	
Lead	16.98	0.464	9.28	7.362	104	75 - 125	16.52	2.74	20	

PDS Sample ID: **HS18120004-29PDS** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:40**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861961** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.46	0.459	9.174	2.842	93.9	75 - 125				
Lead	16.07	0.459	9.174	7.362	94.9	75 - 125				

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135451 **Instrument: ICPMS04** **Method: SW6020**

SD Sample ID: **HS18120004-29SD** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:33**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861958** PrepDate: **11-Dec-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Arsenic	3.005	2.29					2.842	5.71	10	
Lead	7.315	2.29					7.362	0.645	10	

The following samples were analyzed in this batch: HS18120004-26 HS18120004-28 HS18120004-29 HS18120004-30 HS18120004-31 HS18120004-32 HS18120004-33 HS18120004-34

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135452 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-135452** Units: **mg/Kg** Analysis Date: **14-Dec-2018 19:49**
Client ID: Run ID: **ICPMS04_329261** SeqNo: **4866984** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.100	0.500								U
Lead	0.100	0.500								U

LCS Sample ID: **LCS-135452** Units: **mg/Kg** Analysis Date: **14-Dec-2018 19:51**
Client ID: Run ID: **ICPMS04_329261** SeqNo: **4866985** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	9.338	0.500	10	0	93.4	80 - 120				
Lead	9.804	0.500	10	0	98.0	80 - 120				

MS Sample ID: **HS18120004-10MS** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:20**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4866998** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	10.17	0.459	9.184	1.743	91.8	75 - 125				
Lead	19.21	0.459	9.184	10.17	98.5	75 - 125				

MSD Sample ID: **HS18120004-10MSD** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:22**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4866999** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.17	0.464	9.287	1.743	102	75 - 125	10.17	9.37	20	
Lead	21.34	0.464	9.287	10.17	120	75 - 125	19.21	10.5	20	

PDS Sample ID: **HS18120004-10PDS** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:25**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4867000** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	10.9	0.458	9.166	1.743	99.9	75 - 125				
Lead	20	0.458	9.166	10.17	107	75 - 125				

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135452 **Instrument: ICPMS04** **Method: SW6020**

SD Sample ID: **HS18120004-10SD** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:18**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4866997** PrepDate: **11-Dec-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Arsenic	1.71	2.29					1.743	0	10	J
Lead	10.41	2.29					10.17	2.42	10	

The following samples were analyzed in this batch:

HS18120004-01	HS18120004-02	HS18120004-03	HS18120004-04
HS18120004-06	HS18120004-07	HS18120004-08	HS18120004-10
HS18120004-11	HS18120004-13	HS18120004-14	HS18120004-15
HS18120004-16	HS18120004-18	HS18120004-19	HS18120004-21
HS18120004-22	HS18120004-23	HS18120004-24	HS18120004-25

ALS Houston, US Date: 18-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: **HS18120004**

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

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
North Carolina	624-2018	31-Dec-2018
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	22-Dec-2018
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019

ALS Houston, US Date: 18-Dec-18

Sample Receipt Checklist

Client Name: CBI-Houston
Work Order: HS18120004
Date/Time Received: **30-Nov-2018 09:40**
Received by: **PJM**

Checklist completed by: *Pablo Marinez* eSignature 1-Dec-2018 Date
Reviewed by: *RJ Modashia* eSignature 3-Dec-2018 Date

Matrices: **SOIL, 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):	2.1C/2.5C UC/C	IR # 11	
Cooler(s)/Kit(s):	44426		
Date/Time sample(s) sent to storage:	12/1/18 9:20		
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: Trip Blank not listed on CoC, logged in on hold

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

APTIM

COC ID: LHAAP03-NOV2018-ALSHT-1811-29 TURNAROUND TIME: normal RUSH: Page 1 of 3

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-03			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stancliff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company	Fedex		

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	ANALYSIS: Metals (As & Pb) by 6020	
035SB18-0.0-2.0	035SB18	0	2	FT	Soil	11/29/18	1000	1	X	
035SB19-0.0-2.0	035SB19	0	2	FT			1018	1	X	
035SB19-3.0-4.0	035SB19	3	4				1020	1	X	
035SB19-6.0-7.0	035SB19	6	7				1024	1	X	
035SB19-8.0-9.0	035SB19	8	9				1026	1	X	— HOLD SAMPLE
035SB20-0.0-2.0	035SB20	0	2				1030	1	X	
035SB20-0.0-2.0-FD	035SB20	0	2				1030	1	X	
035SB20-3.0-4.0	035SB20	3	4				1035	1	X	
035SB20-6.0-7.0	035SB20	6	7				1038	1	X	— HOLD SAMPLE
035SB21-0.0-2.0	035SB21	0	2				1045	1	X	
035SB21-0.0-2.0-MS	035SB21	0	2				1045	1	X	
035SB21-0.0-2.0-MSD	035SB21	0	2				1045	1	X	
035SB21-3.0-4.0	035SB21	3	4				1050	1	X	
035SB21-6.0-7.0	035SB21	6	7				1055	1	X	— HOLD SAMPLE
035SB22-0.0-2.0	035SB22	0	2				1105	1	X	
035SB22-3.0-4.0	035SB22	3	4				1110	1	X	

HS18120004

Aptim Environmental & Infrastucture, Inc.
Longhorn Army Ammunition Plant LHAAP-29

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
		11/29/18 1900	PM/MCS	11/30/18 09:40

Cooler 44426
Temp 2.1
IR 11
CF 0.4

00933851

APTIM

COC ID: LHAAP03-NOV2018-ALSHT-1811-29 TURNAROUND TIME: normal RUSH: Page 1 of 3

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-03			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stancliff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company	Fedex		

SAMPLE DETAILS								ANALYSIS REQUESTED	
Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Metals (As & Pb) by 6020
035B22-3.0-4.0-FD	035B22	3	4	FT	Soil	11/29/18	1110	1	X
035B22-6.0-7.0	035B22	6	7				1113	1	X
035B22-8.0-9.0	035B22	8	9				1115	1	X — HOLD SAMPLE
035B23-0.0-2.0	035B23	0	2				1130	1	X
035B23-3.0-4.0	035B23	3	4				1133	1	X
035B23-6.0-7.0	035B23	6	7				1135	1	X — HOLD SAMPLE
035B24-0.0-2.0	035B24	0	2				1145	1	X
035B25-0.0-2.0	035B25	0	2				1140	1	X
035B26-0.0-2.0	035B26	0	2				1005	1	X
035B26-0.0-2.0-FD	035B26	0	2				1005	1	X
035B26-3.0-4.0	035B26	3	4				1010	1	X
035B26-6.0-7.0	035B26	6	7				1013	1	X
035B26-8.0-9.0	035B26	8	9				1015	1	X — HOLD SAMPLE
035B27-0.0-2.0	035B27	0	2				1155	1	X
035B27-3.0-4.0	035B27	3	4				1200	1	X
035B27-3.0-4.0-MS	035B27	3	4				1200	1	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	[signature]	11/29/18 1900	PM / ALS	11/30/18 09:40

HS18120004

Aptim Environmental & Infrastucture, Inc.
Longhorn Army Ammunition Plant LHAAP-29

Cooler 44426
Temp 2.1
IR 11
CF 0.4

00933852

APTIM

COC ID: LHAAP03-NOV2018-ALSHT-1811-29 TURNAROUND TIME: normal RUSH: Page 3 of 3

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-03			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stancliff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company	Fedex		

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	ANALYSIS: Metals (As & Pb) by 6020
035B27-3.0-4.0-MSD	035B27	3	4	FT	Soil	11/29/18	1200	1	X
035B27-6.0-7.0	035B27	6	7				1205	1	X
035B27-8.0-9.0	035B27	8	9				1208	1	X
035B28-0.0-2.0	035B28	0	2				1215	1	X
035B28-3.0-4.0	035B28	3	4				1218	1	X
035B28-6.0-7.0	035B28	6	7				1220	1	X
035B28-8.0-9.0	035B28	8	9				1224	1	X → HOLD SAMPLE

HS18120004

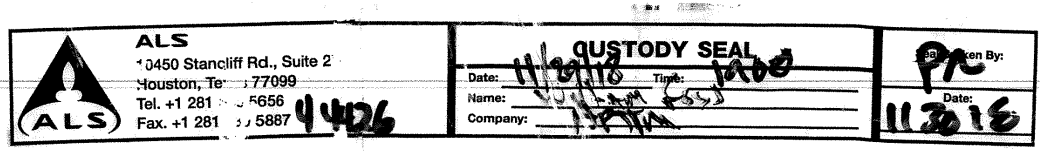
Aptim Environmental & Infrastucture, Inc.

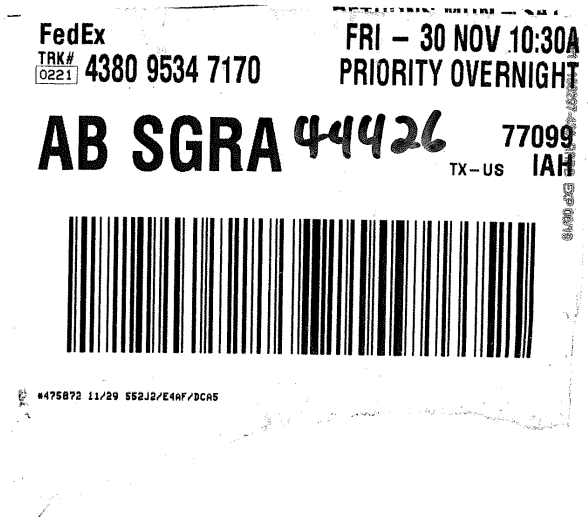
Longhorn Army Ammunition Plant LHAAP-29

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
		11/29/18 1900	ALS	11/30/18 09:40

Cooler 44426
Temp 2.1
IR11
CF-0.4

00933853


ALS
10450 Stancliff Rd., Suite 2
Houston, Te 77099
Tel. +1 281 5656
Fax. +1 281 5887
44426
CUSTODY SEAL
Date: 11/29/18 Time: 1400
Name:
Company:
Date:
11/30/18


FedEx
TRK# 0221 4380 9534 7170
FRI – 30 NOV 10:30A
PRIORITY OVERNIGHT
AB SGRA 44426
77099
TX-US IAH
#4758?2 11/29 552J2/E4AF/DCA5

Appendix B

Sample Collection Logs for November 2018 Soil Samples

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **03SB18**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB18-0.0-2.0

DATE/TIME: 11/29/2018 / 10:00

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03S819-3.0-4.0

DATE/TIME: 11/29/2018 / 10:20

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03S819-6.0-7.0

DATE/TIME: 11/29/2018 / 10:24

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03S819-8.0-9.0

DATE/TIME: 11/29/2018 / 10:26

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB19-0.0-2.0

DATE/TIME: 11/29/2018 / 10:19

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **03SB19**

Project No: **501032**

Sampler(s):

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB19-3.0-4.0

DATE/TIME: 11/29/2018 / 10:20

Sample Interval: 3 - 4 FT

Sampling Method:

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
No COC Specified	None		

Sampler:		

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **03SB19**

Project No: **501032**

Sampler(s):

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB19-6.0-7.0

DATE/TIME: 11/29/2018 / 10:24

Sample Interval: 6 - 7 FT

Sampling Method:

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
No COC Specified	None		

Sampler:		

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB20**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-0.0-2.0

DATE/TIME: 11/29/2018 / 10:30

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB20-0.0-2.0-FD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB20**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-0.0-2.0-FD

DATE/TIME: 11/29/2018 / 10:30

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: FD

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **03SB20**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-3.0-4.0

DATE/TIME: 11/29/2018 / 10:35

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB20**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-6.0-7.0

DATE/TIME: 11/29/2018 / 10:38

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB21**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB21-0.0-2.0

DATE/TIME: 11/29/2018 / 10:45

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB21-0.0-2.0-MS and MSD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB21**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB21-3.0-4.0

DATE/TIME: 11/29/2018 / 10:50

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB21**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB21-6.0-7.0

DATE/TIME: 11/29/2018 / 10:55

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB22**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-0.0-2.0

DATE/TIME: 11/29/2018 / 11:05

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **03SB22**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-3.0-4.0

DATE/TIME: 11/29/2018 / 11:10

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB22-3.0-4.0-FD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **03SB22**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-3.0-4.0-FD

DATE/TIME: 11/29/2018 / 11:10

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: FD

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **03SB22**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-6.0-7.0

DATE/TIME: 11/29/2018 / 11:13

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB22**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-8.0-9.0

DATE/TIME: 11/29/2018 / 11:15

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB23**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB23-0.0-2.0

DATE/TIME: 11/29/2018 / 11:30

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB23**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB23-3.0-4.0

DATE/TIME: 11/29/2018 / 11:33

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB23**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB23-6.0-7.0

DATE/TIME: 11/29/2018 / 11:35

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB24**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB24-0.0-2.0

DATE/TIME: 11/29/2018 / 11:45

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB25**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB25-0.0-2.0

DATE/TIME: 11/29/2018 / 11:40

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **03SB26**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-0.0-2.0

DATE/TIME: 11/29/2018 / 10:05

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB26-0.0-2.0-FD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-0.0-2.0-FD

DATE/TIME: 11/29/2018 / 10:05

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: FD

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **03SB26**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-3.0-4.0

DATE/TIME: 11/29/2018 / 10:10

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-6.0-7.0

DATE/TIME: 11/29/2018 / 10:13

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-8.0-9.0

DATE/TIME: 11/29/2018 / 10:15

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-0.0-2.0

DATE/TIME: 11/29/2018 / 11:55

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-3.0-4.0

DATE/TIME: 11/29/2018 / 12:00

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB27-3.0-4.0-MS and MSD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-6.0-7.0

DATE/TIME: 11/29/2018 / 12:05

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-8.0-9.0

DATE/TIME: 11/29/2018 / 12:08

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **03SB28**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-0.0-2.0

DATE/TIME: 11/29/2018 / 12:15

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB28**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-3.0-4.0

DATE/TIME: 11/29/2018 / 12:18

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB28**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-6.0-7.0

DATE/TIME: 11/29/2018 / 12:20

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB28**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-8.0-9.0

DATE/TIME: 11/29/2018 / 12:24

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Appendix C

State of Texas Well Completion Report for Monitoring Well 03WW01

STATE OF TEXAS WELL REPORT for Tracking #162475

Owner:	**Longhorn Army Ammunition Plant**	Owner Well #:	**03WW01**
Address:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Latitude:	**32° 41' 10" N**
Well County:	**Harrison**	Longitude:	**094° 09' 15" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin e-trex**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **11/18/2008**
Completed: **11/18/2008**

Diameter of Hole: Diameter: **8.25 in From Surface To 30 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Gravel Packed From: **18 ft to 30 ft**
Gravel Pack Size: **20/40**

Annular Seal Data: 1st Interval: **From 16 ft to 18 ft with 1 Bentonite (#sacks and material)**
2nd Interval: **From 0 ft to 16 ft with 5 Cement (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Tremmie Pipe**
Cemented By: **Driller**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **ETTL Engineers & Consultants Inc.**
1717 E. Erwin

	Tyler , TX 75702
Driller License Number:	**2126**
Licensed Well Driller Signature:	**H. Douglas Hinds**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking **#162475**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-9.5 Sandy lean clay - brown
9.5-15.5 Silty sand - brown-gray
15.5-23.5 Clayey sand - brown
23.5-30 Sandy clay - gray

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Sch. 40 0 - 20
2 New PVC Sch. 40 - slotted 20 - 30 0.010"

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

July 11, 2019

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 2018 Remedial Action Operation Report, Landfill 12 (LHAAP-12), Longhorn Army Ammunition Plant, Karnack, Texas, July 2019

Dear Mr. Mayer,

One hard copy replacement cover page and one compact disc (CD) of the above-referenced document are being transmitted to you for your review. There were no EPA or TCEQ comments on the Draft document. In accordance with Federal Facility Agreement, this Draft Final will be considered Final after 30 days without further comment.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, 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)
R. Smith, USACE, Tulsa District, OK (electronic only)
A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

July 11, 2019

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 2018 Remedial Action Operation Report, Landfill 12 (LHAAP-12), Longhorn Army Ammunition Plant, Karnack, Texas, May 2019

Dear Ms. Palmie,

One hard copy replacement cover page and one compact disc (CD) of the above-referenced document are being transmitted to you for your review. There were no EPA or TCEQ comments on the Draft document. In accordance with Federal Facility Agreement, this Draft Final will be considered Final after 30 days without further comment.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, 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:
R. Mayer, USEPA Region 6, Dallas, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK (Electronic only)
A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

Draft Final
2018 Remedial Action Operation Report, Landfill 12 (LHAAP-12)
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

Contract No. W9128F-13-D-0012
Task Order No. W9128BV17F0150
Project No. 501032
Rev 0
July 2019

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Acronyms and Abbreviations

µg/L	micrograms per liter
AECOM	AECOM Technical Services, Inc.
APTIM	Aptim Federal Services, LLC
bgs	below ground surface
Bhate	Bhate Environmental Associates, Inc.
BRAC	Base Realignment and Closure
DCE	dichloroethene
ERS	Environmental Remediation Services
IRA	interim remedial action
LHAAP	Longhorn Army Ammunition Plant
LUC	land use control
MATOC	Multiple Award Task Order Contract
MCL	maximum contaminant level
MEGA	Multiple Environmental Government Acquisition
MMRP	Military Munitions Response Program
MNA	monitored natural attenuation
No.	number
RA(O)	Remedial Action Operation
RAOs	remedial action objectives
RD	remedial design
ROD	record of decision
Shaw	Shaw Environmental, Inc.
TCE	trichloroethene
U.S.	United States
USACE	U.S. Army Corps of Engineers
VC	vinyl chloride
VOC	volatile organic compound

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Tulsa District, on behalf of the U.S. Army Base Realignment and Closure (BRAC) Division contracted Bhate Environmental Associates, Inc. (Bhate) under the Omaha Multiple Environmental Government Acquisition (MEGA) National Small Business Multiple Award Task Order Contract (MATOC), Environmental Remediation Services (ERS) with Military Munitions Response Program (MMRP), Task Order 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). APTIM is conducting the groundwater monitoring and site inspection activities as described in the *Final Remedial Design Addendum Landfill 12 (LHAAP-12)* (Shaw 2007). LHAAP-12 was transferred to the U.S. Fish and Wildlife Service as part of the Caddo Lake National Wildlife Refuge in 2014. This report, summarizing the results of the December 2018 groundwater sampling, the July 2018 landfill integrity inspections and repairs, and the January 2019 well integrity inspections, is the 11th Remedial Action Operation (RA[O]) Report since the Remedial Design (RD) Addendum was finalized in 2007 (Shaw 2007).

1.1 Remedial Action Objectives

Work completed in 2018 as part of the remedial action objectives (RAOs) at LHAAP-12 consisted of the following components: physical inspections and repairs; groundwater monitoring; and concentration trend analysis. Physical inspections are conducted annually, at a minimum, to confirm compliance with land use control (LUC) objectives, which consist of ensuring the integrity of the existing landfill cover, and ensuring no exposure to trichloroethene (TCE)-contaminated groundwater.

The objectives for groundwater monitoring at LHAAP-12 are to:

- Determine the effectiveness of natural attenuation in reducing contaminant concentrations over time
- Evaluate plume migration to ensure that TCE-contaminated groundwater does not impact nearby surface water
- Perform trend analysis of groundwater contaminants of concern: TCE, cis-1,2-dichloroethene (DCE), and vinyl chloride (VC)
- Perform a comparison of the contaminants of concern concentration trends relative to the maximum contaminant levels (MCLs)

The remedy at LHAAP-12 is functioning as intended and all human risks are currently under control. This report summarizes the results of groundwater sampling and the landfill integrity inspections and repairs.

1.2 Site Description

LHAAP-12 was established in 1963, covers approximately seven acres, and is 500 feet southeast of Central Creek, which eventually drains into Caddo Lake. LHAAP-12 was used for the disposal of industrial solid wastes, possibly containing small quantities of hazardous constituents generated at LHAAP. From 1978 until its closure in April 1994, the landfill was used continuously for the disposal of non-hazardous industrial solid waste, including cafeteria waste, chemical waste, petroleum-contaminated soil, and asbestos. The construction of a landfill cap over the site was completed in 1998 as part of an interim remedial action (IRA). The IRA is consistent with U.S. Environmental Protection Agency presumptive remedy guidance. The final remedy for LHAAP-12 is protective of human health and the environment and consists of LUCs in conjunction with monitored natural attenuation (MNA). LUCs include those set in place by the *Final Record of Decision, Landfill 12 (LHAAP-12)* (Shaw 2006) for landfill cap maintenance and restriction of groundwater use.

2.0 OPERATIONS AND MAINTENANCE ACTIVITIES AT LHAAP-12

Operation, maintenance and physical inspection activities at LHAAP-12 consist of:

- Maintenance of the integrity of the landfill cap and repairs to desiccation cracks, erosion, or gullying upon observance.
- Maintenance of the vegetative cover on the landfill cap, including periodic mowing.
- Maintenance of the signage around the landfill cap.
- Prohibition of any activities that would affect the integrity of the cap.
- Prohibition of any activities that would cause exposure to contaminated groundwater.

Inspections of the well field are conducted annually, and the information is recorded on well inspection forms (**Appendix A**). Maintenance or repairs are then conducted, as needed, based on observed conditions.

Mowing the sampling area for brush and weeds is conducted on a routine basis, and as needed, to access the well field. Mowing was conducted on 3 May 2018.

The RD Addendum (Shaw 2007) stipulated physical inspections to be conducted annually and annual groundwater sampling to monitor the effectiveness of natural attenuation in reducing contaminant concentrations over time. Inspections are actually conducted more frequently with periodic drive-by oversight to ensure compliance with the above requirements. The effectiveness of MNA was initially evaluated quarterly in the *Draft Annual Remedial Action Operation Report, Years 1 and 2, Landfill 12 (LHAAP-12)* (Shaw 2011) and has been evaluated annually beginning in the 3rd year of RAO. Groundwater monitoring was included as a component of the remedy for LHAAP-12 identified in the Record of Decision (ROD) (Shaw 2006).

2.1 Physical Inspection Summary

During the July 2018 inspection, the landfill appeared to be in good condition. Four holes were observed in the vegetative cover; otherwise, the vegetative cover was observed in good condition and well maintained during routine mowing with no excessive cracking or desiccation cracks. No change in land or groundwater use was observed at the site, and the use of the site is consistent with the LUCs mandated by the ROD (Shaw 2006). The holes in the

vegetative cover were repaired on 1 Feb 2019 by filling them with soil and the areas were allowed to vegetate naturally. Photos of the signs and the repaired holes in the cover are provided in **Appendix A**. Signs were all visible around the landfill. A follow-up well inspection was conducted in January 2019 to document the condition of the wells. No damage to bollards, pads, or protective casings was observed, and minimal encroachment of weeds or brush on the well pads was observed. Well head locks continue to be in good condition. The January 2019 well inspection forms are provided in **Appendix A**.

The official 2018 physical inspection of the LHAAP-12 cap was completed on 26 Jul 2018 and the LUC Inspection and Maintenance Log is included in **Appendix B**.

2.2 Groundwater Monitoring and Analytical Results

The purpose of sampling was to develop data to support the effectiveness of natural attenuation in reducing contaminant concentrations over time, to evaluate plume migration, and to ensure that TCE-contaminated groundwater does not impact nearby surface water. As described by the Groundwater Sampling Plan included in the RD Addendum (Shaw 2007), annual groundwater sampling of three on-site monitoring wells (12WW20, 12WW21, and 12WW24) and two downgradient compliance monitoring wells (12WW22 and 12WW23) was to be conducted annually beginning in the third year of the RA(O) (i.e., 2010). As recommended in the *Draft Final 2014 Remedial Action Operation Report* (AECOM 2015), the sampling frequency of monitoring well 12WW22 was changed to once every five years and sampling was discontinued at well 12WW23. The locations of these groundwater monitoring wells are shown in **Figure 2-1**. The sampling event in December 2018 included the three on-site wells 12WW20, 12WW21, and 12WW24.

All monitoring wells were in good condition and no evidence of turbidity or silt accumulation was identified during the sampling and gauging event. The groundwater elevations from the three wells sampled in December 2018 are included in **Table 2-1**. The remaining wells were inadvertently not gauged during the December 2018 sampling event. Therefore, in January 2019, an additional gauging event was conducted during the physical inspection of the wells which included eight wells at LHAAP-12 (12WW01, 12WW02, 12WW05, 12WW20, 12WW21, 12WW22, 12WW23, and 12WW24). The groundwater elevation measurements collected in January 2019 indicate an easterly groundwater flow as shown on **Figure 2-2**. The groundwater elevation in January 2019 was slightly higher than in December 2018. The hydraulic gradient based on January 2019 data was 0.006 feet vertical per foot horizontal. The well siltation measurements from the January 2019 gauging event have been included in **Appendix A**. Based on these observations, the wells at LHAAP-12 do not need additional repair.

Groundwater samples were collected in December 2018 using the low-flow method in accordance with Bhate's *Standard Operating Procedures, Groundwater Sampling Procedures* (Bhate 2018). The objective of using low-flow sampling methods is 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 the water quality parameters stabilized and were within acceptable ranges, samples were collected at the same low flow rate. Groundwater monitoring well sampling forms were completed for each monitoring well sampled and are included in **Appendix C**. Laboratory analytical results are included in **Appendix D**.

Annual groundwater samples were collected on 4 Dec 2018 from 12WW20, 12WW21, and 12WW24, and were analyzed for volatile organic compounds (VOCs) according to SW-846 Method 8260. No VOCs were detected in monitoring wells 12WW20 and 12WW21. In monitoring well 12WW24, TCE was the only VOC that exceeded its respective MCL of 5 micrograms per liter (µg/L). TCE concentration at monitoring well 12WW24 reduced from 83 µg/L in December 2017 to 48 µg/L in December 2018. Analytical results for the samples are shown in **Table 2-2**. Historical TCE concentrations for LHAAP-12 wells are shown in **Table 2-3**. Historic contaminants of concern concentrations for monitoring well 12WW24 are shown on **Table 2-4**.

The MNA evaluation completed as part of the *Final 2013 Five-Year Review Report* (AECOM 2014a), concluded that TCE degradation was occurring via anaerobic reductive dechlorination. Although an increasing trend in TCE concentration was observed in well 12WW24 in December 2013 and January 2015, concentrations have decreased over the past four sampling events, December 2015, December 2016, December 2017, and December 2018 (see **Figure 2-3** for 12WW24). TCE concentrations appear to inversely correlate with fluctuating water levels because samples collected when the water table is high tend to have lower contaminant concentrations as shown on **Figure 2-3**. The presence of cis-1,2-DCE and VC indicates that degradation by anaerobic reductive dechlorination is occurring (see **Table 2-4** and **Figure 2-3**). However, the concentration trends for these degradation products mimic those of TCE, suggesting that dilution and dispersion is the dominant natural attenuation pathway. Groundwater TCE concentrations for all wells can be found in **Table 2-3**. The December 2018 concentrations are shown on **Figure 2-4**.

Statistical analysis of the concentration profile for TCE in 12WW24 using Mann-Kendall trend analysis was completed for the data collected from 2006 to 2018. The results are shown in **Appendix E**. The Mann-Kendall trend test indicates a statistically significant decreasing trend at the 99% confidence level for TCE concentrations in monitoring well 12WW24. A drought persisted between 2011 and 2012. This resulted in decreased groundwater levels and well 12WW24 being dry and not being sampled in 2012. After the groundwater level in 12WW24

had recovered, TCE concentrations increased during the December 2013 and January 2015 sampling events, before declining during the December sampling events in 2015, 2016, 2017 and 2018. Additional annual sampling is necessary for the next five year review when the trends will continue to be evaluated for statistical significance and a decrease of sampling frequency. The decreasing contaminant trend provide evidence that the plume is stable and natural attenuation is occurring, resulting in an overall decrease in TCE concentration in groundwater over time. The presence of cis-1,2-DCE and VC in 12WW24 since 2013 also indicates that biodegradation has been occurring.

The TCE trend in 12WW24 as shown in **Figure 2-3** was used to calculate a first order decay rate (**Appendix F**). Two calculations have been made; the first for the dataset through June 2011 and the second for the dataset that includes all results through December 2018. The reason for the two calculations is because drought conditions evidenced by the dry well in December 2012 later manifested in an increase in TCE concentration in this well in the December 2013, and January 2015 sampling events. However, the water levels have been increasing since the well was dry in December 2012 and an overall decrease in TCE concentration has also been observed. The first order rate constant for the period through June 2011 was 6.0 E-04 per day while the first order rate constant for the entire dataset was 2.4 E-04 per day, an implied decrease of less than one order of magnitude. Based on these rate constants, the estimated durations to achieve the MCL for TCE in 12WW24 are 15 years using the rate constant for the dataset through June 2011 and approximately 26 years using the rate constant for the entire dataset. The drought conditions along with changes in seasonal sampling have constrained the trends observed.

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3.0 CONCLUSIONS AND RECOMMENDATIONS

Physical inspections and groundwater monitoring continue at LHAAP-12 in compliance with the ROD for LHAAP-12 (Shaw 2006). No damage to bollards, pads, or protective casings was observed, and limited encroachment of weeds or brush on the well pads was observed. No change in land or groundwater use has occurred at the site. Four holes were identified in the center of the landfill cap during the official 2018 physical inspection of the LHAAP-12 cap completed on 26 Jul 2018. The holes were covered with dirt in February 2019 and allowed to vegetate naturally. LUCs were verified, and the use of the site is still consistent with that mandated by the ROD. Annual LUC inspections will continue to be conducted annually.

In accordance with the Groundwater Sampling Plan, found in Appendix A of the RD Addendum for LHAAP-12 (Shaw 2007), annual sampling of wells will continue until the next Five-Year Review. Results for year 11 are documented in this report.

The groundwater gauging event from January 2019 indicates an easterly gradient similar to the most prevalent historic flow direction. The monitoring wells will continue to be gauged and inspected as part of future sampling events.

Monitoring wells 12WW20, 12WW21 and 12WW24 were sampled on 4 Dec 2018 for VOCs. No VOCs were detected in 12WW20 and 12WW21. At 12WW24, TCE was detected above its MCL of 5 µg/L at a concentration of 48 µg/L. This was a decrease since the December 2017 TCE concentration of 83 µg/L. None of the other detected compounds exceeded their respective MCLs. TCE concentrations in 12WW24 show a statistically significant decreasing trend since 2006 based on Mann-Kendall analysis (**Appendix E**).

When compared to VOC concentrations, the groundwater elevation data (**Figure 2-3**) exhibits an inverse correlation with VOC concentrations in 12WW24. The increase in TCE in the December 2013 and January 2015 sampling events in 12WW24 is thought to be associated with low water levels and sampling during drought conditions, as these were the first samples collected since the well was dry due to drought conditions in 2012. Water levels have continued to increase since 2012, and the TCE concentration from the 4 Dec 2018 sampling is the lowest value measured during the 2006-2018 period.

The Five Year review evaluations indicate the need for an additional well to the east, dowgradient of monitoring well 12WW24 to define the plume (US Army, 2019). The well will be installed at the location shown on **Figure 3-1** and sampled following development. The well will be installed in accordance with the Installation Wide Work Plan (Bhate, 2018) with the same screened interval as 12WW24 from 15.5 to 25.5 feet below ground surface (bgs) unless

different lithologies are noted during drilling. The decision to add the well to the annual monitoring list will be based on the initial sample results and consultation with the regulators.

The three wells (12WW20, 12WW21, and 12WW24) will continue to be sampled annually for VOCs. Any change in this frequency will be evaluated in the next five year review.

4.0 REFERENCES

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Contract No. W9128F-13-D-0012, Task Order No. W9128BV17F0150 • Draft Final • Rev 0 • July 2019

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Tables

Table 2-1
Groundwater Elevation Data, LHAAP-12

Well ID	Sampling Date	Top of Casing Elevation (ft)	Depth to Water from TOC (ft)	Groundwater Elevation (ft amsl)	Total Depth bgs (ft)	Screen Interval bgs (ft)
12WW01	12/1/2016	204.19	23.60	180.59	26.5	14.50 - 26.50
	3/27/2018	204.19	23.55	180.64		
	1/29/2019	204.19	22.99	181.20		
12WW02	12/1/2016	202.45	22.07	180.38	28.50	13.50 - 28.50
	3/27/2018	202.45	21.82	180.63		
	1/29/2019	202.45	20.93	181.52		
12WW05	12/1/2016	190.52	9.88	180.64	38.00	15.50 - 35.50
	3/27/2018	190.52	8.05	182.47		
	1/29/2019	190.52	6.95	183.57		
12WW20	6/15/2010	199.15	17.98	181.17	38.85	28.85 - 38.85
	6/7/2011	199.15	19.78	179.37		
	12/3/2012	199.15	22.03	177.12		
	1/8/2014	199.15	20.71	178.44		
	1/9/2015	199.15	19.34	179.81		
	12/19/2015	199.15	19.00	180.15		
	12/1/2016	199.15	18.69	180.46		
	12/4/2017	199.15	18.8	180.35		
	3/27/2018	199.15	17.6	181.55		
	12/4/2018	199.15	18.35	180.8		
	1/29/2019	199.15	16.81	182.34		
12WW21	6/15/2010	202.07	21.85	180.22	41.70	31.70 - 41.70
	6/7/2011	202.07	23.35	178.72		
	12/3/2012	202.07	24.21	177.86		
	1/8/2014	202.07	24.56	177.51		
	1/9/2015	202.07	24.35	177.72		
	12/19/2015	202.07	22.95	179.12		
	12/1/2016	202.07	21.97	180.10		
	12/4/2017	202.07	21.92	180.15		
	3/27/2018	202.07	21.42	180.65		
	12/4/2018	202.07	22.2	179.87		
	1/29/2019	202.07	21.00	181.07		
12WW22	6/15/2010	190.20	7.93	182.27	38.36	28.36 - 38.36
	6/7/2011	190.20	9.72	180.48		
	12/3/2012	190.20	13.46	176.74		
	1/8/2014	190.20	10.57	179.63		
	1/9/2015	190.20	9.60	180.60		
	12/1/2016	190.20	10.32	179.88		
	3/27/2018	190.20	7.81	182.39		
	1/29/2019	190.20	6.93	183.27		
12WW23	6/16/2010	196.97	18.28	178.69	25.14	15.14 - 25.14
	6/7/2011	196.97	19.40	177.57		
	12/3/2012	196.97	20.38	176.59		
	1/8/2014	196.97	20.80	176.17		
	1/9/2015	196.97	19.34	177.63		
	12/1/2016	196.97	17.23	179.74		
	3/27/2018	196.97	16.88	180.09		
	1/29/2019	196.97	16.02	180.95		

Table 2-1
Groundwater Elevation Data, LHAAP-12

Well ID	Sampling Date	Top of Casing Elevation (ft)	Depth to Water from TOC (ft)	Groundwater Elevation (ft amsl)	Total Depth bgs (ft)	Screen Interval bgs (ft)
12WW24	6/16/2010	203.17	22.50	180.67	26.00	15.50 - 25.50
	6/7/2011	203.17	24.15	179.02		
	12/3/2012	203.17	Dry	Dry		
	12/9/2013	203.17	26.00	177.17		
	1/9/2015	203.17	24.22	178.95		
	12/18/2015	203.17	23.50	179.67		
	11/30/2016	203.17	22.53	180.64		
	12/4/2017	203.17	22.61	180.56		
	3/27/2018	203.17	22.35	180.82		
	12/4/2018	203.17	22.87	180.30		
	1/29/2019	203.17	21.61	181.56		

Notes:
amsl - above mean sea level
bgs - below ground surface
ft - feet
ID - identification
TOC - top of casing

Table 2-2
2018 Sample Results, LHAAP-12

		Location Code	12WW20		12WW21				12WW24	
		Sample ID	12WW20-181204		12WW21-181204		12WW21-181204-FD		12WW24-181204	
		Sample Date	12/4/2018		12/4/2018		12/4/2018		12/4/2018	
		Sample Purpose	REG		REG		FD		REG	
Parameter	Units	MCL / GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Tests										
Conductivity	mS/cm	NV	1.45		5.42				1.55	
Dissolved oxygen	mg/L	NV	0.55		0.08				0.04	
Flow Rate	mL/min	NV	100		100				100	
Oxidation-Reduction Potential	mV	NV	249		202				119	
pH	STD UNIT	NV	5		5.51				5.45	
Temperature	°C	NV	17.8		16				14.68	
Total Purge	L	NV	3		3				3	
Turbidity	NTU	NV	3.7		34.4				3.9	
Water Level at Reading Time	ft btoc	NV	18.58		22.43				22.87	
VOCs										
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethane	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 0.5	U	< 0.5	U	0.71	J
1,1-Dichloropropene	µg/L	2.9	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichloropropane	µg/L	0.041	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1	U	< 1	U	< 1	U	< 1	U
1,2-Dibromoethane	µg/L	0.05	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-2
2018 Sample Results, LHAAP-12

		Location Code	12WW20		12WW21				12WW24	
		Sample ID	12WW20-181204		12WW21-181204		12WW21-181204-FD		12WW24-181204	
		Sample Date	12/4/2018		12/4/2018		12/4/2018		12/4/2018	
		Sample Purpose	REG		REG		FD		REG	
Parameter	Units	MCL / GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,4-Dichlorobenzene	µg/L	75	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Butanone	µg/L	61,000	< 1	U	< 1	U	< 1	U	< 1	U
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Hexanone	µg/L	6,100	< 1	U	< 1	U	< 1	U	< 1	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Acetone	µg/L	92,000	< 2	U	< 2	U	< 2	U	< 2	U
Benzene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromobenzene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromodichloromethane	µg/L	4.6	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromoform	µg/L	36	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromomethane	µg/L	140	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Carbon disulfide	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chlorobenzene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	1.5	J
Chloroethane	µg/L	41,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloromethane	µg/L	220	< 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	22	
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-2
2018 Sample Results, LHAAP-12

			Location Code	12WW20		12WW21				12WW24	
			Sample ID	12WW20-181204		12WW21-181204		12WW21-181204-FD		12WW24-181204	
			Sample Date	12/4/2018		12/4/2018		12/4/2018		12/4/2018	
			Sample Purpose	REG		REG		FD		REG	
Parameter	Units	MCL / GW-Ind		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dichlorodifluoromethane	µg/L	20,000		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Ethylbenzene	µg/L	700		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Hexachlorobutadiene	µg/L	20		< 1	U	< 1	U	< 1	U	< 1	U
Isopropylbenzene	µg/L	10,000		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
m,p-Xylenes	µg/L	10,000		< 1	U	< 1	U	< 1	U	< 1	U
Methyl isobutyl ketone	µg/L	8,200		< 1	U	< 1	U	< 1	U	< 1	U
Methylene chloride	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Naphthalene	µg/L	2,000		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
n-Butylbenzene	µg/L	4,100		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
n-Propylbenzene	µg/L	4,100		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
o-Xylene	µg/L	10,000		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
p-Isopropyltoluene	µg/L	10,000		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
sec-Butylbenzene	µg/L	4,100		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Styrene	µg/L	100		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
tert-Butylbenzene	µg/L	4,100		< 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
Toluene	µg/L	1,000		< 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
trans-1,3-Dichloropropene	µg/L	29		< 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	**48**	
Trichlorofluoromethane	µg/L	31,000		< 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

Notes:

Highlighted **bold** result indicates concentration above the MCL.

µg/L - micrograms per liter

< - less than

°C - degrees Celsius

Table 2-2
2018 Sample Results, LHAAP-12

			Location Code	12WW20		12WW21				12WW24	
			Sample ID	12WW20-181204		12WW21-181204		12WW21-181204-FD		12WW24-181204	
			Sample Date	12/4/2018		12/4/2018		12/4/2018		12/4/2018	
			Sample Purpose	REG		REG		FD		REG	
Parameter	Units	MCL / GW-Ind		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual

Notes: (cont.)

FD - field duplicate

ft btoc - feet below top of casing

GW-Ind - groundwater medium-specific concentration for industrial use

ID - identification

J - estimated value

L - liter

MCL - maximum contaminant level

mg/L - milligrams per liter

mL/min - milliliters per minute

mS/cm - millisiemens per centimeter

mV - millivolts

NTU - nephelometric turbidity unit

NV - not established

REG - regular sample

STD UNIT - standard unit

U - Not detected; The analyte was analyzed for but not detected above the associated method detection limit.

Val Qual - validation qualifier

VOCs - volatile organic compounds

Table 2-3
Historic TCE Concentrations at LHAAP-12 Monitoring Wells

	Monitoring Wells					
Sampling Date	12WW20 (µg/L)	12WW21 (µg/L)	12WW22 (µg/L)	12WW23 (µg/L)	12WW24 (µg/L)	12WW25(30) [a] (µg/L)
1 Dec 2006	0.713	1 U	1 U	1 U	396	NS
1 Sep 2007	1.34	1 U	1 U	1 U	272	NS
1 Dec 2007	1.19	1 U	1 U	1 U	313	NS
1 Mar 2008	0.999 J	0.25 U	0.25 U	0.25 U	301	NS
1 Jun 2008	1.04	0.25 U	0.25 U	0.25 U	237	NS
1 Sep 2008	0.985	0.25 U	0.25 U	0.25 U	185	NS
1 Feb 2009	1.18	0.25 U	0.25 U	0.25 U	334	NS
1 Apr 2009	0.997	0.25 U	0.25 U	0.25 U	197	NS
1 Jul 2009	0.931	0.25 U	0.25 U	0.25 U	204	NS
1 Jun 2010	0.353 J	0.25 U	0.25 U	0.25 U	145	NS
1 Jun 2011	0.263 J	0.25 U	0.25 U	0.25 U	147	NS
1 Dec 2012	0.5 J	0.582 J	0.5 U	0.5 U	Dry Well	NS
1 Jan 2014	5	0.721 J	0.5 U	0.5 U	259 [b]	NS
1 Aug 2014	NS	NS	NS	NS	NS	0.317 J
1 Jan 2015	0.293 J	0.25 U	0.25 U	0.25 U	353	NS
1 Dec 2015	0.5 U	0.5 U	NS	NS	278	NS
1 Dec 2016	0.5 U	0.5 U	0.5 U	0.5 U	151	NS
1 Dec 2017	1 U	1 U	NS	NS	83	NS

Notes:

[a] This was a 2014 DPT boring grab groundwater sample, no well was subsequently installed.

[b] Analyte was diluted 5X

µg/L - micrograms per liter

J - estimated value

DPT - direct-push technology

NS - not sampled

TCE - trichloroethene

U - Not detected; The analyte was analyzed for but not detected above the associated method detection limit.

Table 2-4
Historic COC Concentrations at Monitoring Well 12WW24

Sampling Date	Monitoring Wells		
	Trichloroethene (µg/L)	cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
1 Dec 2006	396	1 U	1 U
1 Sep 2007	272	1 U	1 U
1 Dec 2007	313	1 U	1 U
1 Mar 2008	301	0.25 U	0.25 U
1 Jun 2008	237	0.25 U	0.25 U
1 Sep 2008	185	0.25 U	0.25 U
1 Feb 2009	334	0.25 U	0.25 U
1 Apr 2009	197	0.25 U	0.25 U
1 Jul 2009	204	0.25 U	0.25 U
1 Jun 2010	145	0.25 U	0.25 U
1 Jun 2011	147	0.25 U	0.25 U
11 Dec 2013	259	66.1	0.873
1 Jan 2015	353	70.8	1.25
1 Dec 2015	278	58.5	0.786
1 Dec 2016	151	36.7	0.51
1 Dec 2017	83	26	1 U
4 Dec 2018	48	22	0.5 U

Notes:

µg/L - micrograms per liter

COC - contaminant of concern

DCE - dichloroethene

U - Not detected; The analyte was analyzed for but not detected above the associated method detection limit.

Figures

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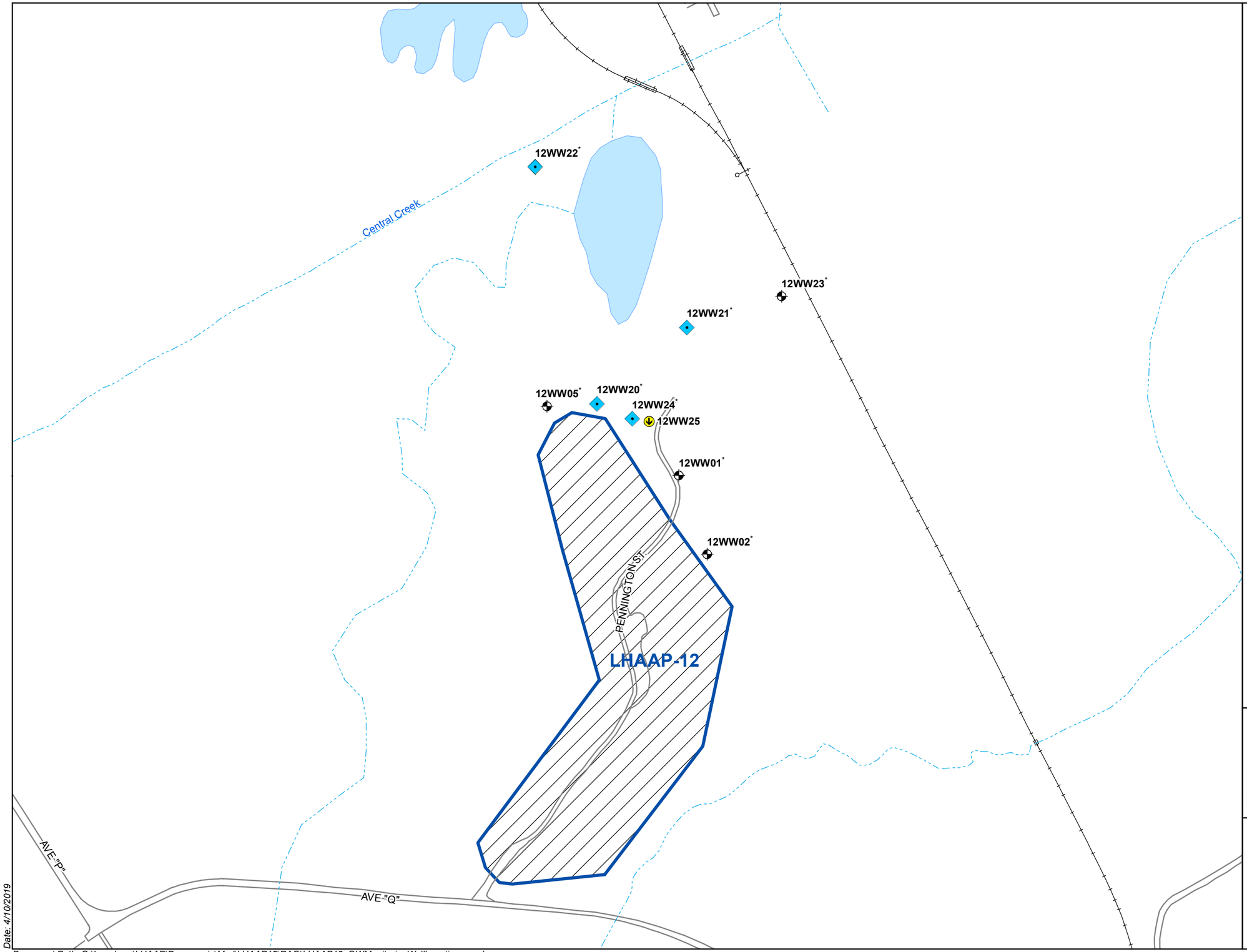

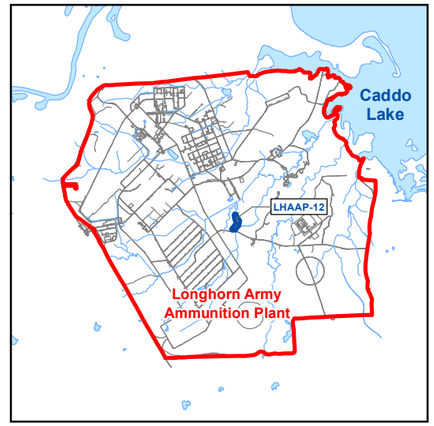

- Monitoring Well
- Monitored Natural Attenuation Shallow Well
- 2014 DPT Location (This was a DPT boring grab groundwater sample, no well was subsequently installed)
- Stream
- Road
- Site Boundary
- Landfill Cap Area
- Railroad

Note:
1. Each well has 5'x5' concrete surface monument surrounded bollards. Each well has a PVC riser. Appopriate equipment and care used around these features.
2. * Gauged for water levels.

N

0 125 250 Feet

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Figure 2-1

Groundwater Monitoring Well Locations
LHAAP-12

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/10/2019

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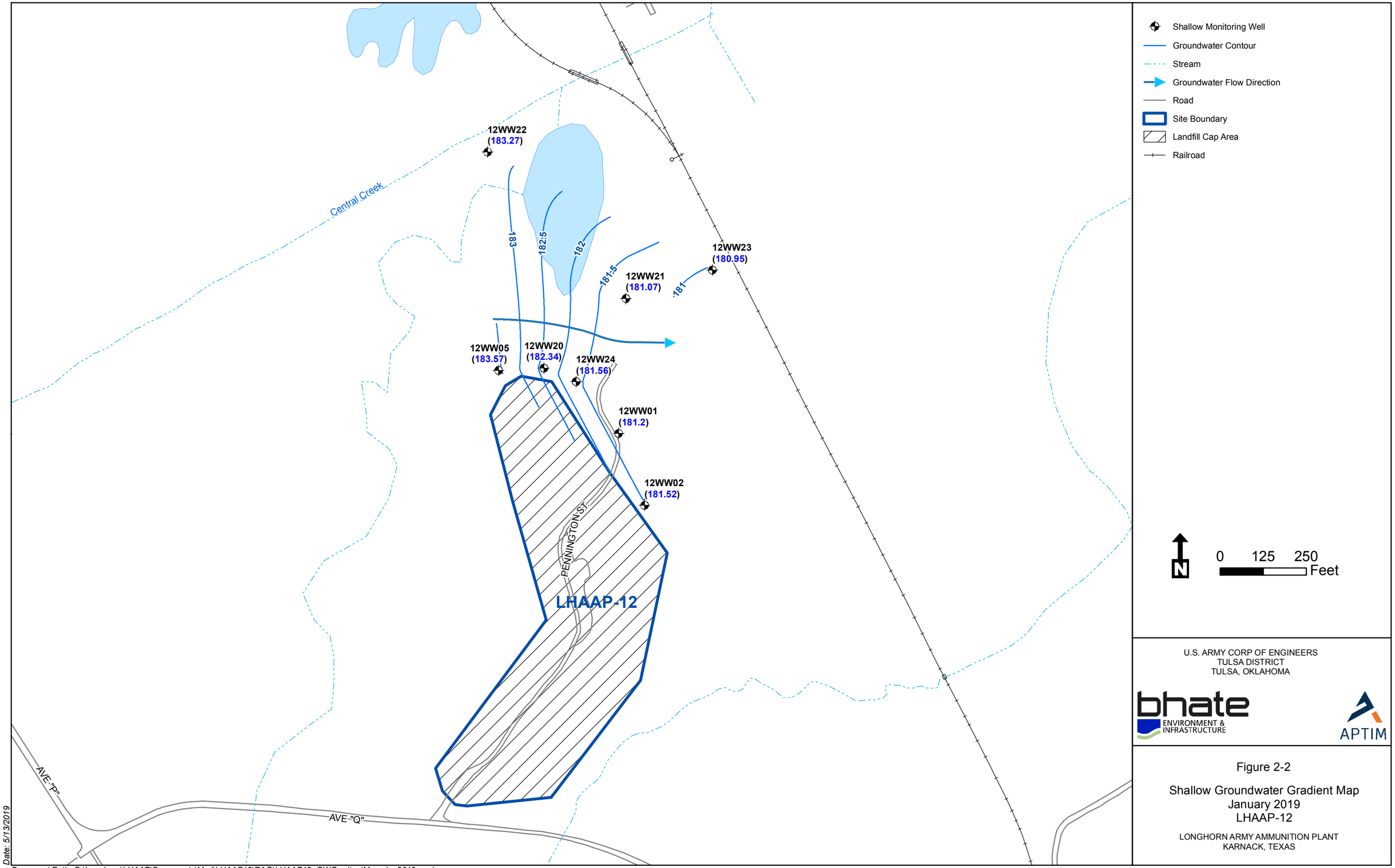

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Figure 2-2

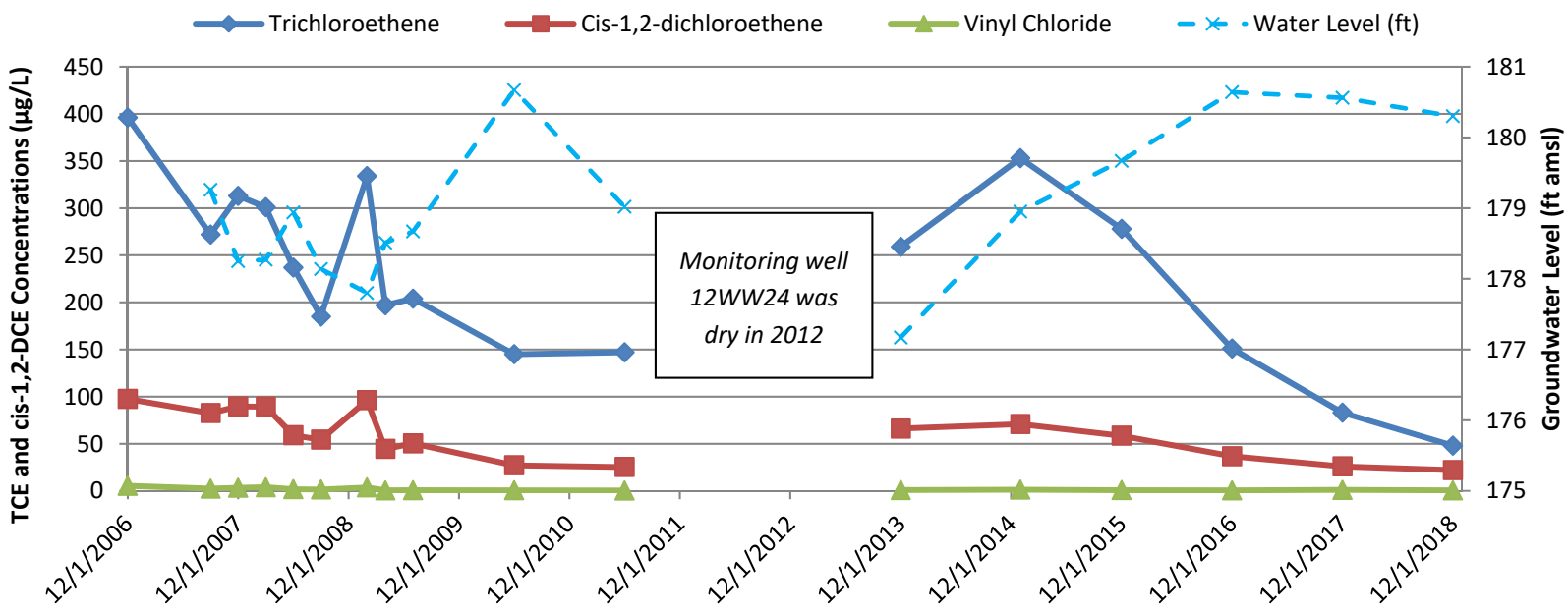
Shallow Groundwater Gradient Map
January 2019
LHAAP-12

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

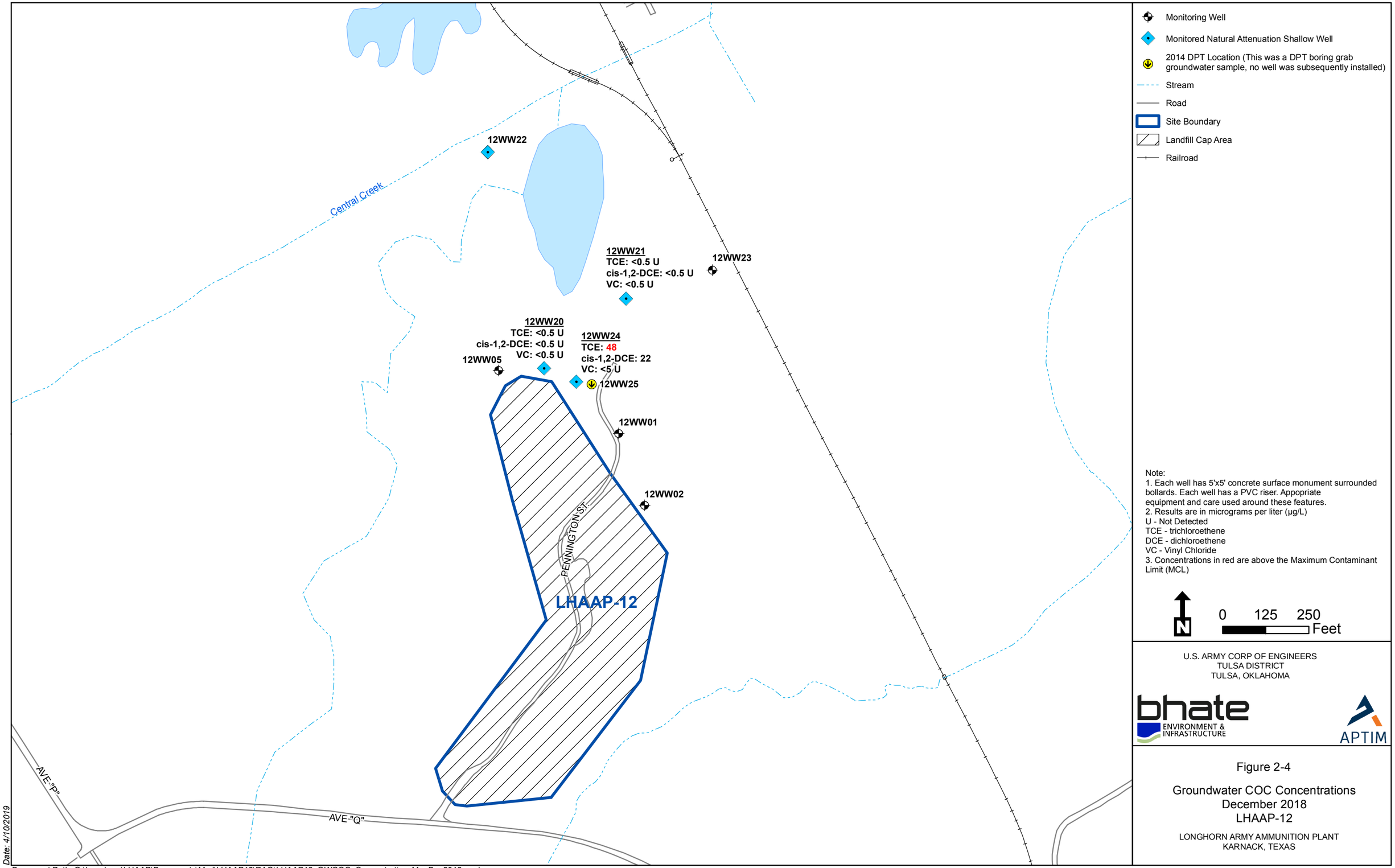
Date: 5/13/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP12\RAO\LHAAP12_GWGradientMap_Jan2019.mxd

Figure 2-3
TCE, cis-1,2-DCE, and VC Concentrations in 12WW24
LHAAP-12



Notes:
Maximum Contaminant Levels: TCE = 5 µg/L; cis-1,2-DCE = 70 µg/L; VC = 2 µg/L
ft amsl - feet above mean sea level
µg/L - micrograms per liter
TCE - trichloroethene
DCE - dichloroethene
VC - vinyl chloride



Note:
1. Each well has 5'x5' concrete surface monument surrounded bollards. Each well has a PVC riser. Appopriate equipment and care used around these features.
2. Results are in micrograms per liter (µg/L)
U - Not Detected
TCE - trichloroethene
DCE - dichloroethene
VC - Vinyl Chloride
3. Concentrations in red are above the Maximum Contaminant Limit (MCL)

N

0 125 250 Feet

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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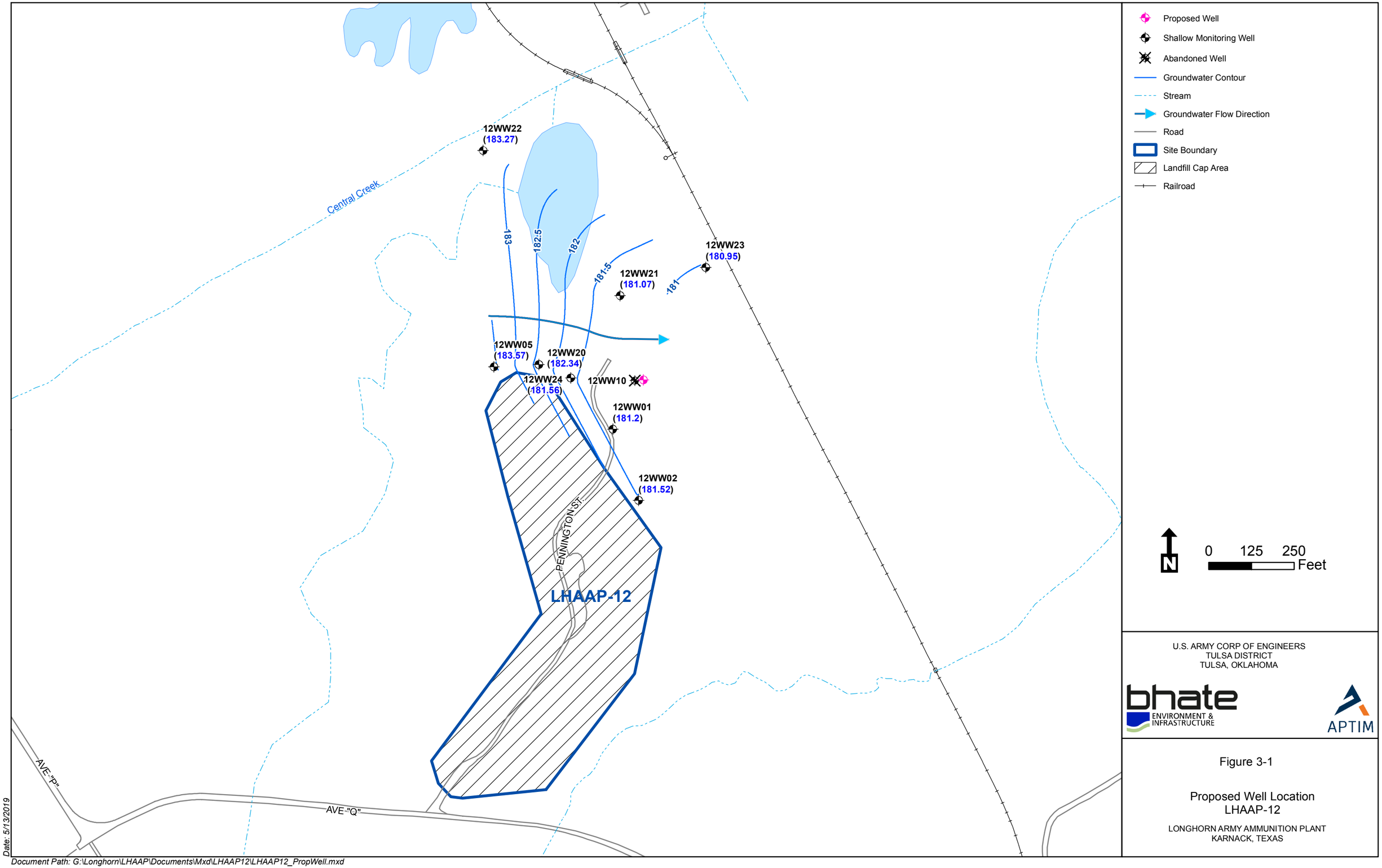
Figure 2-4

Groundwater COC Concentrations
December 2018
LHAAP-12

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/10/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP12\RAO\LHAAP12_GWCOC_ConcentrationsMapDec2018.mxd



U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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APTIM

Figure 3-1

Proposed Well Location
LHAAP-12

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 5/13/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP12\LHAAP12_PropWell.mxd

Appendix A

Photo Log and Well Inspection Forms

APPENDIX A

Photo Log

Photo No.	Date	Task and Description
1	7/25/2018	Signage Along Site in Good Condition
2	7/25/2018	Signage Along Site in Good Condition
3	1/29/2019	Monitoring Well 12WW01
4	1/29/2019	Monitoring Well 12WW02
5	1/29/2019	Monitoring Well 12WW05
6	1/29/2019	Monitoring Well 12WW20
7	1/29/2019	Monitoring Well 12WW21
8	1/29/2019	Monitoring Well 12WW22
9	1/29/2019	Monitoring Well 12WW23
10	1/29/2019	Monitoring Well 12WW24
11	2/1/2019	Repair of Hole in Landfill Cover
12	2/1/2019	Repair of Hole in Landfill Cover
13	2/1/2019	Repair of Hole in Landfill Cover
14	2/1/2019	Repair of Hole in Landfill Cover

PHOTO 1: Signage Along Site in Good Condition
DATE: July 25, 2018

PHOTO 2: Signage Along Site in Good Condition
DATE: July 25, 2018

PHOTO 3: Monitoring Well 12WW01
DATE: January 29, 2019

PHOTO 4: Monitoring Well 12WW02
DATE: January 29, 2019

PHOTO 5: Monitoring Well 12WW05
DATE: January 29, 2019

PHOTO 6: Monitoring Well 12WW20
DATE: January 29, 2019

PHOTO 7: Monitoring Well 12WW21
DATE: January 29, 2019

PHOTO 8: Monitoring Well 12WW22
DATE: January 29, 2019

PHOTO 9: Monitoring Well 12WW23
DATE: January 29, 2019

PHOTO 10: Monitoring Well 12WW24
DATE: January 29, 2019

PHOTO 11: Repair of Holes in Cover
DATE: February 1, 2019

PHOTO 12: Repair of Holes in Cover
DATE: February 1, 2019

PHOTO 13: Repair of Holes in Landfill Cover
DATE: February 1, 2019

PHOTO 14: Repair of Holes in Landfill Cover
DATE: February 1, 2019

00933937

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 12
Well ID: 12WW02
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 31.70
Inspector: Scott Beesinger

☑ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☑ Yes ☐ No
Material: Steel
Condition: ☑ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☑ Good ☐ Broken ☐ Cracked
Hinge Condition: ☑ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED NA

Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☑ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☑ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☑ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

00933938

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 12
Well ID: 12MW22
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 38.69
Inspector: Scott Bessinger

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Steel
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED NA
Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

00933939

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 12
Well ID: 12WW05
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 38.61
Inspector: Scott Bassinger

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Steel
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED NA
Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches): 4 11
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

00933940

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 12
Well ID: 12WW20
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 39.33
Inspector: Scott Baysinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Steel
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED NA

Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

00933941

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 12
Well ID: 12WW24
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 28.24
Inspector: Scott Bessinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Steel
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

00933942

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 12
Well ID: 12WW21
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 41.74
Inspector: Scott Beesinger

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Steel
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ **FLUSH MOUNTED** NA
Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

00933943

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 12
Well ID: 12WW23
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 25.43
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Steel
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED NA

Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

00933944

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 12
Well ID: 12WW01
Inspection Date: 1/29/19
Well Completion Depth/ Measured Depth: 29.97
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Steel
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED NA

Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

2018 Summary of Monitoring Well Inspection and Repair

Well Information		Visual Inspections of Well												
Well Identification	Date	ID Plate	Lock	Gasket	Cap	Bolts	Bollards	Pad	Vegetation	Tampering/ Obstructions	Limited Access	New Wells	Subsurface Activities	Comments
12WW01	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	
12WW02	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	
12WW05	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	
12WW20	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	
12WW21	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	
12WW22	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	
12WW23	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	
12WW24	1/29/2019	X	X	X	X	X	Present/Functioning	Good	None - Well is Clear	N	N	N	N	

Notes:
ID - identification
N - none

Well Construction Information

Well Identification	Log Date	Depth to Water (ft btoc)	Total Measured Well Depth (ft btoc)	Total Measured Well Depth (ft bgs)	Dry?	Water Column (ft)	Survey Data		Well Construction Data				
							Top of Casing Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Constructed Well Depth (ft bgs)	Well Screen Beginning Depth (ft bgs)	Well Screen Ending Depth (ft bgs)	Screen Length (ft)	Percent Siltation
12WW01	1/29/2019	22.99	29.97	27.35	No	3.51	204.19	201.57	26.5	14.50	26.50	12.00	0.0%
12WW02	1/29/2019	20.93	31.70	29.51	No	7.57	202.45	200.26	28.5	13.50	28.50	15.00	0.0%
12WW05	1/29/2019	6.95	38.61	36.46	No	31.05	190.52	188.37	38	15.50	35.50	20.00	0.0%
12WW20	1/29/2019	16.81	39.33	37.26	No	22.04	199.15	197.08	38.85	28.85	38.85	10.00	4.1%
12WW21	1/29/2019	21.00	41.74	39.77	No	20.70	202.07	200.10	41.7	31.70	41.70	10.00	4.6%
12WW22	1/29/2019	6.93	38.69	36.27	No	31.43	190.20	187.78	38.36	28.36	38.36	10.00	5.4%
12WW23	1/29/2019	16.02	25.43	23.33	No	9.12	196.97	194.87	25.14	15.14	25.14	10.00	7.2%
12WW24	1/29/2019	21.61	28.24	25.94	No	4.39	203.17	200.87	26	15.50	25.50	10.00	0.0%

Notes:

ft - feet

ft amsl - feet above mean sea level

ft bgs - feet below ground surface

ft btoc - feet below top of casing

Appendix B

Land Use Controls and Maintenance Log

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected By	Inspection / Maintenance Activities (Yearly, at a Minimum)					Corrective Action or Repairs Required?	Repairs / Action Taken
		Protect Landfill Integrity				Prevent Human Exposure to Groundwater		
		Vegetative Cover Maintained (i.e., grass mowed at least annually)	Fence and Signage Maintained	Observance of Landfill Cover Degradation (e.g., desiccation cracks, erosion, or gullying)	Continued Compliance Verified for No Digging or Disturbance of Landfill Cover or Contents	Verified No Withdrawal of Use of Groundwater (other than environmental testing)		
7/25/2018	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover subsidence observed and found to be in good condition. No erosion, cracks, or gullying was found. There are 4 locations in the center of the cap that have sink holes.	No evidence of animal burrowing in the cap.	Completed and verified.	Top soil needed to fill in the sink holes in center of landfill cap.	Holes were covered with dirt on 2/1/2019.

Notes:
e.g. - for example
i.e. - that is
LUC - land use control

Appendix C

Groundwater Sampling Forms

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **12WW20**

Project No: **501032**

Sampler(s): **Scott Beesinger**

FIELD CONDITIONS

Clear

SAMPLING INFORMATION

Sample No: 12WW20-181204

DATE/TIME: 12/4/2018 / 12:05

Pump Inlet Depth (ft): 34.30

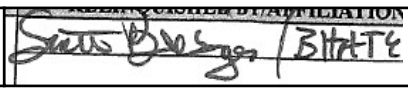
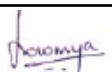
Sampling Method: Low Flow

Sample Purpose: REG

Sample Matrix: GW

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
12-DEC2018-GW-ALSHT-181204	None	VOLATILES	SW8260

Sampler:		Scott Beesinger	
QC'ed By:			

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 12/4/2018 / 11:35

Depth to Water - Initial (DTWi) (ft) 18.35

Purge End Date/Time: 12/4/2018 / 12:05

Measured Depth of Well (ft): 39.6

PID Reading: N/A

Screen Interval (ft): 29.30 - 39.30

Pump Start Time: 12/4/2018 / 11:35

APTIM

Sample Collection Log

Location ID: 12WW20				Sample No: 12WW20-181204						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
12/4/2018	11:40	100	0.5	18.42	1.47	16.07	5.45	6.6	164	0.95
12/4/2018	11:45	100	1.0	18.48	1.46	17.33	5.10	6.0	223	0.63
12/4/2018	11:50	100	1.5	18.52	1.45	17.61	5.01	5.5	246	0.57
12/4/2018	11:55	100	2.0	18.55	1.45	17.69	5.0	4.9	247	0.56
12/4/2018	12:00	100	2.5	18.57	1.45	17.74	5.0	4.1	248	0.56
12/4/2018	12:05	100	3.0	18.58	1.45	17.80	5.0	3.7	249	0.55

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **12WW21**

Sampler(s): **Scott Beesinger**

FIELD CONDITIONS

Clear

SAMPLING INFORMATION

Sample No: 12WW21-181204

DATE/TIME: 12/4/2018 / 10:05

Pump Inlet Depth (ft): 36.80

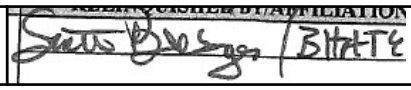
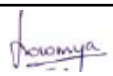
Sampling Method: Low Flow

Sample Purpose: REG

Sample Matrix: GW

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
12-DEC2018-GW-ALSHT-181204	None	VOLATILES	SW8260

Sampler:		Scott Beesinger	
QC'ed By:			

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) 22.2

Measured Depth of Well (ft): 42.15

Screen Interval (ft): 31.80 - 41.80

Pump Start Time: 12/4/2018 / 09:35

Purging Method/Equipment: Bladder Pump

Purge Start Date/Time: 12/4/2018 / 09:35

Purge End Date/Time: 12/4/2018 / 10:05

PID Reading: N/A

APTIM

Sample Collection Log

Location ID: 12WW21				Sample No: 12WW21-181204						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
12/4/2018	09:40	100	0.5	22.27	4.94	14.83	6.68	51.3	162	0.73
12/4/2018	09:45	100	1.0	22.34	5.40	15.67	5.72	39.5	187	0.25
12/4/2018	09:50	100	1.5	22.38	5.41	15.89	5.53	35.9	200	0.09
12/4/2018	09:55	100	2.0	22.40	5.42	15.93	5.52	35.2	201	0.09
12/4/2018	10:00	100	2.5	22.42	5.42	15.97	5.51	34.8	201	0.08
12/4/2018	10:05	100	3.0	22.43	5.42	16.0	5.51	34.4	202	0.08

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **12WW21**

Project No: **501032**

Sampler(s): **Scott Beesinger**

FIELD CONDITIONS

Clear

SAMPLING INFORMATION

Sample No: 12WW21-181204-FD

DATE/TIME: 12/4/2018 / 10:05

Pump Inlet Depth (ft): 36.80

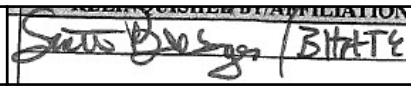
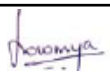
Sampling Method: Low Flow

Sample Purpose: FD

Sample Matrix: GW

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
12-DEC2018-GW-ALSHT-181204	None	VOLATILES	SW8260

Sampler:		Scott Beesinger	
QC'ed By:			

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 12/4/2018 / 09:35

Depth to Water - Initial (DTWi) (ft) 22.2

Purge End Date/Time: 12/4/2018 / 10:05

Measured Depth of Well (ft): 42.15

PID Reading: N/A

Screen Interval (ft): 31.70 - 41.70

Pump Start Time: 12/4/2018 / 09:35

Location ID: 12WW21 Sample No: 12WW21-181204-FD

Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L

00933955

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **12WW24**

Project No: **501032**

Sampler(s): **Scott Beesinger**

FIELD CONDITIONS

Clear

SAMPLING INFORMATION

Sample No: 12WW24-181204

DATE/TIME: 12/4/2018 / 11:10

Pump Inlet Depth (ft): 24.0

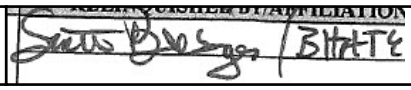
Sampling Method: Low Flow

Sample Purpose: REG

Sample Matrix: GW

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
12-DEC2018-GW-ALSHT-181204	None	VOLATILES	SW8260

Sampler:		Scott Beesinger	
QC'ed By:			

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 12/4/2018 / 10:40

Depth to Water - Initial (DTWi) (ft) 22.87

Purge End Date/Time: 12/4/2018 / 11:10

Measured Depth of Well (ft): 28.25

PID Reading: N/A

Screen Interval (ft): 15.50 - 25.50

Pump Start Time: 12/4/2018 / 10:40

Location ID: 12WW24 Sample No: 12WW24-181204										
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
12/4/2018	10:45	100	0.5	22.95	1.59	13.85	5.49	9.4	134	0.42
12/4/2018	10:50	100	1.0	23.01	1.55	14.53	5.48	4.4	123	0.22
12/4/2018	10:55	100	1.5	23.05	1.55	14.57	5.46	4.2	120	0.05
12/4/2018	11:00	100	2.0	23.08	1.55	14.60	5.45	4.1	120	0.05
12/4/2018	11:05	100	2.5	23.10	1.55	14.64	5.45	4.0	119	0.05
12/4/2018	11:10	100	3.0	23.12	1.55	14.68	5.45	3.9	119	0.04

Appendix D

Laboratory Analytical Data Package

HS18120278 Cover Page

ALS WO# HS18120278

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Table of Contents

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WorkOrder: HS18120278

LHAARP - 12

Aptim Environmental & Infrastucture, Inc.

Susan Huang
2500 City West Blvd., Suite 1700
Houston TX 77042

28-Jan-2019

HS18120278 LHAARP 12 Final

ALS WO# HS18120278

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
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December 19, 2018

Susan Huang
Aptim Environmental & Infrastucture, Inc.
2500 City West Blvd., Suite 1700
Houston, TX 77042

Work Order: **HS18120278**

Laboratory Results for: **LHAARP - 12**

Dear Susan,

ALS Environmental received 5 sample(s) on Dec 05, 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 Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Work Order: HS18120278

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120278-01	12WW21-181204	Groundwater		04-Dec-2018 10:05	05-Dec-2018 09:30	☐
HS18120278-02	12WW21-181204 FD	Groundwater		04-Dec-2018 10:05	05-Dec-2018 09:30	☐
HS18120278-03	12WW24-181204	Groundwater		04-Dec-2018 13:10	05-Dec-2018 09:30	☐
HS18120278-04	12WW20-181204	Groundwater		04-Dec-2018 12:05	05-Dec-2018 09:30	☐
HS18120278-05	Trip Blank ALS-071918-78	Water		04-Dec-2018 00:00	05-Dec-2018 09:30	☐

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Work Order: HS18120278

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R329535

Sample ID: VLCSW-1812018

- 1,4_Dichlorobenzene and Hexachlorobutadiene exceeded QC limits for LCS. CCV is OK.

Sample ID: VSTD050

- cis-1,3-Dichloropropene exceeded %D limits for CCV. Samples are ND for this compound.

Sample ID: 12WW24-181204 (HS18120278-03MS)

- MS/MSD recovered outside the control limits for multiple compounds

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW21-181204
Collection Date: 04-Dec-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:27
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 16:27
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 16:27
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 16:27
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 16:27
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW21-181204
Collection Date: 04-Dec-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:27
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:27
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 16:27
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Surr: 1,2-Dichloroethane-d4	*91.4*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 16:27*
Surr: 4-Bromofluorobenzene	*99.2*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 16:27*
Surr: Dibromofluoromethane	*87.4*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 16:27*
Surr: Toluene-d8	*106*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 16:27*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW21-181204 FD
Collection Date: 04-Dec-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:13
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 15:13
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 15:13
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 15:13
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 15:13
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW21-181204 FD
Collection Date: 04-Dec-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:13
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:13
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 15:13
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Surr: 1,2-Dichloroethane-d4	*90.5*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 15:13*
Surr: 4-Bromofluorobenzene	*97.8*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 15:13*
Surr: Dibromofluoromethane	*88.4*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 15:13*
Surr: Toluene-d8	*105*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 15:13*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW24-181204
Collection Date: 04-Dec-2018 13:10

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1-Dichloroethene	**0.71**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:02
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 16:02
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 16:02
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 16:02
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 16:02
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Chlorobenzene	**1.5**		**0.30**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW24-181204
Collection Date: 04-Dec-2018 13:10

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
cis-1,2-Dichloroethene	**22**		**0.20**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:02
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:02
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 16:02
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Trichloroethene	**48**		**0.20**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Surr: 1,2-Dichloroethane-d4	*91.4*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 16:02*
Surr: 4-Bromofluorobenzene	*97.6*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 16:02*
Surr: Dibromofluoromethane	*89.1*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 16:02*
Surr: Toluene-d8	*105*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 16:02*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW20-181204
Collection Date: 04-Dec-2018 12:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-04
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:37
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 15:37
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 15:37
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 15:37
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 15:37
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW20-181204
Collection Date: 04-Dec-2018 12:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-04
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:37
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:37
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 15:37
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Surr: 1,2-Dichloroethane-d4	*91.4*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 15:37*
Surr: 4-Bromofluorobenzene	*96.8*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 15:37*
Surr: Dibromofluoromethane	*88.0*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 15:37*
Surr: Toluene-d8	*105*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 15:37*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: Trip Blank ALS-071918-78
Collection Date: 04-Dec-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-05
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 14:48
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 14:48
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 14:48
Acetone	**2.7**		**2.0**	**2.0**	**2.0**	**ug/L**	1	18-Dec-2018 14:48
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 14:48
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: Trip Blank ALS-071918-78
Collection Date: 04-Dec-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-05
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 14:48
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 14:48
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 14:48
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Surr: 1,2-Dichloroethane-d4	*89.5*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 14:48*
Surr: 4-Bromofluorobenzene	*98.2*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 14:48*
Surr: Dibromofluoromethane	*87.9*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 14:48*
Surr: Toluene-d8	*106*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 14:48*

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R329535	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Water	
HS18120278-05	Trip Blank ALS-071918-78	04 Dec 2018 00:00			18 Dec 2018 14:48	1
Batch ID R329535	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS18120278-01	12WW21-181204	04 Dec 2018 10:05			18 Dec 2018 16:27	1
HS18120278-02	12WW21-181204 FD	04 Dec 2018 10:05			18 Dec 2018 15:13	1
HS18120278-03	12WW24-181204	04 Dec 2018 13:10			18 Dec 2018 16:02	1
HS18120278-04	12WW20-181204	04 Dec 2018 12:05			18 Dec 2018 15:37	1

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MBLK Sample ID: **VBLKW-181218** Units: **ug/L** Analysis Date: **18-Dec-2018 13:34**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872159** 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-Trichlor-1,2,2-trifluoroethane	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	1.0	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	2.0	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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MBLK Sample ID: **VBLKW-181218** Units: **ug/L** Analysis Date: **18-Dec-2018 13:34**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872159** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Bromomethane	0.50	1.0								U
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	1.0	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	0.50	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	*45.19*	*1.0*	*50*	*0*	*90.4*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*48.92*	*1.0*	*50*	*0*	*97.8*	*82 - 115*				
Surr: Dibromofluoromethane	*43.69*	*1.0*	*50*	*0*	*87.4*	*73 - 126*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MBLK Sample ID: **VBLKW-181218** Units: **ug/L** Analysis Date: **18-Dec-2018 13:34**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872159** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*52.1*	*1.0*	*50*	*0*	*104*	*81 - 120*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

LCS Sample ID: **VLCSW-1812018** Units: **ug/L** Analysis Date: **18-Dec-2018 13:58**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872160** 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	21.7	1.0	20	0	109	77 - 118				
1,1,1-Trichloroethane	20.06	1.0	20	0	100	70 - 130				
1,1,2,2-Tetrachloroethane	21.61	1.0	20	0	108	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	21.66	1.0	20	0	108	70 - 130				
1,1,2-Trichloroethane	21.9	1.0	20	0	109	77 - 113				
1,1-Dichloroethane	20.96	1.0	20	0	105	71 - 122				
1,1-Dichloroethene	20.63	1.0	20	0	103	70 - 130				
1,1-Dichloropropene	22.62	1.0	20	0	113	78 - 118				
1,2,3-Trichlorobenzene	22.19	1.0	20	0	111	70 - 130				
1,2,3-Trichloropropane	21.99	1.0	20	0	110	70 - 127				
1,2,4-Trichlorobenzene	21.92	1.0	20	0	110	77 - 126				
1,2,4-Trimethylbenzene	23.08	1.0	20	0	115	73 - 121				
1,2-Dibromo-3-chloropropane	19.69	1.0	20	0	98.4	70 - 130				
1,2-Dibromoethane	22.19	1.0	20	0	111	76 - 123				
1,2-Dichlorobenzene	21.19	1.0	20	0	106	77 - 113				
1,2-Dichloroethane	20.79	1.0	20	0	104	70 - 124				
1,2-Dichloropropane	23.16	1.0	20	0	116	72 - 119				
1,3,5-Trimethylbenzene	23.2	1.0	20	0	116	75 - 118				
1,3-Dichlorobenzene	21.7	1.0	20	0	109	78 - 118				
1,3-Dichloropropane	22.28	1.0	20	0	111	75 - 116				
1,4-Dichlorobenzene	22.92	1.0	20	0	115	79 - 113				S
2,2-Dichloropropane	21.28	1.0	20	0	106	70 - 130				
2-Butanone	42.42	2.0	40	0	106	70 - 130				
2-Chlorotoluene	22.49	1.0	20	0	112	70 - 128				
2-Hexanone	46.58	2.0	40	0	116	70 - 130				
4-Chlorotoluene	22.67	1.0	20	0	113	74 - 126				
4-Isopropyltoluene	23.85	1.0	20	0	119	74 - 126				
4-Methyl-2-pentanone	46.52	2.0	40	0	116	70 - 130				
Acetone	42.82	2.0	40	0	107	70 - 130				
Benzene	22.64	1.0	20	0	113	74 - 120				
Bromobenzene	21.59	1.0	20	0	108	78 - 113				
Bromochloromethane	22.21	1.0	20	0	111	76 - 124				
Bromodichloromethane	20.86	1.0	20	0	104	74 - 122				
Bromoform	19.3	1.0	20	0	96.5	73 - 128				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

LCS Sample ID: **VLCSW-1812018** Units: **ug/L** Analysis Date: **18-Dec-2018 13:58**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872160** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Bromomethane	23.28	1.0	20	0	116	70 - 130				
Carbon disulfide	43.3	2.0	40	0	108	70 - 130				
Carbon tetrachloride	21.74	1.0	20	0	109	71 - 125				
Chlorobenzene	21.78	1.0	20	0	109	76 - 113				
Chloroethane	23.06	1.0	20	0	115	70 - 130				
Chloroform	20	1.0	20	0	100	71 - 121				
Chloromethane	24.03	1.0	20	0	120	70 - 129				
cis-1,2-Dichloroethene	20.82	1.0	20	0	104	75 - 122				
cis-1,3-Dichloropropene	22.79	1.0	20	0	114	73 - 127				
Dibromochloromethane	21.85	1.0	20	0	109	77 - 122				
Dibromomethane	21.43	1.0	20	0	107	78 - 121				
Dichlorodifluoromethane	21.72	1.0	20	0	109	70 - 130				
Ethylbenzene	22.49	1.0	20	0	112	77 - 117				
Hexachlorobutadiene	26.61	1.0	20	0	133	70 - 130				S
Isopropylbenzene	23.13	1.0	20	0	116	73 - 127				
m,p-Xylene	45.63	2.0	40	0	114	77 - 122				
Methylene chloride	22.57	2.0	20	0	113	70 - 127				
Naphthalene	22.83	1.0	20	0	114	70 - 130				
n-Butylbenzene	24.18	1.0	20	0	121	72 - 130				
n-Propylbenzene	23.41	1.0	20	0	117	73 - 124				
o-Xylene	22.9	1.0	20	0	114	75 - 119				
sec-Butylbenzene	23.6	1.0	20	0	118	73 - 128				
Styrene	23.39	1.0	20	0	117	72 - 126				
tert-Butylbenzene	23.13	1.0	20	0	116	73 - 124				
Tetrachloroethene	22.36	1.0	20	0	112	76 - 119				
Toluene	22.56	1.0	20	0	113	77 - 118				
trans-1,2-Dichloroethene	20.73	1.0	20	0	104	72 - 127				
trans-1,3-Dichloropropene	19.97	1.0	20	0	99.9	77 - 119				
Trichloroethene	21.82	1.0	20	0	109	77 - 121				
Trichlorofluoromethane	20.41	1.0	20	0	102	70 - 130				
Vinyl chloride	23.07	1.0	20	0	115	70 - 130				
Surr: 1,2-Dichloroethane-d4	*44.22*	*1.0*	*50*	*0*	*88.4*	*70 - 130*				
Surr: 4-Bromofluorobenzene	*51.18*	*1.0*	*50*	*0*	*102*	*82 - 115*				
Surr: Dibromofluoromethane	*44.56*	*1.0*	*50*	*0*	*89.1*	*73 - 126*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

LCS Sample ID: **VLCSW-1812018** Units: **ug/L** Analysis Date: **18-Dec-2018 13:58**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872160** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*52.7*	*1.0*	*50*	*0*	*105*	*81 - 120*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MS Sample ID: **HS18120278-03MS** Units: **ug/L** Analysis Date: **18-Dec-2018 17:41**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872166** 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	23.88	1.0	20	0	119	70 - 120				
1,1,1-Trichloroethane	22.68	1.0	20	0	113	70 - 130				
1,1,2,2-Tetrachloroethane	23.94	1.0	20	0	120	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	22.2	1.0	20	0	111	70 - 130				
1,1,2-Trichloroethane	24.23	1.0	20	0	121	70 - 117				S
1,1-Dichloroethane	23.28	1.0	20	0	116	70 - 127				
1,1-Dichloroethene	23.18	1.0	20	0.7106	112	70 - 130				
1,1-Dichloropropene	25.8	1.0	20	0	129	70 - 129				S
1,2,3-Trichlorobenzene	24.51	1.0	20	0	123	70 - 130				
1,2,3-Trichloropropane	23.25	1.0	20	0	116	70 - 130				
1,2,4-Trichlorobenzene	23.82	1.0	20	0	119	70 - 125				
1,2,4-Trimethylbenzene	25.68	1.0	20	0	128	70 - 125				S
1,2-Dibromo-3-chloropropane	21.8	1.0	20	0	109	70 - 130				
1,2-Dibromoethane	24.17	1.0	20	0	121	70 - 124				
1,2-Dichlorobenzene	23.25	1.0	20	0	116	70 - 115				S
1,2-Dichloroethane	22.65	1.0	20	0	113	70 - 127				
1,2-Dichloropropane	25.31	1.0	20	0	127	70 - 122				S
1,3,5-Trimethylbenzene	25.78	1.0	20	0	129	70 - 126				S
1,3-Dichlorobenzene	23.52	1.0	20	0	118	70 - 119				
1,3-Dichloropropane	24.4	1.0	20	0	122	70 - 121				S
1,4-Dichlorobenzene	25.75	1.0	20	0	129	70 - 114				S
2,2-Dichloropropane	21.93	1.0	20	0	110	70 - 130				
2-Butanone	45.49	2.0	40	0	114	70 - 130				
2-Chlorotoluene	24.73	1.0	20	0	124	70 - 130				
2-Hexanone	51.07	2.0	40	0	128	70 - 130				
4-Chlorotoluene	25.15	1.0	20	0	126	70 - 130				
4-Isopropyltoluene	26.9	1.0	20	0	134	70 - 130				S
4-Methyl-2-pentanone	50.44	2.0	40	0	126	70 - 130				
Acetone	46	2.0	40	0	115	70 - 130				
Benzene	25.3	1.0	20	0	126	70 - 127				
Bromobenzene	23.78	1.0	20	0	119	70 - 115				S
Bromochloromethane	24.54	1.0	20	0	123	70 - 127				
Bromodichloromethane	22.91	1.0	20	0	115	70 - 124				
Bromoform	20.79	1.0	20	0	104	70 - 129				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MS Sample ID: **HS18120278-03MS** Units: **ug/L** Analysis Date: **18-Dec-2018 17:41**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872166** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Bromomethane	12.09	1.0	20	0	60.5	70 - 130				S
Carbon disulfide	44.81	2.0	40	0	112	70 - 130				
Carbon tetrachloride	24.05	1.0	20	0	120	70 - 130				
Chlorobenzene	25.62	1.0	20	1.542	120	70 - 114				S
Chloroethane	24.72	1.0	20	0	124	70 - 130				
Chloroform	22.07	1.0	20	0	110	70 - 125				
Chloromethane	15.68	1.0	20	0	78.4	70 - 130				
cis-1,2-Dichloroethene	44.9	1.0	20	21.65	116	70 - 128				
cis-1,3-Dichloropropene	24.3	1.0	20	0	121	70 - 125				
Dibromochloromethane	23.74	1.0	20	0	119	70 - 124				
Dibromomethane	22.87	1.0	20	0	114	70 - 124				
Dichlorodifluoromethane	10.42	1.0	20	0	52.1	70 - 130				S
Ethylbenzene	25.15	1.0	20	0	126	70 - 124				S
Hexachlorobutadiene	28.15	1.0	20	0	141	70 - 130				S
Isopropylbenzene	26.04	1.0	20	0	130	70 - 130				S
m,p-Xylene	50.97	2.0	40	0	127	70 - 130				
Methylene chloride	24.38	2.0	20	0	122	70 - 128				
Naphthalene	25.37	1.0	20	0	127	70 - 130				
n-Butylbenzene	26.87	1.0	20	0	134	70 - 130				S
n-Propylbenzene	26.34	1.0	20	0	132	70 - 130				S
o-Xylene	25.44	1.0	20	0	127	70 - 124				S
sec-Butylbenzene	26.76	1.0	20	0	134	70 - 130				S
Styrene	25.73	1.0	20	0	129	70 - 130				
tert-Butylbenzene	26.06	1.0	20	0	130	70 - 130				S
Tetrachloroethene	25.53	1.0	20	0	128	70 - 130				
Toluene	25.16	1.0	20	0	126	70 - 123				S
trans-1,2-Dichloroethene	23.47	1.0	20	0	117	70 - 130				
trans-1,3-Dichloropropene	21.37	1.0	20	0	107	70 - 121				
Trichloroethene	72.45	1.0	20	47.56	124	70 - 129				
Trichlorofluoromethane	20.92	1.0	20	0	105	70 - 130				
Vinyl chloride	20.18	1.0	20	0	101	70 - 130				
Surr: 1,2-Dichloroethane-d4	*44.17*	*1.0*	*50*	*0*	*88.3*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*51.45*	*1.0*	*50*	*0*	*103*	*81 - 113*				
Surr: Dibromofluoromethane	*45.03*	*1.0*	*50*	*0*	*90.1*	*77 - 123*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument:** VOA9 **Method:** SW8260

MS Sample ID: **HS18120278-03MS** Units: **ug/L** Analysis Date: **18-Dec-2018 17:41**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872166** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*53.03*	*1.0*	*50*	*0*	*106*	*82 - 127*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MSD Sample ID: **HS18120278-03MSD** Units: **ug/L** Analysis Date: **18-Dec-2018 18:06**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872167** 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	22.94	1.0	20	0	115	70 - 120	23.88	3.99	20	
1,1,1-Trichloroethane	21.46	1.0	20	0	107	70 - 130	22.68	5.56	20	
1,1,2,2-Tetrachloroethane	23.01	1.0	20	0	115	70 - 123	23.94	3.93	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	20.91	1.0	20	0	105	70 - 130	22.2	6	20	
1,1,2-Trichloroethane	23.16	1.0	20	0	116	70 - 117	24.23	4.52	20	
1,1-Dichloroethane	22.19	1.0	20	0	111	70 - 127	23.28	4.8	20	
1,1-Dichloroethene	21.54	1.0	20	0.7106	104	70 - 130	23.18	7.34	20	
1,1-Dichloropropene	24.29	1.0	20	0	121	70 - 129	25.8	6.04	20	
1,2,3-Trichlorobenzene	22.99	1.0	20	0	115	70 - 130	24.51	6.4	20	
1,2,3-Trichloropropane	21.98	1.0	20	0	110	70 - 130	23.25	5.62	20	
1,2,4-Trichlorobenzene	22.88	1.0	20	0	114	70 - 125	23.82	4.03	20	
1,2,4-Trimethylbenzene	24.38	1.0	20	0	122	70 - 125	25.68	5.16	20	
1,2-Dibromo-3-chloropropane	20.49	1.0	20	0	102	70 - 130	21.8	6.15	20	
1,2-Dibromoethane	23.25	1.0	20	0	116	70 - 124	24.17	3.85	20	
1,2-Dichlorobenzene	22.08	1.0	20	0	110	70 - 115	23.25	5.16	20	
1,2-Dichloroethane	21.98	1.0	20	0	110	70 - 127	22.65	3	20	
1,2-Dichloropropane	24.76	1.0	20	0	124	70 - 122	25.31	2.19	20	S
1,3,5-Trimethylbenzene	24.4	1.0	20	0	122	70 - 126	25.78	5.52	20	
1,3-Dichlorobenzene	22.5	1.0	20	0	112	70 - 119	23.52	4.46	20	
1,3-Dichloropropane	23.35	1.0	20	0	117	70 - 121	24.4	4.39	20	
1,4-Dichlorobenzene	24.57	1.0	20	0	123	70 - 114	25.75	4.7	20	S
2,2-Dichloropropane	20.71	1.0	20	0	104	70 - 130	21.93	5.72	20	
2-Butanone	45.19	2.0	40	0	113	70 - 130	45.49	0.66	20	
2-Chlorotoluene	23.65	1.0	20	0	118	70 - 130	24.73	4.47	20	
2-Hexanone	49.4	2.0	40	0	124	70 - 130	51.07	3.32	20	
4-Chlorotoluene	23.94	1.0	20	0	120	70 - 130	25.15	4.92	20	
4-Isopropyltoluene	25.24	1.0	20	0	126	70 - 130	26.9	6.37	20	
4-Methyl-2-pentanone	48.64	2.0	40	0	122	70 - 130	50.44	3.64	20	
Acetone	43.54	2.0	40	0	109	70 - 130	46	5.49	20	
Benzene	24.46	1.0	20	0	122	70 - 127	25.3	3.38	20	
Bromobenzene	22.37	1.0	20	0	112	70 - 115	23.78	6.13	20	
Bromochloromethane	23.65	1.0	20	0	118	70 - 127	24.54	3.69	20	
Bromodichloromethane	22.31	1.0	20	0	112	70 - 124	22.91	2.64	20	
Bromoform	20.15	1.0	20	0	101	70 - 129	20.79	3.11	20	

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MSD Sample ID: **HS18120278-03MSD** Units: **ug/L** Analysis Date: **18-Dec-2018 18:06**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872167** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Bromomethane	13.33	1.0	20	0	66.6	70 - 130	12.09	9.71	20	S
Carbon disulfide	42.21	2.0	40	0	106	70 - 130	44.81	5.98	20	
Carbon tetrachloride	23.31	1.0	20	0	117	70 - 130	24.05	3.09	20	
Chlorobenzene	24.33	1.0	20	1.542	114	70 - 114	25.62	5.14	20	
Chloroethane	20.67	1.0	20	0	103	70 - 130	24.72	17.8	20	
Chloroform	21.16	1.0	20	0	106	70 - 125	22.07	4.18	20	
Chloromethane	14.94	1.0	20	0	74.7	70 - 130	15.68	4.84	20	
cis-1,2-Dichloroethene	42.81	1.0	20	21.65	106	70 - 128	44.9	4.77	20	
cis-1,3-Dichloropropene	23.85	1.0	20	0	119	70 - 125	24.3	1.86	20	
Dibromochloromethane	23.1	1.0	20	0	115	70 - 124	23.74	2.73	20	
Dibromomethane	22.89	1.0	20	0	114	70 - 124	22.87	0.084	20	
Dichlorodifluoromethane	9.87	1.0	20	0	49.3	70 - 130	10.42	5.41	20	S
Ethylbenzene	23.86	1.0	20	0	119	70 - 124	25.15	5.24	20	
Hexachlorobutadiene	26.61	1.0	20	0	133	70 - 130	28.15	5.63	20	S
Isopropylbenzene	24.62	1.0	20	0	123	70 - 130	26.04	5.58	20	
m,p-Xylene	48.45	2.0	40	0	121	70 - 130	50.97	5.06	20	
Methylene chloride	22.91	2.0	20	0	115	70 - 128	24.38	6.23	20	
Naphthalene	24.2	1.0	20	0	121	70 - 130	25.37	4.71	20	
n-Butylbenzene	25.57	1.0	20	0	128	70 - 130	26.87	4.97	20	
n-Propylbenzene	24.76	1.0	20	0	124	70 - 130	26.34	6.18	20	
o-Xylene	24	1.0	20	0	120	70 - 124	25.44	5.82	20	
sec-Butylbenzene	25.1	1.0	20	0	125	70 - 130	26.76	6.41	20	
Styrene	24.44	1.0	20	0	122	70 - 130	25.73	5.15	20	
tert-Butylbenzene	24.73	1.0	20	0	124	70 - 130	26.06	5.27	20	
Tetrachloroethene	24.06	1.0	20	0	120	70 - 130	25.53	5.9	20	
Toluene	23.77	1.0	20	0	119	70 - 123	25.16	5.68	20	
trans-1,2-Dichloroethene	21.99	1.0	20	0	110	70 - 130	23.47	6.52	20	
trans-1,3-Dichloropropene	20.89	1.0	20	0	104	70 - 121	21.37	2.3	20	
Trichloroethene	68.98	1.0	20	47.56	107	70 - 129	72.45	4.9	20	
Trichlorofluoromethane	19.31	1.0	20	0	96.6	70 - 130	20.92	8.01	20	
Vinyl chloride	18.76	1.0	20	0	93.8	70 - 130	20.18	7.31	20	
Surr: 1,2-Dichloroethane-d4	*43.56*	*1.0*	*50*	*0*	*87.1*	*70 - 126*	*44.17*	*1.38*	*20*	
Surr: 4-Bromofluorobenzene	*51.09*	*1.0*	*50*	*0*	*102*	*81 - 113*	*51.45*	*0.704*	*20*	
Surr: Dibromofluoromethane	*44.93*	*1.0*	*50*	*0*	*89.9*	*77 - 123*	*45.03*	*0.218*	*20*	

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument:** VOA9 **Method:** SW8260

MSD Sample ID: **HS18120278-03MSD** Units: **ug/L** Analysis Date: **18-Dec-2018 18:06**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872167** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*52.59*	*1.0*	*50*	*0*	*105*	*82 - 127*	*53.03*	*0.822*	*20*	

The following samples were analyzed in this batch: HS18120278-01 HS18120278-02 HS18120278-03 HS18120278-04 HS18120278-05

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: **HS18120278**

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

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
North Carolina	624-2018	31-Dec-2018
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	22-Dec-2018
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019

ALS Houston, US Date: 19-Dec-18

Sample Receipt Checklist

Client Name: CBI-Houston
Work Order: HS18120278
Date/Time Received: **05-Dec-2018 09:30**
Received by: **RPG**

Checklist completed by: *Raegen Giga* eSignature 6-Dec-2018 Date
Reviewed by: *Sonia West* eSignature 10-Dec-2018 Date

Matrices: **GW**
Carrier name: **ALS.HS**

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):	1.8c/2.1c uc/c	IR 25	
Cooler(s)/Kit(s):	25741		
Date/Time sample(s) sent to storage:	12/05/2018 19:55		
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:

APTIM

COC ID: LHAAP12-DEC2018-ALSHT-1812- TURNAROUND TIME: normal RUSH: Page 1 of

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-12			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stanciff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company			

SAMPLE DETAILS — ANALYSIS REQUESTED

HS18120278

Aptim Environmental & Infrastucture, Inc.

LHAARP - 12

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	ANALYSIS: Voes by 8260B (3-40ml Voa Vials w/HCL)
12WW21-181204	LHAAP12	22.20	22.43		WG	12/4/18	1005	3	X
12WW21-181204-FD	LHAAP12	22.20	22.43		WG	12/4/18	1005	3	X
12WW24-181204	LHAAP12	22.87	23.12		WG	12/4/18	1110	3	X
12WW24-181204-MS	LHAAP12	22.87	23.12		WG	12/4/18	1110	3	X
12WW24-181204-MSD	LHAAP12	22.87	23.12		WG	12/4/18	1110	3	X
12WW20-181204	LHAAP12	18.35	18.58		WG	12/4/18	1205	3	X
TRIP BLANK					W	12/4/18		2	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Susan Blessing / BHHF	12/4/18 1400	R Ciga	12/5/18 09:30 am
				cooler # 25741
				TEMP - 1.8c
				IR 25 cf +0.3c

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

25741

CUSTODY SEAL

Date: 12/4/18 Time: 1400
Name: Scott Beesinger
Company: BHATE

Seal Broken By: SM
Date: 12/05/18

25741 DEC 0 5 2018

Must Deliver Next Business Day
Time and Tempature Sensitive!

25741

ORIGIN ID:SGRA (903) 930-8193
ATT: SCOTT BEESINGER
APTIM ENVIRONMENTAL & INFRAST. INC
1203-B EAST GRAND AVE PMB202

MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 28NOV18
ACTWGT: 1.00 LB MAN
CAD: 300130/CAFE3211
DIMS: 19x16x13 IN

TO **CLIENT SERVICES**
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: LHAAP-BO 62490-RJ

RMA:

FedEx Express

FedEx
TRK# 0221 4380 9535 0865

WED - 05 DEC 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH

FID 162705 04DEC18 GGGA 553C1/FFFE/8C6A

HS18120278 8260 Raw Data

ALS WO# HS18120278

MSVOA09 -Logbook

Batch: 33625
Date: 11-13-2018
Method: 8260
Comments:

Analyst: Presenta Cabascango
Reviewer: Anjana Poluri
Laboratory: Houston

#	Samp ID	Type	Analyzed	DF	Init Wt/Vol	Final Vol	File ID	Matrix	Status	pH
1	BFB	TUNE	11-13-2018 10:58 am	1.00	50 mL	50 mL	U111301.D	Liquid	Y	NA
	Auto find/purged									
2	VSTD000.25	ICAL1	11-13-2018 11:23 am	1.00	50 mL	50 mL	U111302.D	Liquid	Y	NA
	0.25 uL cal std/250 mL DI									
3	VSTD000.5	ICAL2	11-13-2018 11:47 am	1.00	50 mL	50 mL	U111303.D	Liquid	Y	NA
	0.5 uL cal std/250 mL DI									
4	VSTD001	ICAL3	11-13-2018 12:36 pm	1.00	50 mL	50 mL	U111304.D	Liquid	Y	NA
	1 uL cal std/250 mL DI									
5	VSTD002	ICAL4	11-13-2018 01:01 pm	1.00	50 mL	50 mL	U111305.D	Liquid	Y	NA
	2 uL cal std/250 mL DI									
6	VSTD005	ICAL5	11-13-2018 01:25 pm	1.00	50 mL	50 mL	U111306.D	Liquid	Y	NA
	5 uL cal std/250 mL DI									
7	VSTD020	ICAL6	11-13-2018 01:50 pm	1.00	50 mL	50 mL	U111307.D	Liquid	Y	NA
	4 uL cal std/50 mL DI									
8	VSTD050	ICAL7	11-13-2018 02:15 pm	1.00	50 mL	50 mL	U111308.D	Liquid	Y	NA
	10 uL cal std/50 mL DI									
9	VSTD100	ICAL8	11-13-2018 02:39 pm	1.00	50 mL	50 mL	U111309.D	Liquid	Y	NA
	20 uL cal std/50 mL DI									
10	VSTD150	ICAL9	11-13-2018 03:04 pm	1.00	50 mL	50 mL	U111310.D	Liquid	Y	NA
	30 uL cal std/50 mL DI									
11	VSTD200	ICAL	11-13-2018 03:28 pm	1.00	50 mL	50 mL	U111311.D	Liquid	Y	NA
	40 uL cal std/50 mL DI									
12	BLANK	SAMP	11-13-2018 03:53 pm	1.00	50 mL	50 mL	U111312.D	Liquid	Y	NA
	Cleanup blk									
13	VSTD050	ICV	11-13-2018 04:18 pm	1.00	50 mL	50 mL	U111313.D	Liquid	Y	NA
	10 uL ICV std/50 mL DI									
14	BFB	TUNE	11-13-2018 05:07 pm	1.00	50 mL	50 mL	V111301.D	Liquid	Y	NA
	Auto find/purged									
15	VSTD050	CCV	11-13-2018 05:32 pm	1.00	50 mL	50 mL	V111302.D	Liquid	Y	NA
	10 uL cal std/50 mL DI									
16	VSTD050	CCV	11-13-2018 05:56 pm	1.00	50 mL	50 mL	V111303.D	Liquid	Y	NA
	10 uL cal std/50 mL DI									
17	VLCSW-181113	LCS	11-13-2018 06:21 pm	1.00	50 mL	50 mL	V111304.D	Liquid	Y	NA
	4 uL cal std/50 mL DI									
18	BLANK	SAMP	11-13-2018 06:46 pm	1.00	50 mL	50 mL	V111305.D	Liquid	Y	NA
19	VBLKW-181113	MBLK	11-13-2018 07:10 pm	1.00	50 mL	50 mL	V111306.D	Liquid	Y	NA
20	HS18110428-01	SAMP	11-13-2018 07:35 pm	1.00	50 mL	50 mL	V111307.D	Liquid	Y	<2
21	HS18110496-01	SAMP	11-13-2018 08:00 pm	1.00	50 mL	50 mL	V111308.D	Liquid	Y	<2
22	HS18110428-02	SAMP	11-13-2018 08:25 pm	1.00	50 mL	50 mL	V111309.D	Liquid	Y	<2
23	HS18110428-03	SAMP	11-13-2018 08:49 pm	1.00	50 mL	50 mL	V111310.D	Liquid	Y	<2
24	HS18110428-04	SAMP	11-13-2018 09:14 pm	1.00	50 mL	50 mL	V111311.D	Liquid	Y	<2
25	HS18110496-04	SAMP	11-13-2018 09:39 pm	1.00	50 mL	50 mL	V111312.D	Liquid	Y	<2
26	HS18110496-05	SAMP	11-13-2018 10:04 pm	1.00	50 mL	50 mL	V111313.D	Liquid	Y	<2
27	HS18110496-06	SAMP	11-13-2018 10:28 pm	1.00	50 mL	50 mL	V111314.D	Liquid	Y	<2
28	HS18110428-08	SAMP	11-13-2018 10:53 pm	1.00	50 mL	50 mL	V111315.D	Liquid	Y	<2
29	HS18110428-09	SAMP	11-13-2018 11:18 pm	1.00	50 mL	50 mL	V111316.D	Liquid	Y	<2
30	HS18110496-04MS	MS	11-13-2018 11:43 pm	1.00	50 mL	50 mL	V111317.D	Liquid	Y	<2
	8 uL cal std/40 mL Sample									
31	HS18110496-04MSD	MSD	11-14-2018 12:07 am	1.00	50 mL	50 mL	V111318.D	Liquid	Y	<2
	8 uL cal std/40 mL Sample									

MSVOA09 -Logbook

#	Samp ID	Type	Analyzed	DF	Init Wt/Vol	Final Vol	File ID	Matrix	Status	pH
32	HS18110650-09	SAMP	11-14-2018 12:32 am	1.00	50 mL	50 mL	V111319.D	Liquid	Y	<2
33	HS18110428-05	SAMP	11-14-2018 12:57 am	5.00	10 mL	50 mL	V111320.D	Liquid	Y	<2
34	HS18110428-05	SAMP	11-14-2018 01:22 am	25.00	2 mL	50 mL	V111321.D	Liquid	Y	<2
35	HS18110428-06	SAMP	11-14-2018 01:46 am	5.00	10 mL	50 mL	V111322.D	Liquid	Y	<2
36	HS18110428-06	SAMP	11-14-2018 02:11 am	25.00	2 mL	50 mL	V111323.D	Liquid	Y	<2
37	HS18110428-07	SAMP	11-14-2018 02:36 am	100.0(	500 µL	50 mL	V111324.D	Liquid	Y	<2
38	HS18110428-07	SAMP	11-14-2018 03:01 am	10.00	5 mL	50 mL	V111325.D	Liquid	Y	<2
39	HS18110650-05	SAMP	11-14-2018 03:25 am	1.00	50 mL	50 mL	V111326.D	Liquid	Y	<2
40	HS18110650-06	SAMP	11-14-2018 03:50 am	1.00	50 mL	50 mL	V111327.D	Liquid	Y	<2
41	VSTD050-END	CCV	11-14-2018 04:15 am	1.00	50 mL	50 mL	V111328.D	Liquid	Y	NA

10 uL cal std/50 mL DI

Chemical	Value
SURR SPK ID	30502-51-03
IS ID	30502-51-03
ICV STD ID	30603-41-01
LCS/MS ID	30502-51-01/02
CAL STD ID	30502-51-01/02
BFB ID	30502-51-03

FORM 3
WATER VOLATILE METHOD SPIKE RECOVERY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Matrix Spike - Sample No.: VICV050

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE AMOUNT ()	% REC #	QC. LIMITS REC.
cis-1,3-Dichloropropene	50.00	53.22	106	80-120
trans-1,3-Dichloroprope	50.00	47.39	95	80-120
1,3-Dichlorobenzene	50.00	45.55	91	80-120
2,2-Dichloropropane	50.00	51.21	102	80-120
1,1-Dichloropropene	50.00	46.61	93	80-120
Dibromomethane	50.00	47.16	94	80-120
1,2-Dibromoethane	50.00	48.42	97	80-120
trans-1,2-Dichloroethen	50.00	46.36	93	80-120
1,1,1,2-Tetrachloroetha	50.00	49.98	100	80-120
1,1,1-Trichloroethane	50.00	48.15	96	80-120
1,1,2,2-Tetrachloroetha	50.00	45.96	92	80-120
Freon TF	50.00	46.03	92	80-120
1,1,2-Trichloroethane	50.00	45.83	92	80-120
1,1-Dichloroethane	50.00	45.57	91	80-120
1,1-Dichloroethene	50.00	45.66	91	80-120
Trichlorofluoromethane	50.00	46.76	94	80-120
1,2,3-Trichlorobenzene	50.00	48.30	97	80-120
Toluene	50.00	46.16	92	80-120
1,2,4-Trichlorobenzene	50.00	47.47	95	80-120
1,2,4-Trimethylbenzene	50.00	47.71	95	80-120
Tetrachloroethene	50.00	45.53	91	80-120
Trichloroethene	50.00	46.38	93	80-120
1,2-Dichlorobenzene	50.00	44.93	90	80-120
1,2-Dichloroethane	50.00	45.18	90	80-120
1,2-Dichloropropane	50.00	47.27	94	80-120
1,3,5-Trimethylbenzene	50.00	47.70	95	80-120
1,3-Dichloropropane	50.00	46.16	92	80-120
1,4-Dichlorobenzene	50.00	48.32	97	80-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

_____

FORM III VOA

FORM 3
WATER VOLATILE METHOD SPIKE RECOVERY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Matrix Spike - Sample No.: VICV050

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE AMOUNT ()	% REC #	QC. LIMITS REC.
2-Butanone	100.00	92.32	92	80-120
2-Chlorotoluene	50.00	45.71	91	80-120
2-Hexanone	100.00	99.26	99	80-120
4-Chlorotoluene	50.00	46.84	94	80-120
tert-Butylbenzene	50.00	47.82	96	80-120
4-Methyl-2-Pentanone	100.00	96.36	96	80-120
Acetone	100.00	95.46	95	80-120
Benzene	50.00	46.32	93	80-120
Bromobenzene	50.00	46.19	92	80-120
Bromochloromethane	50.00	50.90	102	80-120
Bromodichloromethane	50.00	48.53	97	80-120
Bromoform	50.00	47.71	95	80-120
Bromomethane	50.00	50.93	102	80-120
Carbon Disulfide	100.00	98.32	98	80-120
Carbon Tetrachloride	50.00	49.39	99	80-120
Chlorobenzene	50.00	45.35	91	80-120
Chloroethane	50.00	44.97	90	80-120
Chloroform	50.00	45.67	91	80-120
Chloromethane	50.00	46.70	93	80-120
cis-1,2-Dichloroethene	50.00	45.95	92	80-120
Dibromochloromethane	50.00	52.11	104	80-120
Dichlorodifluoromethane	50.00	47.87	96	80-120
Ethylbenzene	50.00	46.81	94	80-120
Hexachlorobutadiene	50.00	55.07	110	80-120
Isopropylbenzene	50.00	47.92	96	80-120
m,p-Xylenes	100.00	94.65	95	80-120
Methylene Chloride	50.00	48.07	96	80-120
n-Butylbenzene	50.00	49.50	99	80-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

_____

FORM III VOA

FORM 3
WATER VOLATILE METHOD SPIKE RECOVERY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Matrix Spike - Sample No.: VICV050

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE AMOUNT ()	% REC #	QC. LIMITS REC.
n-Propylbenzene	50.00	47.57	95	80-120
Naphthalene	50.00	51.20	102	80-120
o-Xylene	50.00	47.39	95	80-120
sec-Butylbenzene	50.00	48.40	97	80-120
Styrene	50.00	49.81	100	80-120
Vinyl Chloride	50.00	47.66	95	80-120
1,2,3-Trichloropropane	50.00	49.28	98	80-120
p-Isopropyltoluene	50.00	49.15	98	80-120
1,2-Dibromo-3-Chloropro	50.00	47.82	96	80-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

_____

FORM III VOA

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Lab File ID: U111301 BFB Injection Date: 11/13/18

Instrument ID: VOA9 BFB Injection Time: 1058

GC Column: DB624 ID: 0.25 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	20.9
75	30.0 - 60.0% of mass 95	53.3
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.1
173	Less than 2.0% of mass 174	0.6 (1.0)1
174	Greater than 50.0% of mass 95	67.7
175	5.0 - 9.0% of mass 174	5.2 (7.7)1
176	95.0 - 101.0% of mass 174	64.6 (95.4)1
177	5.0 - 9.0% of mass 176	4.8 (7.4)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD000.25	VSTD000.25	U111302	11/13/18	1123
02	VSTD000.5	VSTD000.5	U111303	11/13/18	1147
03	VSTD001	VSTD001	U111304	11/13/18	1236
04	VSTD002	VSTD002	U111305	11/13/18	1301
05	VSTD005	VSTD005	U111306	11/13/18	1325
06	VSTD020	VSTD020	U111307	11/13/18	1350
07	VSTD050	VSTD050	U111308	11/13/18	1415
08	VSTD100	VSTD100	U111309	11/13/18	1439
09	VSTD150	VSTD150	U111310	11/13/18	1504
10	VSTD200	VSTD200	U111311	11/13/18	1528
11	VICV050	VICV050	U111313	11/13/18	1618
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Instrument ID: VOA9 Calibration Date(s): 11/13/18 11/13/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1123 1528

LAB FILE ID: RF0.25: U111302 RF0.5: U111303 RF1: U111304
RF2: U111305 RF5: U111306 RF20: U111307

COMPOUND	RF0.25	RF0.5	RF1	RF2	RF5	RF20
cis-1,3-Dichloropropene		0.514	0.452	0.424	0.458	0.523
trans-1,3-Dichloropropene		3218	5482	10881	30108	147063
1,3-Dichlorobenzene		2.016	1.635	1.560	1.502	1.485
2,2-Dichloropropane		0.895	0.675	0.644	0.597	0.645
1,1-Dichloropropene		0.589	0.484	0.455	0.407	0.432
Dibromomethane		0.272	0.224	0.217	0.212	0.216
1,2-Dibromoethane		0.438	0.364	0.337	0.365	0.365
trans-1,2-Dichloroethene		0.776	0.676	0.607	0.562	0.575
1,1,1,2-Tetrachloroethane		0.357	0.286	0.272	0.294	0.309
1,1,1-Trichloroethane		1.047	0.838	0.848	0.741	0.818
1,1,2,2-Tetrachloroethane		1.478	1.172	1.145	1.215	1.150
Freon TF		0.612	0.528	0.532	0.409	0.460
1,1,2-Trichloroethane		0.411	0.336	0.304	0.314	0.307
1,1-Dichloroethane		1.465	1.215	1.128	1.077	1.065
1,1-Dichloroethene		0.736	0.626	0.565	0.474	0.526
Trichlorofluoromethane		1.241	1.099	1.043	0.817	0.913
1,2,3-Trichlorobenzene		1.196	0.776	0.891	0.911	0.922
Toluene		2.078	1.628	1.576	1.529	1.532
1,2,4-Trichlorobenzene		1.260	0.914	0.912	0.902	0.924
1,2,4-Trimethylbenzene		3.320	2.638	2.610	2.690	2.770
Tetrachloroethene		0.336	0.285	0.263	0.234	0.246
Trichloroethene		0.440	0.361	0.330	0.306	0.325
1,2-Dichlorobenzene		2.072	1.662	1.534	1.584	1.503
1,2-Dichloroethane		0.688	0.543	0.533	0.514	0.502
1,2-Dichloropropane		0.420	0.368	0.338	0.340	0.346
1,3,5-Trimethylbenzene		3.173	2.583	2.523	2.530	2.676
1,3-Dichloropropane		0.875	0.710	0.656	0.685	0.660
1,4-Dichlorobenzene		7995	11659	22453	55298	228900
2-Butanone		0.438	0.357	0.328	0.355	0.335
2-Chlorotoluene		3.108	2.512	2.344	2.371	2.366
2-Hexanone		0.309	0.250	0.264	0.296	0.296
4-Chlorotoluene		3.515	2.726	2.736	2.786	2.768
tert-Butylbenzene		2.788	2.149	2.208	2.094	2.254
4-Methyl-2-Pentanone		0.448	0.409	0.382	0.418	0.418
Acetone		5795	7657	12023	24249	87797
Benzene		1.791	1.472	1.332	1.296	1.322
Bromobenzene		1.057	0.812	0.769	0.798	0.781
Bromochloromethane		0.288	0.289	0.307	0.306	0.304
Bromodichloromethane		0.499	0.390	0.373	0.378	0.400
Bromoform		1478	2470	4530	13391	60993
Bromomethane		2224	4167	7606	17760	65394
Carbon Disulfide		2.186	1.775	1.666	1.469	1.640
Carbon Tetrachloride		0.413	0.348	0.330	0.290	0.344
Chlorobenzene		1.390	1.114	0.980	0.979	0.984

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS1812027

Instrument ID: VOA9 Calibration Date(s): 11/13/18 11/13/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1123 1528

LAB FILE ID: RF0.25: U111302 RF0.5: U111303 RF1: U111304
RF2: U111305 RF5: U111306 RF20: U111307

COMPOUND	RF0.25	RF0.5	RF1	RF2	RF5	RF20
Chloroethane		0.691	0.561	0.547	0.455	0.484
Chloroform		1.493	1.230	1.118	1.087	1.079
Chloromethane		4145	6506	12000	26431	114171
cis-1,2-Dichloroethene		0.890	0.758	0.706	0.655	0.674
Dibromochloromethane		0.340	0.262	0.256	0.287	0.314
Dichlorodifluoromethane		4116	6358	12615	24157	119108
Ethylbenzene		0.660	0.543	0.490	0.475	0.502
Hexachlorobutadiene		2273	2210	4667	8782	45235
Isopropylbenzene		1.845	1.478	1.459	1.431	1.486
m,p-Xylenes		0.830	0.625	0.602	0.602	0.634
Methylene Chloride		5188	7766	13586	29126	113894
n-Butylbenzene		11934	17894	36189	79206	381141
n-Propylbenzene		4.808	3.945	3.820	3.699	3.871
Naphthalene		2.957	2.577	2.535	2.887	3.092
o-Xylene		0.725	0.632	0.608	0.619	0.643
sec-Butylbenzene		4.052	3.193	3.096	2.852	3.218
Styrene		1.201	0.990	1.012	1.047	1.097
Vinyl Chloride		4801	7374	13465	29718	136290
1,2,3-Trichloropropane		1.381	1.095	1.101	1.220	1.204
p-Isopropyltoluene		3.227	2.386	2.598	2.465	2.727
1,2-Dibromo-3-Chloropropane		479	955	1762	5351	24969
1,2-Dichloroethane-d4		8937	11059	18531	38984	138453
Dibromofluoromethane		5664	7705	12925	27004	102630
Toluene-d8		23871	30489	51591	112942	412445
4-Bromofluorobenzene		8554	10512	18827	41214	154498

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS1812027

Instrument ID: VOA9 Calibration Date(s): 11/13/18 11/13/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1123 1528

LAB FILE ID: RF50: U111308 RF100: U111309 RF150: U111310
RF200: U111311

COMPOUND	RF50	RF100	RF150	RF200
cis-1,3-Dichloropropene	0.547	0.595	0.608	0.588
trans-1,3-Dichloropropene	407060	912116	1439550	1983766
1,3-Dichlorobenzene	1.441	1.512	1.522	1.494
2,2-Dichloropropane	0.668	0.740	0.784	0.738
1,1-Dichloropropene	0.414	0.457	0.468	0.451
Dibromomethane	0.214	0.221	0.220	0.212
1,2-Dibromoethane	0.363	0.366	0.360	0.353
trans-1,2-Dichloroethene	0.578	0.598	0.615	0.580
1,1,1,2-Tetrachloroethane	0.320	0.333	0.335	0.332
1,1,1-Trichloroethane	0.837	0.918	0.956	0.902
1,1,2,2-Tetrachloroethane	1.122	1.135	1.138	1.104
Freon TF	0.433	0.506	0.529	0.498
1,1,2-Trichloroethane	0.296	0.302	0.299	0.291
1,1-Dichloroethane	1.077	1.100	1.127	1.057
1,1-Dichloroethene	0.507	0.543	0.568	0.534
Trichlorofluoromethane	0.888	0.996	1.035	0.964
1,2,3-Trichlorobenzene	0.895	0.964	0.981	0.959
Toluene	1.480	1.511	1.507	1.445
1,2,4-Trichlorobenzene	0.918	0.997	1.018	1.004
1,2,4-Trimethylbenzene	2.646	2.808	2.798	2.714
Tetrachloroethene	0.231	0.253	0.257	0.253
Trichloroethene	0.310	0.331	0.336	0.327
1,2-Dichlorobenzene	1.470	1.530	1.529	1.486
1,2-Dichloroethane	0.482	0.494	0.487	0.468
1,2-Dichloropropane	0.339	0.355	0.356	0.342
1,3,5-Trimethylbenzene	2.552	2.731	2.750	2.658
1,3-Dichloropropane	0.642	0.647	0.644	0.623
1,4-Dichlorobenzene	576011	1240019	1907496	2606334
2-Butanone	0.340	0.348	0.343	0.318
2-Chlorotoluene	2.278	2.377	2.372	2.306
2-Hexanone	0.297	0.307	0.305	0.292
4-Chlorotoluene	2.640	2.769	2.781	2.705
tert-Butylbenzene	2.136	2.334	2.363	2.278
4-Methyl-2-Pentanone	0.416	0.431	0.421	0.410
Acetone	201617	430350	636098	869596
Benzene	1.290	1.330	1.333	1.271
Bromobenzene	0.757	0.802	0.810	0.796
Bromochloromethane	0.308	0.299	0.285	0.266
Bromodichloromethane	0.406	0.432	0.438	0.424
Bromoform	170886	383125	610635	844522
Bromomethane	154362	367005	609177	
Carbon Disulfide	1.661	1.759	1.826	1.705
Carbon Tetrachloride	0.337	0.388	0.405	0.392
Chlorobenzene	0.950	0.978	0.966	0.946

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS1812027

Instrument ID: VOA9 Calibration Date(s): 11/13/18 11/13/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1123 1528

LAB FILE ID: RF50: U111308 RF100: U111309 RF150: U111310
RF200: U111311

COMPOUND	RF50	RF100	RF150	RF200
Chloroethane	0.482	0.493	0.509	0.472
Chloroform	1.082	1.104	1.121	1.047
Chloromethane	285521	595590	963160	1334230
cis-1,2-Dichloroethene	0.664	0.681	0.694	0.654
Dibromochloromethane	0.333	0.351	0.354	0.351
Dichlorodifluoromethane	293949	680233	1086406	1483355
Ethylbenzene	0.492	0.514	0.517	0.504
Hexachlorobutadiene	110558	270039	426795	
Isopropylbenzene	1.427	1.543	1.535	1.471
m,p-Xylenes	0.609	0.638	0.632	0.615
Methylene Chloride	276248	577262	911224	1246871
n-Butylbenzene	954951	2203969	3347969	
n-Propylbenzene	3.668	3.966	3.962	3.771
Naphthalene	3.062	3.229	3.212	3.095
o-Xylene	0.629	0.652	0.649	0.635
sec-Butylbenzene	3.062	3.389	3.420	3.284
Styrene	1.100	1.130	1.117	1.082
Vinyl Chloride	335638	744825	1189386	1622522
1,2,3-Trichloropropane	1.240	1.296	1.309	1.275
p-Isopropyltoluene	2.627	2.886	2.907	2.820
1,2-Dibromo-3-Chloropropane	66581	149236	234820	321770
1,2-Dichloroethane-d4	335901	696595	1062364	1441844
Dibromofluoromethane	255826	526814	809097	1112100
Toluene-d8	1045096	2142731	3238162	4386438
4-Bromofluorobenzene	396604	823996	1261578	1723103

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS1812027

Instrument ID: VOA9 Calibration Date(s): 11/13/18 11/13/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1123 1528

COMPOUND	CURVE	COEFFICENTS A0	A1	A2	%RSD OR R^2	MAX %RSD OR R^2
cis-1,3-Dichloropropene	AVRG		0.52317106		12.886	20.000
trans-1,3-Dichloropropene	LINR	2.955e-002	1.87475164		0.9992282	0.9900000
1,3-Dichlorobenzene	AVRG		1.57423339		11.066	20.000
2,2-Dichloropropane	AVRG		0.70955952		12.773	20.000
1,1-Dichloropropene	AVRG		0.46178698		11.618	20.000
Dibromomethane	AVRG		0.22310340		8.428	20.000
1,2-Dibromoethane	AVRG		0.36809182		7.515	20.000
trans-1,2-Dichloroethene	AVRG		0.61854084		10.984	20.000
1,1,1,2-Tetrachloroethane	AVRG		0.31538401		8.665	20.000
1,1,1-Trichloroethane	AVRG		0.87828248		10.125	20.000
1,1,2,2-Tetrachloroethane	AVRG		1.18433615		9.680	20.000
Freon TF	AVRG		0.50088227		12.161	20.000
1,1,2-Trichloroethane	AVRG		0.31787570		11.701	20.000
1,1-Dichloroethane	AVRG		1.14578561		11.273	20.000
1,1-Dichloroethene	AVRG		0.56438078		13.689	20.000
Trichlorofluoromethane	AVRG		0.99961564		12.536	20.000
1,2,3-Trichlorobenzene	AVRG		0.94398267		11.868	20.000
Toluene	AVRG		1.58742783		12.041	20.000
1,2,4-Trichlorobenzene	AVRG		0.98325969		11.514	20.000
1,2,4-Trimethylbenzene	AVRG		2.77717297		7.772	20.000
Tetrachloroethene	AVRG		0.26191977		12.290	20.000
Trichloroethene	AVRG		0.34069901		11.908	20.000
1,2-Dichlorobenzene	AVRG		1.59672308		11.731	20.000
1,2-Dichloroethane	AVRG		0.52321079		12.632	20.000
1,2-Dichloropropane	AVRG		0.35598971		7.249	20.000
1,3,5-Trimethylbenzene	AVRG		2.68643867		7.489	20.000
1,3-Dichloropropane	AVRG		0.68254990		11.227	20.000
1,4-Dichlorobenzene	LINR	-8.51e-004	0.64997268		0.9997856	0.9900000
2-Butanone	AVRG		0.35147036		9.867	20.000
2-Chlorotoluene	AVRG		2.44838115		10.438	20.000
2-Hexanone	AVRG		0.29065206		6.972	20.000
4-Chlorotoluene	AVRG		2.82514687		9.297	20.000
tert-Butylbenzene	AVRG		2.28952823		9.083	20.000
4-Methyl-2-Pentanone	AVRG		0.41710960		4.264	20.000
Acetone	LINR	-8.86e-002	4.54997798		0.9976530	0.9900000
Benzene	AVRG		1.38203708		11.842	20.000
Bromobenzene	AVRG		0.82019754		11.060	20.000
Bromochloromethane	AVRG		0.29476503		4.761	20.000
Bromodichloromethane	AVRG		0.41544996		9.300	20.000
Bromoform	2ORDR	2.367e-002	4.32863402	-0.1428982	0.9996117	0.9900000
Bromomethane	LINR	3.806e-002	2.31863844		0.9951529	0.9900000
Carbon Disulfide	AVRG		1.74293069		11.174	20.000
Carbon Tetrachloride	AVRG		0.36075188		11.334	20.000
Chlorobenzene	AVRG		1.03196120		13.892	20.000

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS1812027

Instrument ID: VOA9 Calibration Date(s): 11/13/18 11/13/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1123 1528

COMPOUND	CURVE	COEFFICENTS A0	A1	A2	%RSD OR R^2	MAX %RSD OR R^2
Chloroethane	AVRG		0.52169853		13.844	20.000
Chloroform	AVRG		1.15119170		11.977	20.000
Chloromethane	LINR	4.59e-003	1.49116761		0.9990790	0.9900000
cis-1,2-Dichloroethene	AVRG		0.70849189		10.610	20.000
Dibromochloromethane	AVRG		0.31638584		12.330	20.000
Dichlorodifluoromethane	LINR	2.002e-002	1.32602499		0.9979384	0.9900000
Ethylbenzene	AVRG		0.52179627		10.571	20.000
Hexachlorobutadiene	2ORDR	5.037e-003	3.37955533	-0.5103543	0.9988978	0.9900000
Isopropylbenzene	AVRG		1.51953048		8.449	20.000
m,p-Xylenes	AVRG		0.64297054		11.093	20.000
Methylene Chloride	LINR	-1.4e-002	1.58950727		0.9987446	0.9900000
n-Butylbenzene	2ORDR	7.523e-003	0.38680994	-2.96e-003	0.9992256	0.9900000
n-Propylbenzene	AVRG		3.94550864		8.657	20.000
Naphthalene	AVRG		2.96078148		8.567	20.000
o-Xylene	AVRG		0.64354428		5.210	20.000
sec-Butylbenzene	AVRG		3.28524136		10.228	20.000
Styrene	AVRG		1.08640200		5.880	20.000
Vinyl Chloride	LINR	1.016e-002	1.21438330		0.9982930	0.9900000
1,2,3-Trichloropropane	AVRG		1.23587941		7.613	20.000
p-Isopropyltoluene	AVRG		2.73812048		9.374	20.000
1,2-Dibromo-3-Chloropropane	2ORDR	2.08e-002	5.38876079	-0.2033476	0.9995316	0.9900000
1,2-Dichloroethane-d4	LINR	-3.55e-002	1.36996396		0.9980055	0.9900000
Dibromofluoromethane	LINR	-2.51e-002	1.78351549		0.9987270	0.9900000
Toluene-d8	LINR	-3.42e-002	0.80924260		0.9991601	0.9900000
4-Bromofluorobenzene	LINR	-2.13e-002	2.06564990		0.9996344	0.9900000

FORM VI VOA

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111301.D

Date : 13-NOV-2018 10:58

Client ID: BFB

Instrument: VOA9.i

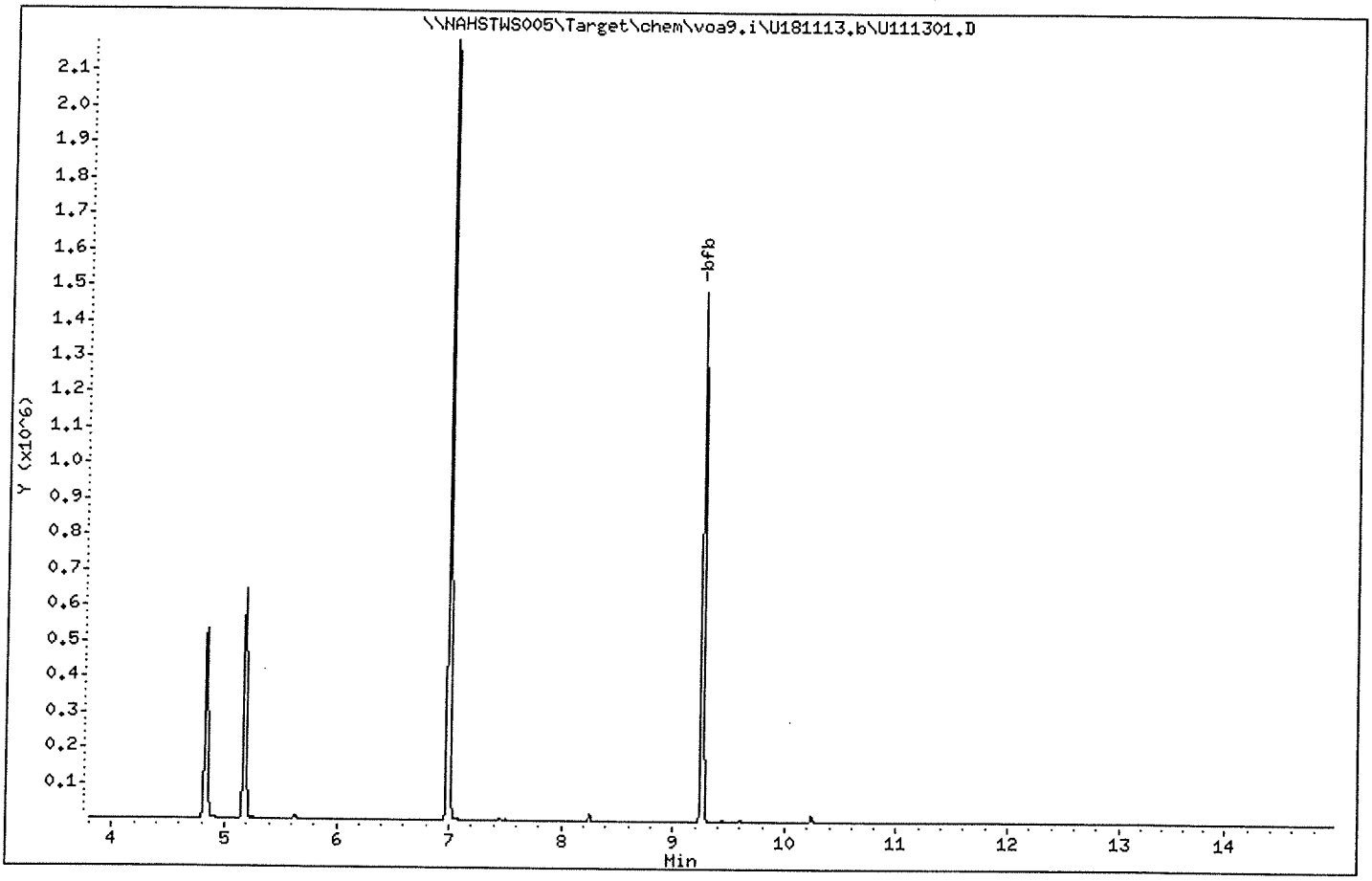
Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25



Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111301.D

Date : 13-NOV-2018 10:58

Client ID: BFB

Instrument: VOA9.i

Sample Info: BFB;BFB;3;;BFB

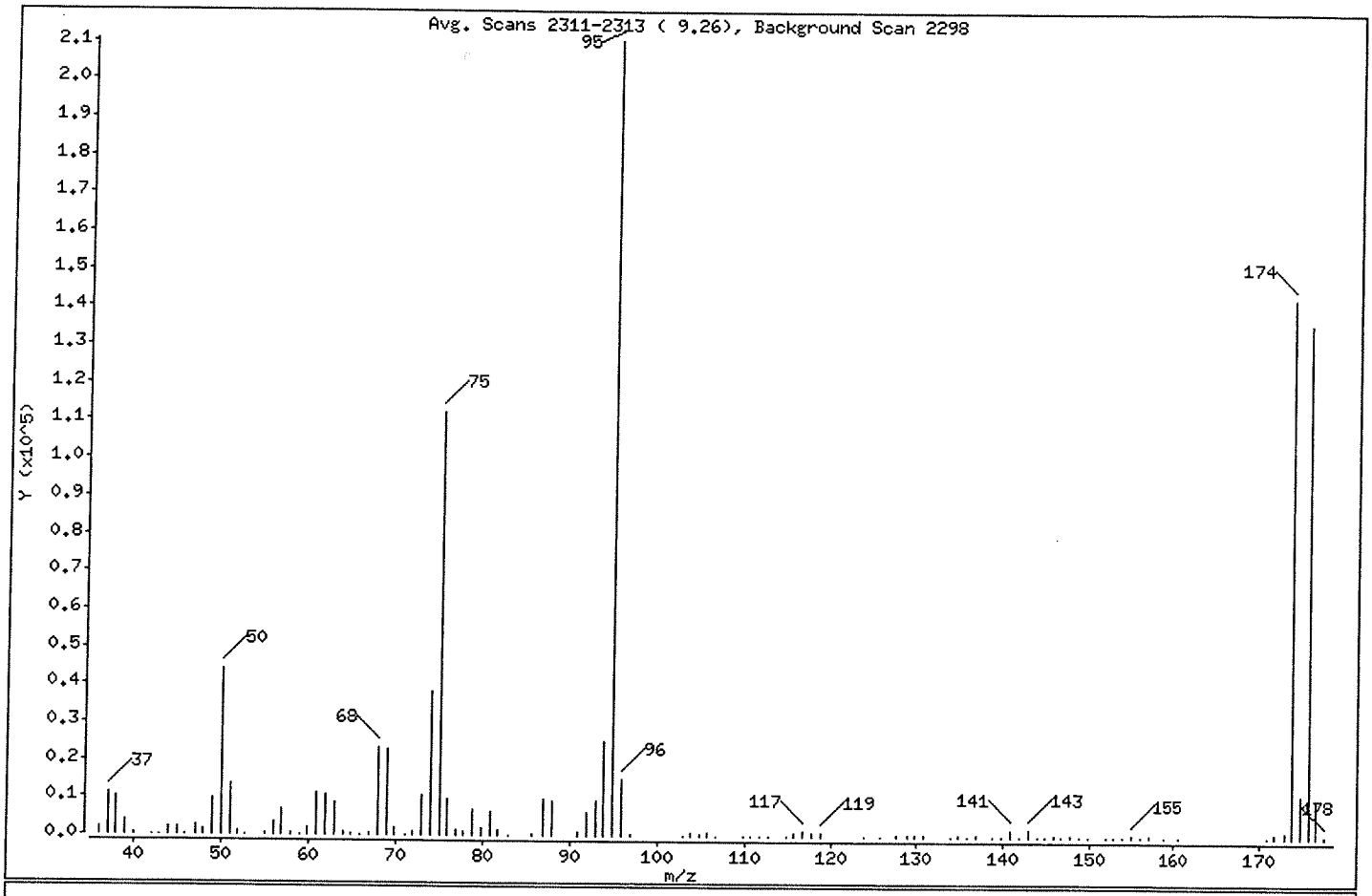
Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25

1 bfb



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	20.93
75	30.00 - 60.00% of mass 95	53.26
96	5.00 - 9.00% of mass 95	7.05
173	Less than 2.00% of mass 174	0.64 (0.95)
174	Greater than 50.00% of mass 95	67.71
175	5.00 - 9.00% of mass 174	5.22 (7.70)
176	95.00 - 101.00% of mass 174	64.61 (95.42)
177	5.00 - 9.00% of mass 176	4.79 (7.41)

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111301.D

Date : 13-NOV-2018 10:58

Client ID: BFB

Instrument: VOA9.i

Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25

Data File: U111301.D

Spectrum: Avg. Scans 2311-2313 (9.26), Background Scan 2298

Location of Maximum: 94.95

Number of points: 108

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	2069	65.90	90	102.90	106	142.80	1933
37.00	11082	66.90	610	103.80	947	143.90	71
38.00	10274	67.90	23360	104.80	338	144.70	179
39.00	3978	69.00	22944	105.80	973	145.70	325
40.00	381	69.90	1893	106.80	216	146.60	113
42.00	60	71.00	66	109.80	116	147.70	442
42.90	178	71.90	1065	110.70	166	148.60	101
43.90	1871	72.90	10562	111.80	126	149.70	180
45.00	2116	73.90	38432	112.70	189	151.80	82
45.90	123	75.00	112016	114.80	219	152.70	121
47.00	2495	75.90	9870	115.70	740	153.70	104
48.00	1426	76.90	1360	116.70	1240	154.70	552
49.00	9563	77.80	949	117.80	730	155.80	58
50.00	44016	78.80	6592	118.80	907	156.70	431
51.00	13714	79.80	1796	123.80	120	158.70	192
51.90	746	80.80	6503	125.70	57	160.60	164
52.70	59	81.80	1400	127.70	639	170.70	72
55.00	590	82.90	197	128.90	349	171.70	746
56.00	3508	85.70	252	129.70	626	172.80	1355
57.00	6688	86.90	9661	130.80	249	173.70	142400
57.90	351	87.90	8961	133.90	56	174.70	10971
58.90	116	90.80	826	134.70	394	175.70	135872
59.90	2009	91.90	6125	135.70	82	176.70	10067
60.90	11206	92.90	9048	136.70	337	177.70	296
62.00	10418	93.90	25168	138.70	60		
63.00	8677	94.90	210304	139.60	79		
63.90	848	95.90	14829	140.70	1870		
64.90	610	96.90	545	141.80	179		

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111302.D
Lab Smp Id: VSTD000.25 Client Smp ID: VSTD000.25
Inj Date : 13-NOV-2018 11:23
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD000.25;VSTD000.25;1;1;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 11:23 Cal File: U111302.D
Als bottle: 2 Calibration Sample, Level: 1
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

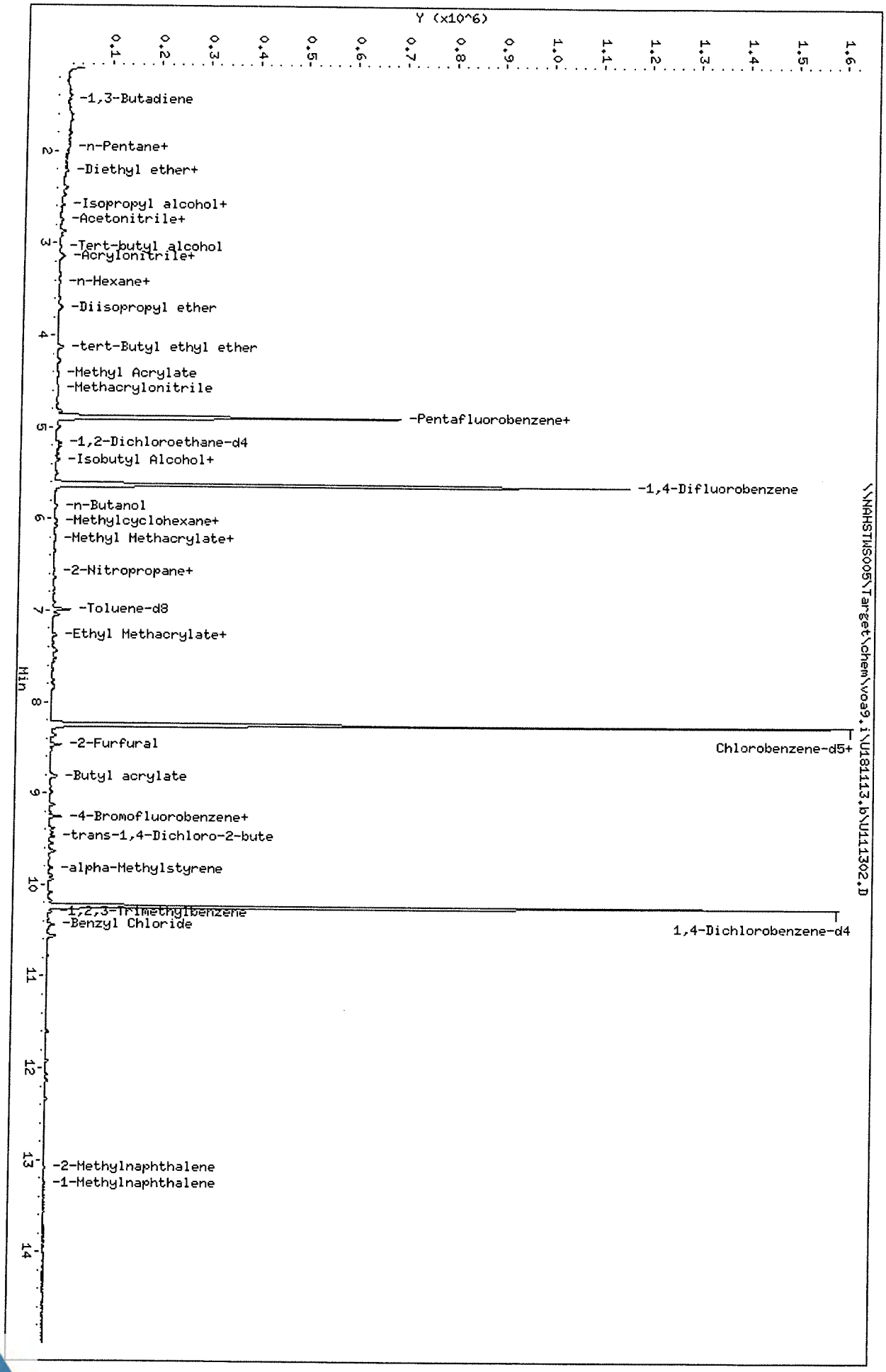
Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)	
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	421654	50.0000		
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	823585	50.0000		
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	757808	50.0000		
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	346489	50.0000		
$ 30 Dibromofluoromethane	113	4.830	4.830	(0.987)	4873	0.25000		(a)
$ 35 1,2-Dichloroethane-d4	65	5.171	5.171	(1.057)	7659	0.25000		(a)
$ 48 Toluene-d8	98	6.989	6.989	(0.847)	19596	0.25000		(a)
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	7125	0.25000		(a)

QC Flag Legend

a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).



Data File: \\NAHSTWS005\Target\chem\voa9,i\U181113,b\U111302.D
Date : 13-NOV-2018 11:23
Client ID: VSTD000.25
Sample Info: VSTD000.25;VSTD000.25;1;1;
Purge Volume: 5.0
Column phase: DB624

\\NAHSTWS005\Target\chem\voa9,i\U181113,b\U111302.D

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111303.D
Lab Smp Id: VSTD000.5 Client Smp ID: VSTD000.5
Inj Date : 13-NOV-2018 11:47
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD000.5;VSTD000.5;1;2;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 11:23 Cal File: U111302.D
Als bottle: 3 Calibration Sample, Level: 2
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

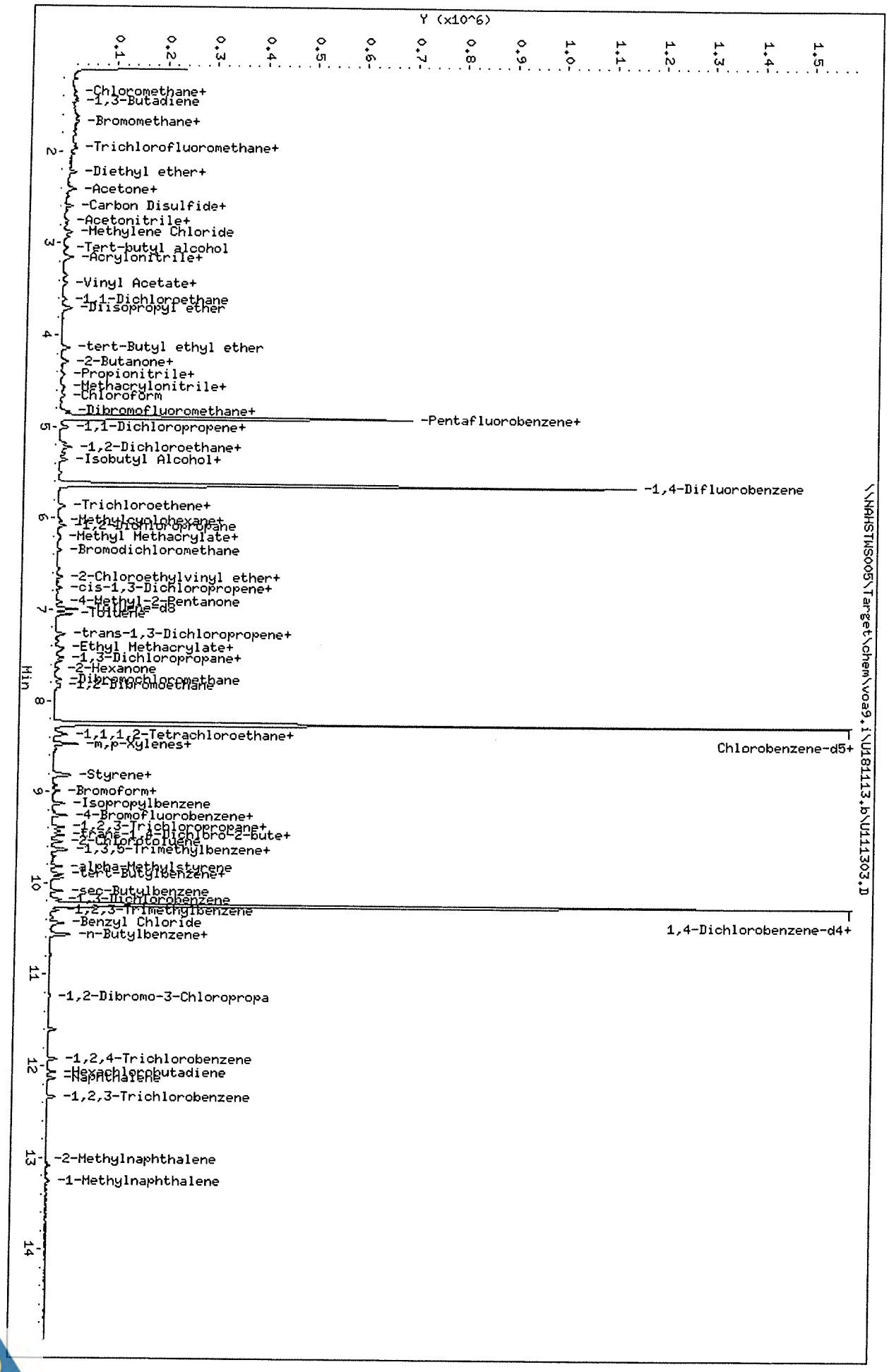
	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
*	1 Pentafluorobenzene	168	4.898	4.898	(1.000)	421285	50.0000	
*	36 1,4-Difluorobenzene	114	5.629	5.629	(1.000)	817288	50.0000	
*	47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	753573	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	345123	50.0000	
$	30 Dibromofluoromethane	113	4.834	4.834	(0.987)	5664	0.50000	(a)
$	35 1,2-Dichloroethane-d4	65	5.179	5.179	(1.057)	8937	0.50000	(a)
$	48 Toluene-d8	98	6.990	6.990	(0.847)	23871	0.50000	(a)
$	69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	8554	0.50000	0.10(a)
	60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	2690	0.50000	0.56(a)
	31 1,1,1-Trichloroethane	97	4.830	4.830	(0.986)	4410	0.50000	0.59(a)
	68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	5102	0.50000	0.62(aM)
	138 Freon TF	101	2.409	2.409	(0.492)	2580	0.50000	0.61(a)
	53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	3095	0.50000	0.64(a)
	22 1,1-Dichloroethane	63	3.608	3.608	(0.737)	6173	0.50000	0.63(a)
	11 1,1-Dichloroethene	96	2.409	2.409	(0.492)	3102	0.50000	0.65(a)
	32 1,1-Dichloropropene	75	5.006	5.006	(0.889)	4812	0.50000	0.63(a)
	93 1,2,3-Trichlorobenzene	180	12.339	12.339	(1.205)	4127	0.50000	0.63(a)
	71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	4767	0.50000	0.55(a)
	90 1,2,4-Trichlorobenzene	180	11.927	11.927	(1.165)	4348	0.50000	0.64(a)
	79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	11460	0.50000	0.59(a)
	89 1,2-Dibromo-3-Chloropropane	155	11.237	11.237	(1.098)	479	0.50000	1.41(aM)
	57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	3298	0.50000	0.59(a)

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111303.D Page 2
Report Date: 24-Jan-2019 18:55

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	7152	0.50000	0.64(a)
33 1,2-Dichloroethane	62	5.258	5.258	(0.934)	5619	0.50000	0.65(aM)
42 1,2-Dichloropropane	63	6.082	6.082	(1.081)	3429	0.50000	0.58(a)
75 1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	10952	0.50000	0.59(a)
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	6957	0.50000	0.64(a)
54 1,3-Dichloropropane	76	7.567	7.567	(0.917)	6595	0.50000	0.64(a)
84 1,4-Dichlorobenzene	146	10.258	10.258	(1.002)	7995	0.50000	0.71(a)
26 2,2-Dichloropropane	77	4.279	4.279	(0.874)	3772	0.50000	0.63(a)
24 2-Butanone	43	4.354	4.354	(0.889)	3689	1.00000	1.24(a)
76 2-Chlorotoluene	91	9.546	9.546	(0.933)	10726	0.50000	0.63(a)
52 2-Hexanone	43	7.649	7.649	(0.927)	4658	1.00000	1.06(a)
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	12130	0.50000	0.62(a)
82 p-Isopropyltoluene	119	10.213	10.213	(0.998)	11138	0.50000	0.58(a)
45 4-Methyl-2-Pentanone	43	6.915	6.915	(0.838)	6749	1.00000	1.07(a)
10 Acetone	43	2.487	2.487	(0.508)	5795	1.00000	(a)
37 Benzene	78	5.220	5.220	(0.927)	14635	0.50000	0.64(a)
74 Bromobenzene	156	9.381	9.381	(0.917)	3648	0.50000	0.64(a)
29 Bromochloromethane	128	4.560	4.560	(0.931)	1212	0.50000	0.48(a)
39 Bromodichloromethane	83	6.348	6.348	(1.128)	4075	0.50000	0.60(aM)
66 Bromoform	173	8.988	8.988	(1.090)	1478	0.50000	1.60(Ta)
6 Bromomethane	94	1.678	1.678	(0.343)	2224	0.50000	2.51(a)
19 Carbon Disulfide	76	2.596	2.596	(0.530)	18415	1.00000	1.25(a)
34 Carbon Tetrachloride	117	4.995	4.995	(0.887)	3377	0.50000	0.57(a)
59 Chlorobenzene	112	8.275	8.275	(1.003)	10477	0.50000	0.67(a)
7 Chloroethane	64	1.760	1.760	(0.359)	2912	0.50000	0.66(aM)
28 Chloroform	83	4.662	4.662	(0.952)	6289	0.50000	0.64(a)
3 Chloromethane	50	1.348	1.348	(0.275)	4145	0.50000	0.96(a)
27 cis-1,2-Dichloroethene	96	4.294	4.294	(0.877)	3748	0.50000	0.62(a)
46 cis-1,3-Dichloropropene	75	6.761	6.761	(1.201)	4205	0.50000	0.49(a)
55 Dibromochloromethane	129	7.758	7.758	(0.940)	2561	0.50000	0.53(a)
44 Dibromomethane	93	6.191	6.191	(1.100)	2223	0.50000	0.60(aM)
2 Dichlorodifluoromethane	85	1.213	1.213	(0.248)	4116	0.50000	1.64(a)
61 Ethylbenzene	106	8.373	8.373	(1.015)	4972	0.50000	0.63(a)
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	2273	0.50000	1.36(a)
67 Isopropylbenzene	105	9.126	9.126	(1.106)	13902	0.50000	0.60(a)
62 m,p-Xylenes	106	8.474	8.474	(1.027)	12504	1.00000	1.29(a)
17 Methylene Chloride	84	2.877	2.877	(0.587)	5188	0.50000	0.27(a)
87 n-Butylbenzene	91	10.558	10.558	(1.031)	11934	0.50000	1.04(a)
73 n-Propylbenzene	91	9.475	9.475	(0.926)	16592	0.50000	0.60(a)
92 Naphthalene	128	12.133	12.133	(1.185)	10205	0.50000	0.49(a)
63 o-Xylene	106	8.811	8.811	(1.068)	5464	0.50000	0.56(aH)
81 sec-Butylbenzene	105	10.086	10.086	(0.985)	13984	0.50000	0.61(a)
64 Styrene	104	8.826	8.826	(1.070)	9048	0.50000	0.55(a)
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	9624	0.50000	0.60(a)
56 Tetrachloroethene	164	7.526	7.526	(0.912)	2536	0.50000	0.64(a)
50 Toluene	91	7.049	7.049	(0.855)	15656	0.50000	0.65(a)
20 trans-1,2-Dichloroethene	96	3.143	3.143	(0.642)	3270	0.50000	0.62(a)
51 trans-1,3-Dichloropropene	75	7.263	7.263	(1.290)	3218	0.50000	1.84(a)
38 Trichloroethene	130	5.865	5.865	(1.042)	3600	0.50000	0.64(a)
8 Trichlorofluoromethane	101	1.963	1.963	(0.401)	5229	0.50000	0.62(a)
5 Vinyl Chloride	62	1.426	1.426	(0.291)	4801	0.50000	1.20(a)

QC Flag Legend

T - Target compound detected outside RT window.
a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



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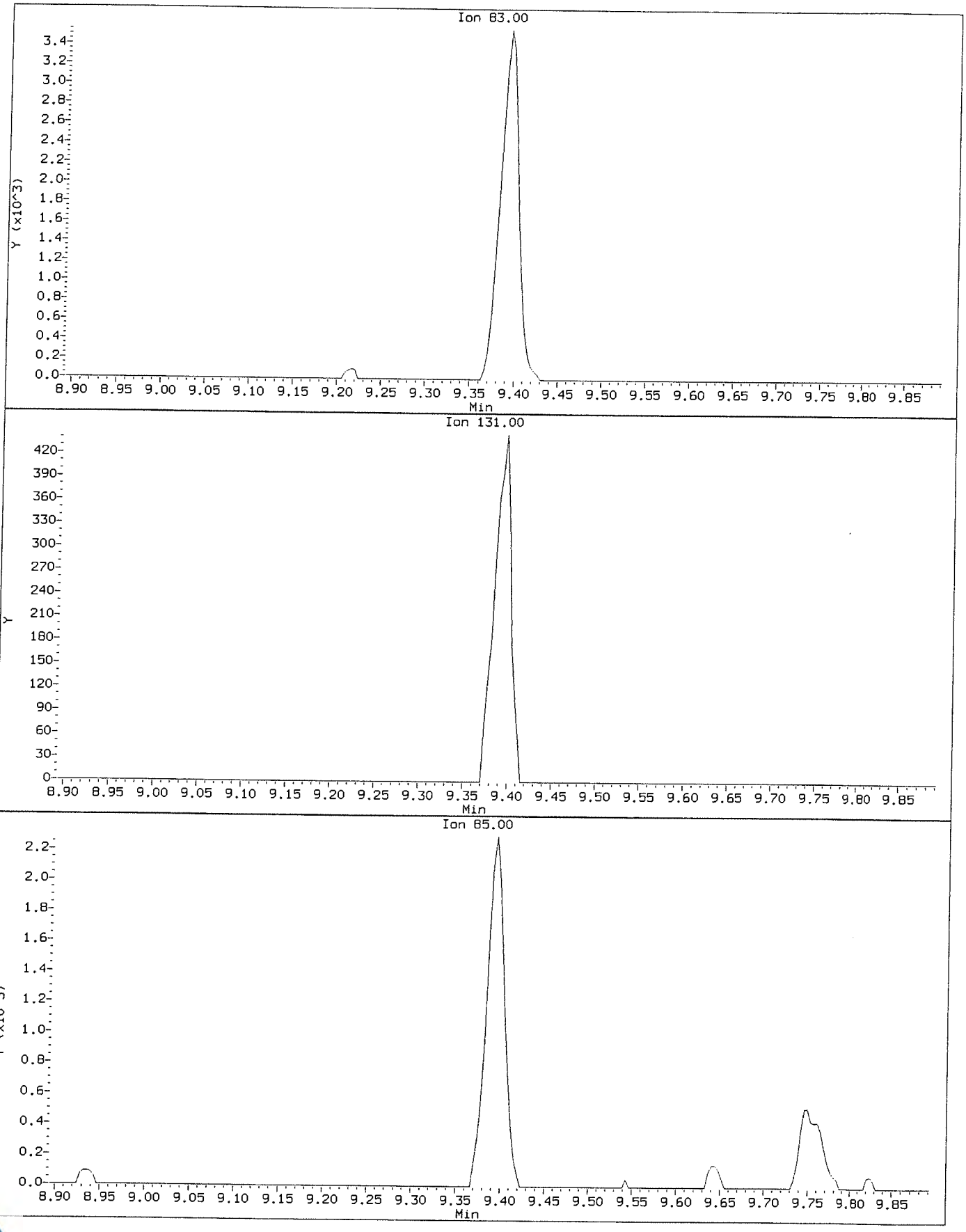
Client ID: VSTD000.5
Sample Info: VSTD000.5;VSTD000.5;1;2;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

\\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111303.D

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111303.D
Injection Date: 13-NOV-2018 11:47
Instrument: VOA9.i
Client Sample ID: VSTD000.5

Compound: 1,1,2,2-Tetrachloroethane
CAS Number: 79-34-5



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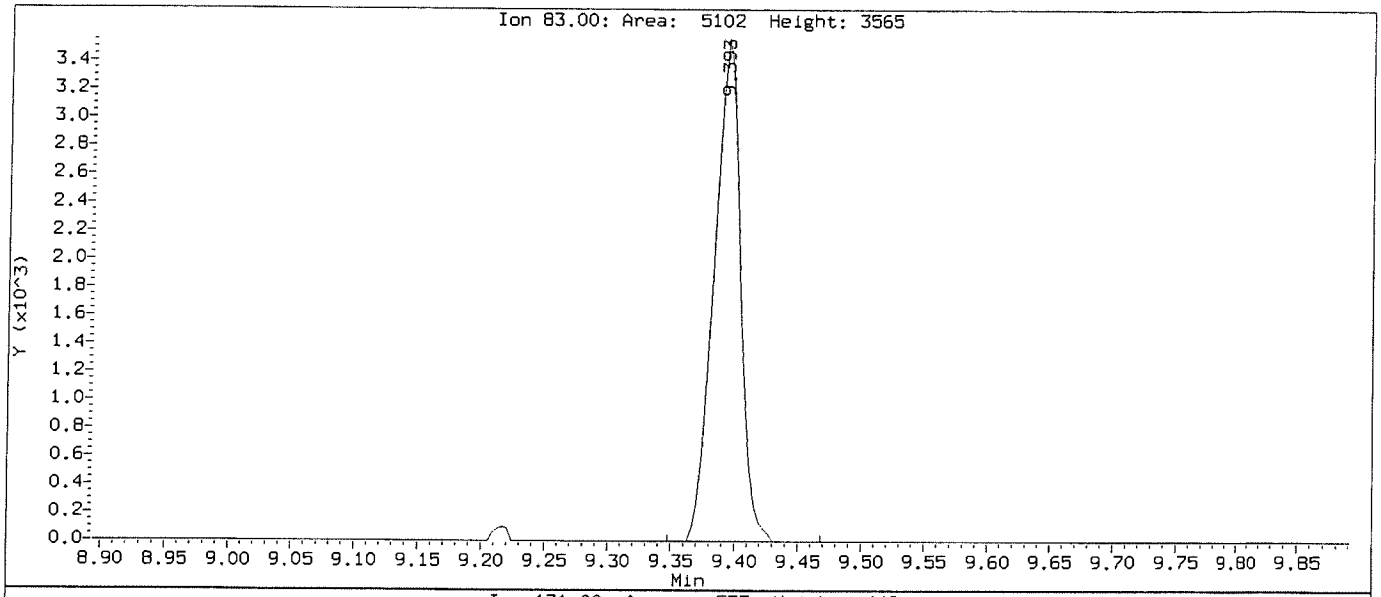
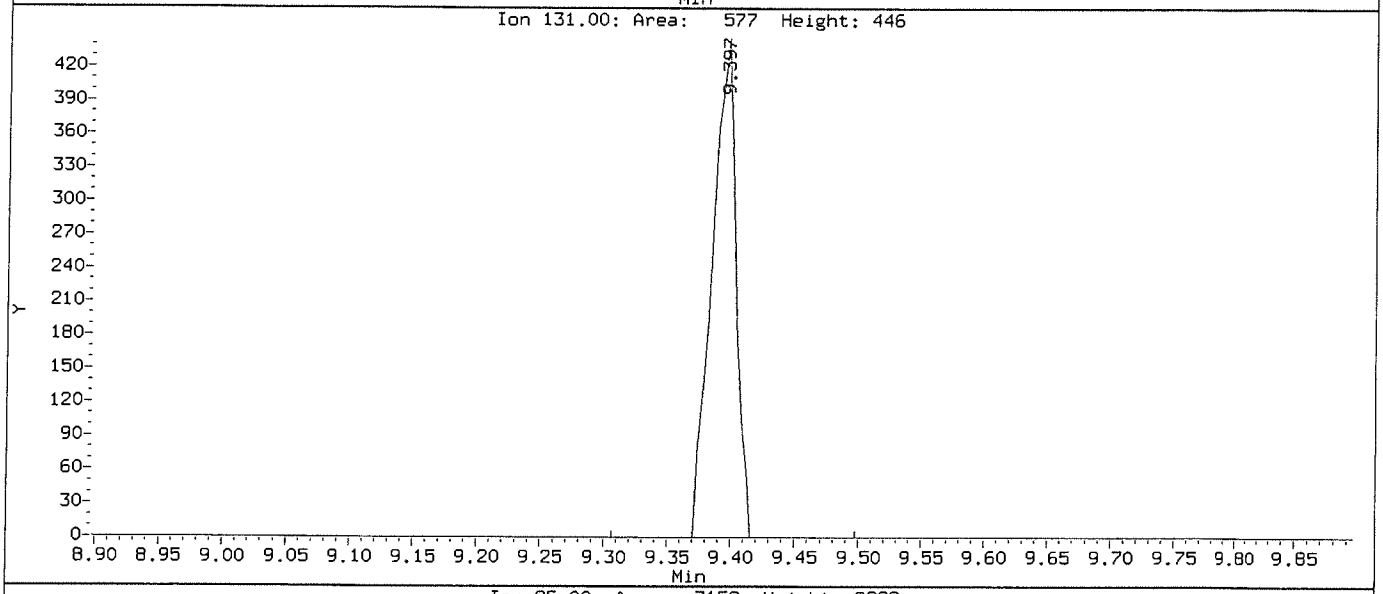
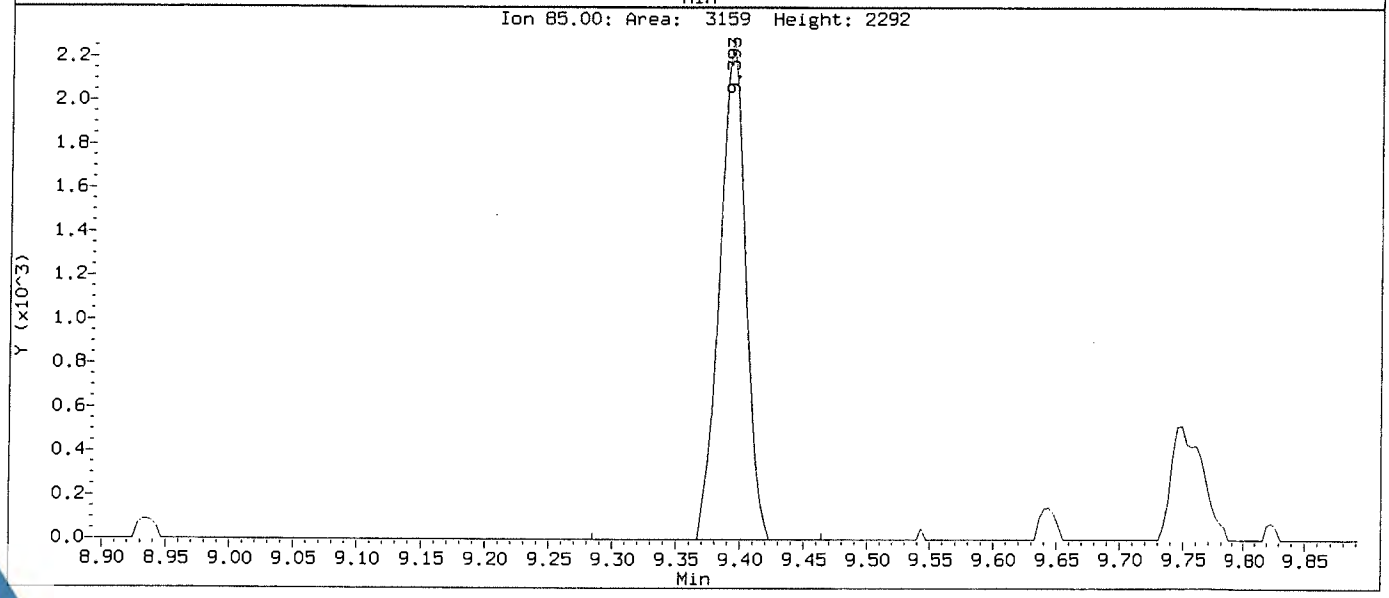
Compound: 1,1,2,2-Tetrachloroethane
CAS Number: 79-34-5







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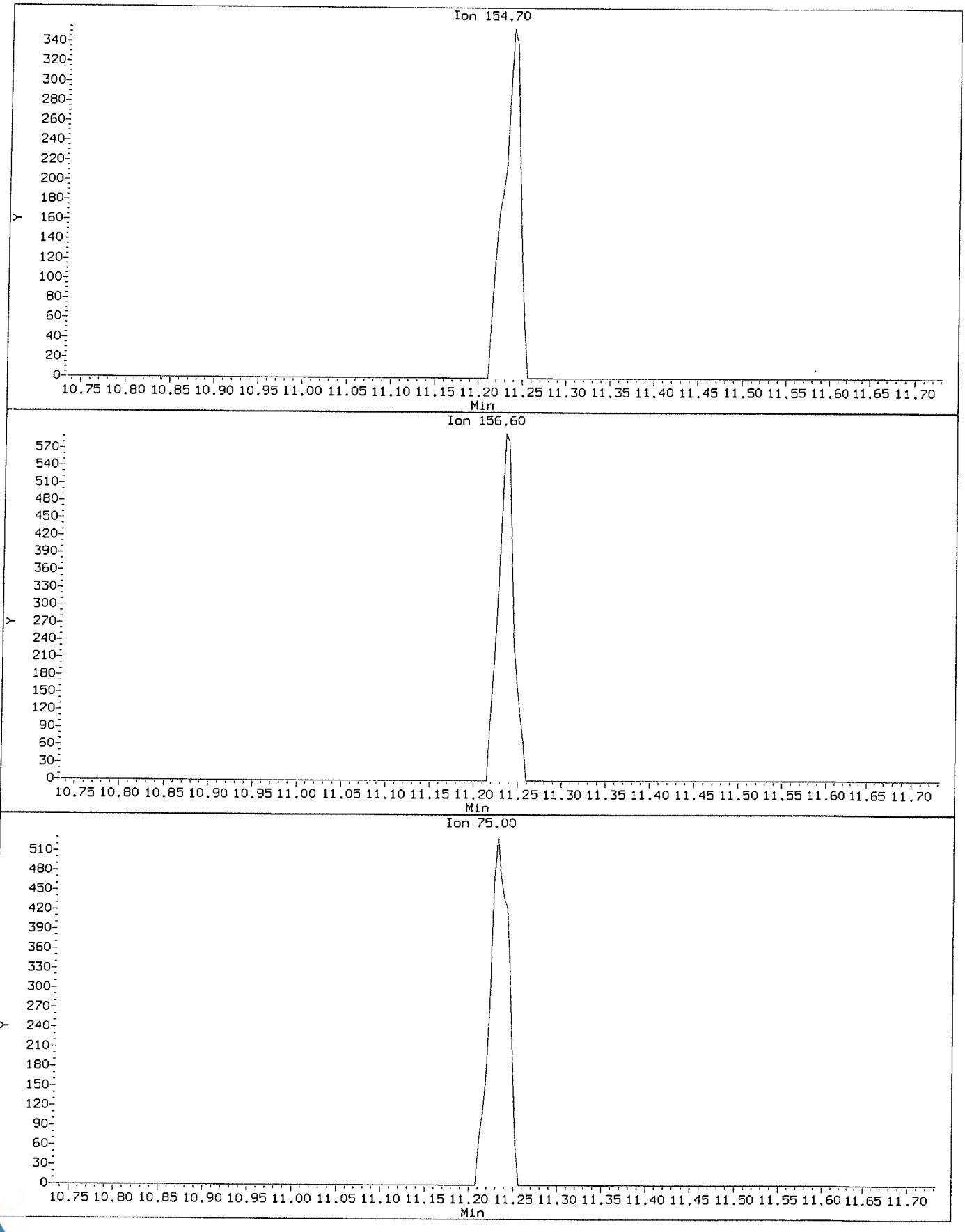
Instrument: VOA9.i
Client Sample ID: VSTD000.5

Compound: 1,2-Dibromo-3-Chloropropane
CAS Number: 96-12-8



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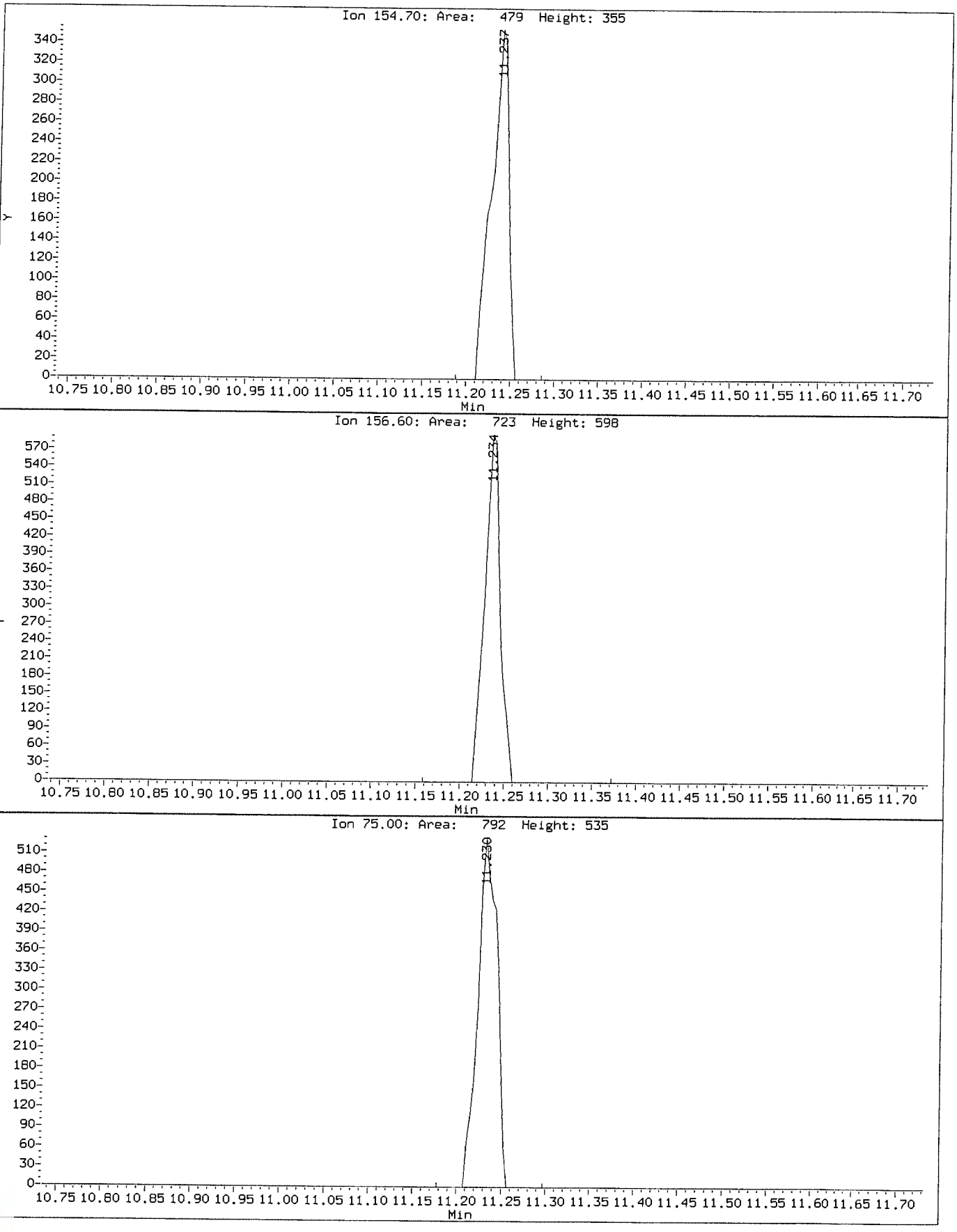
Compound: 1,2-Dibromo-3-Chloropropane
CAS Number: 96-12-8



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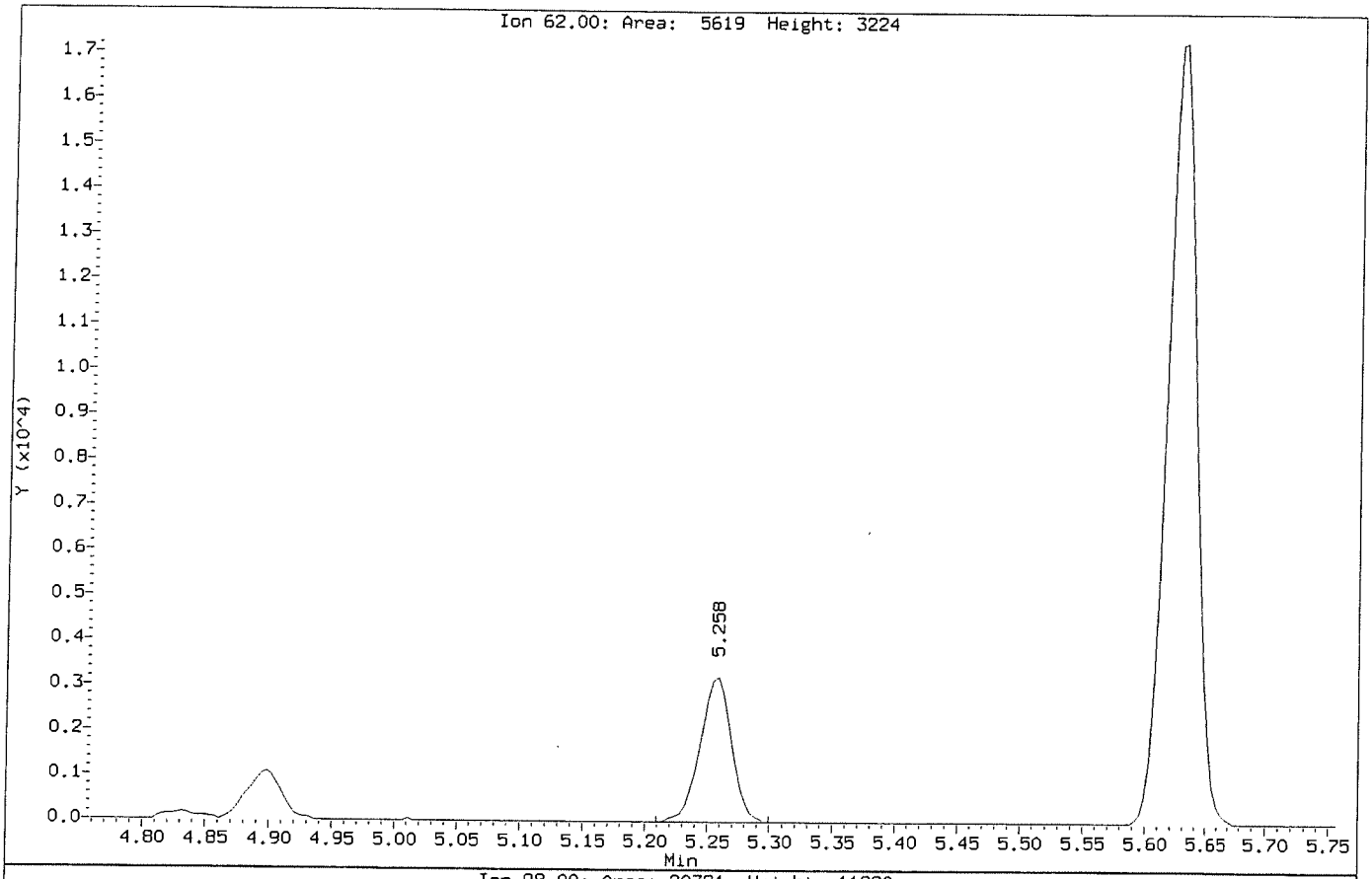
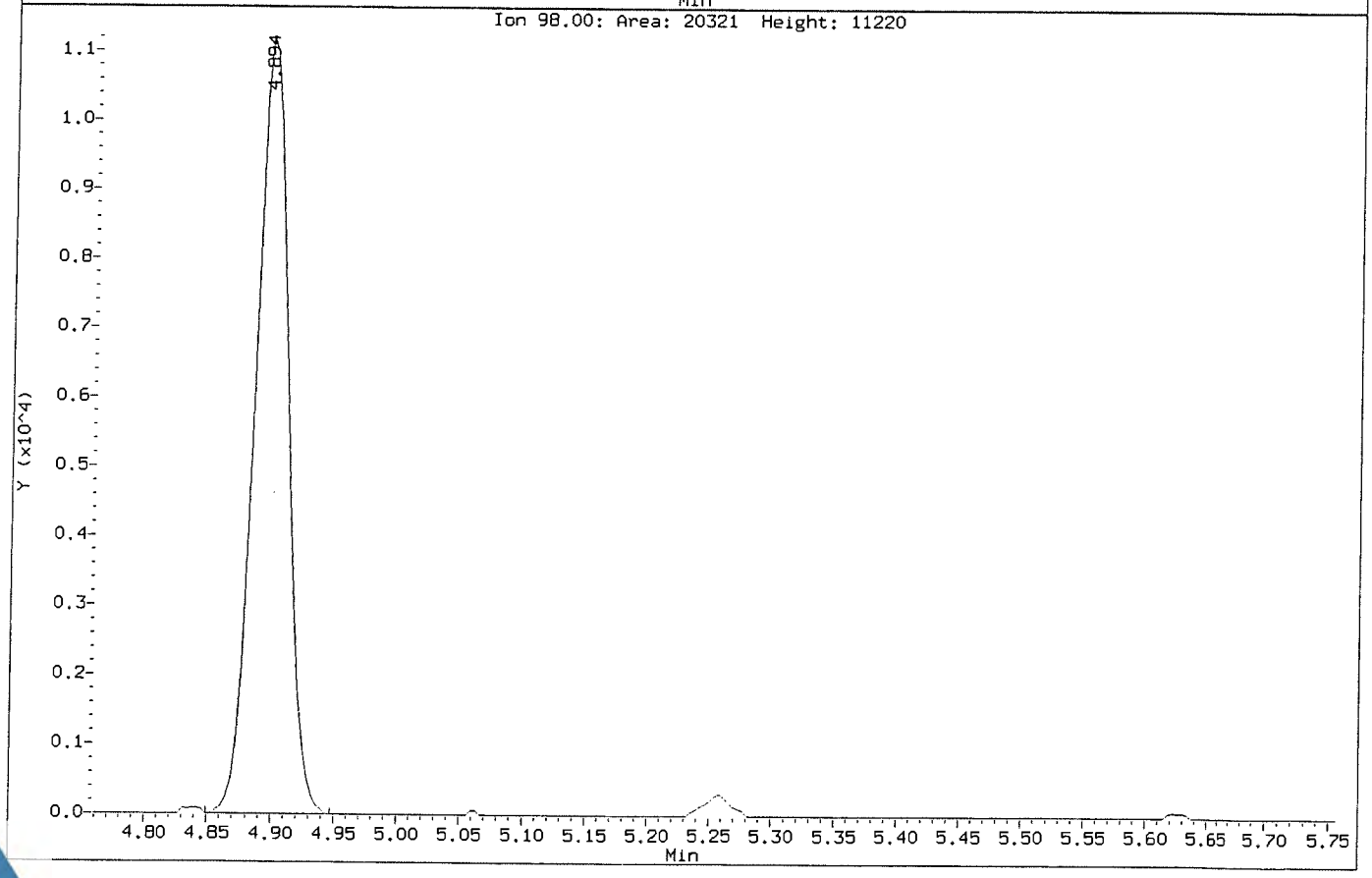
Compound: 1,2-Dichloroethane
CAS Number: 107-06-2





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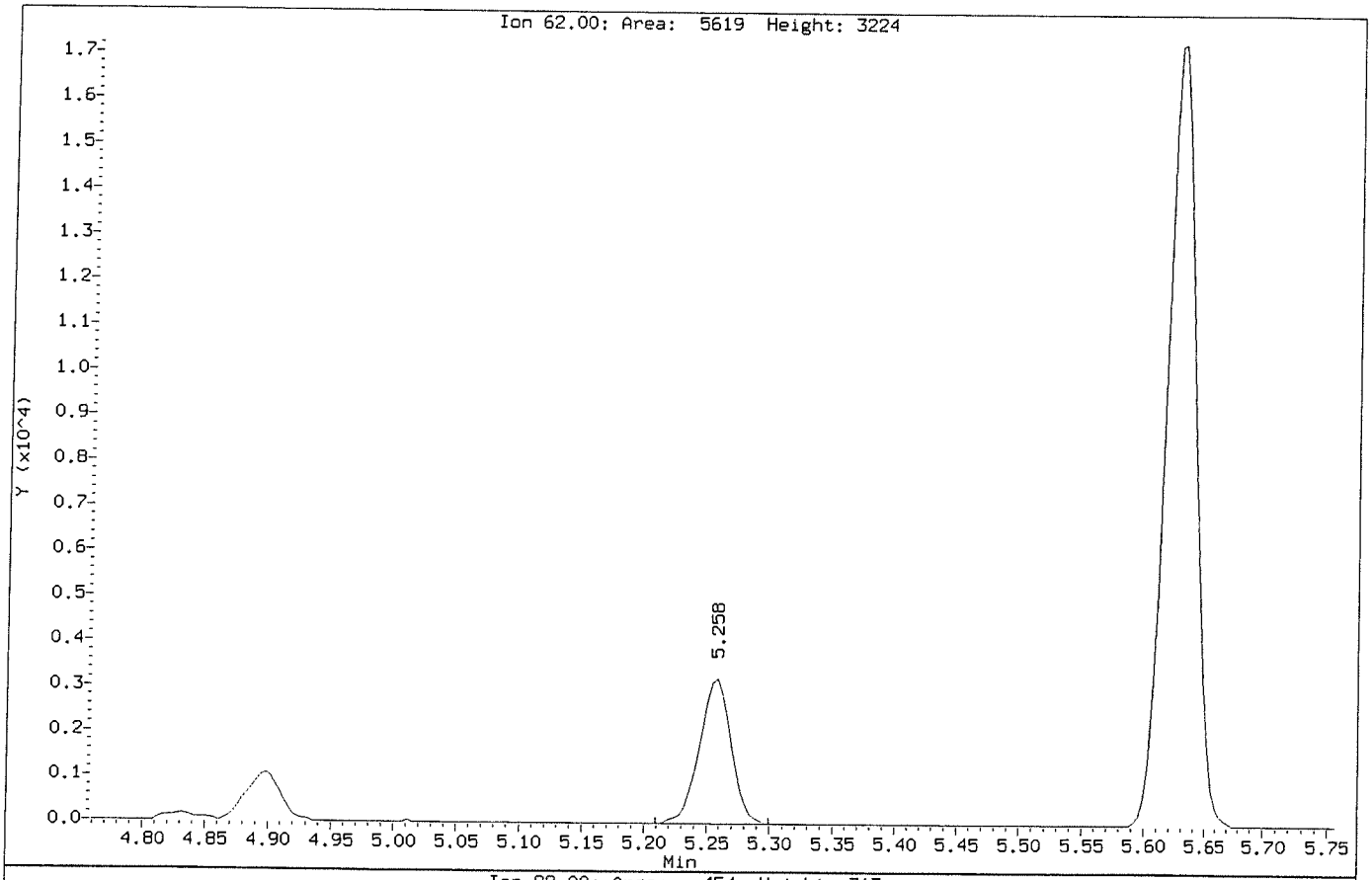
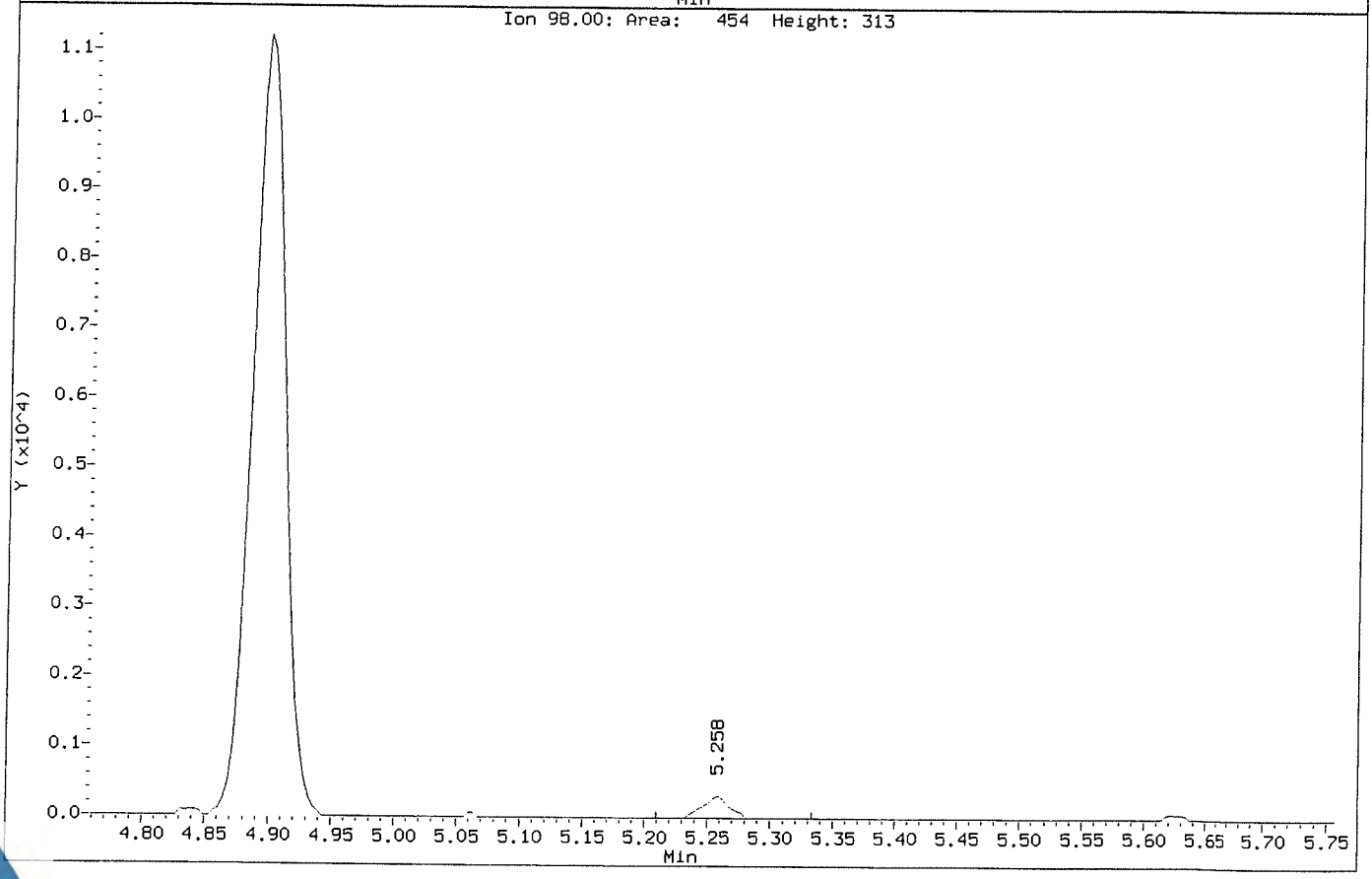
Compound: 1,2-Dichloroethane
CAS Number: 107-06-2





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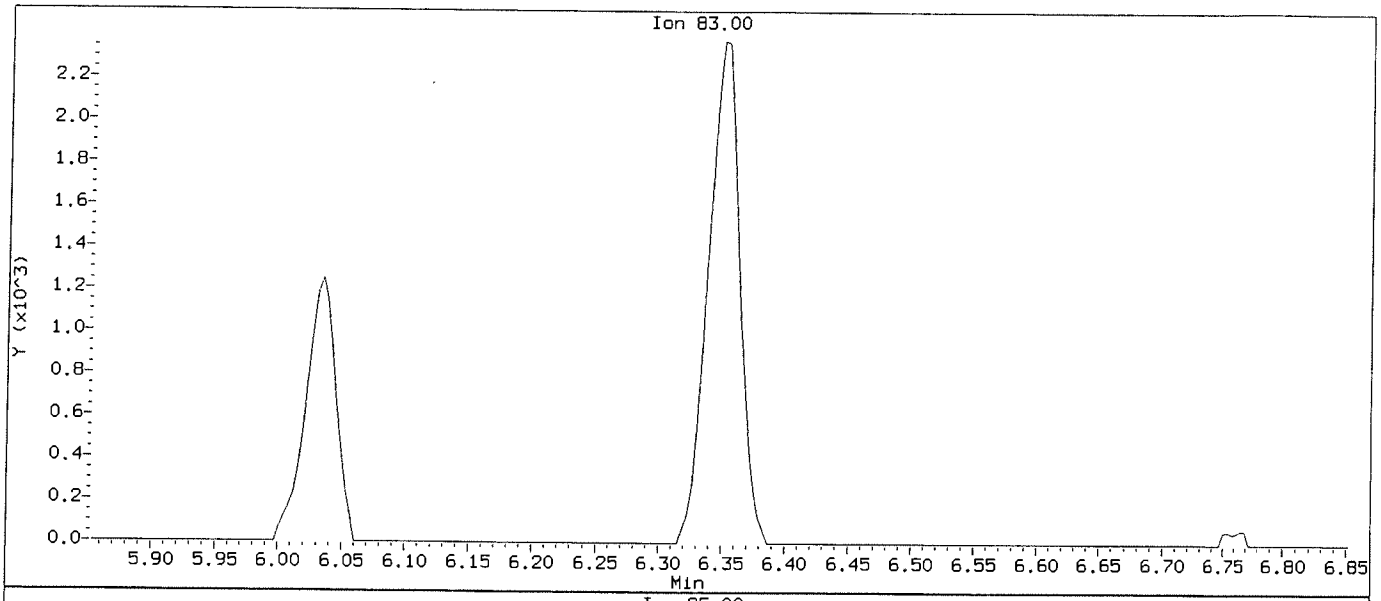
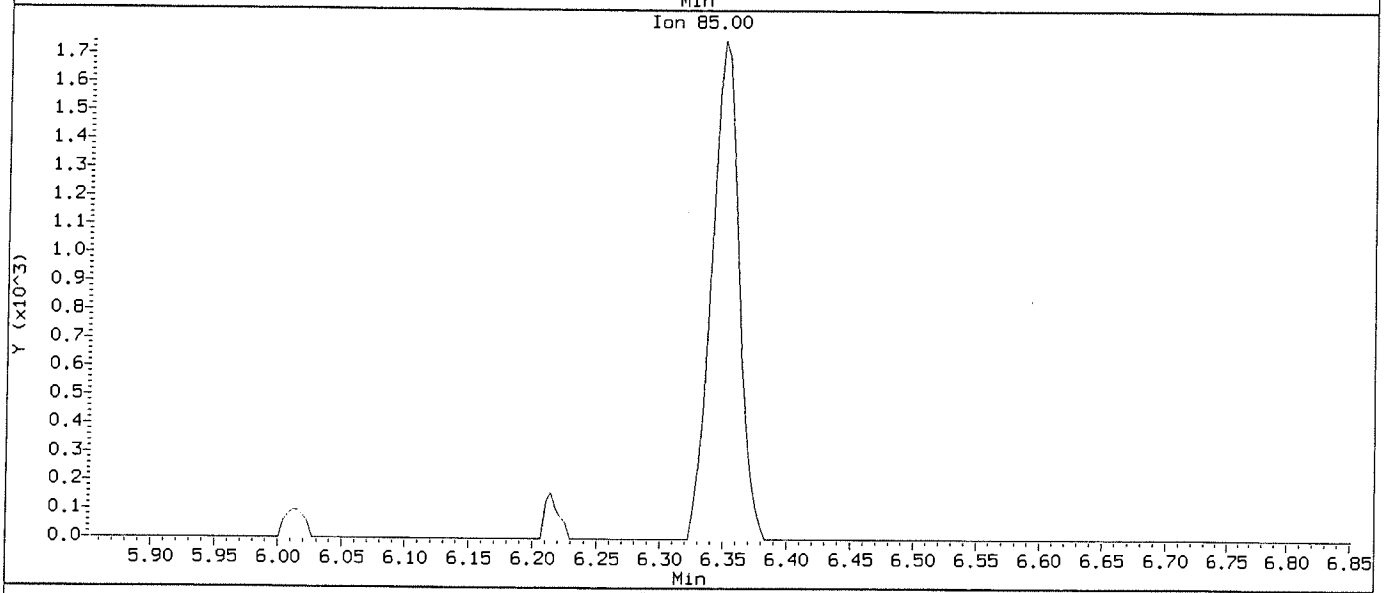
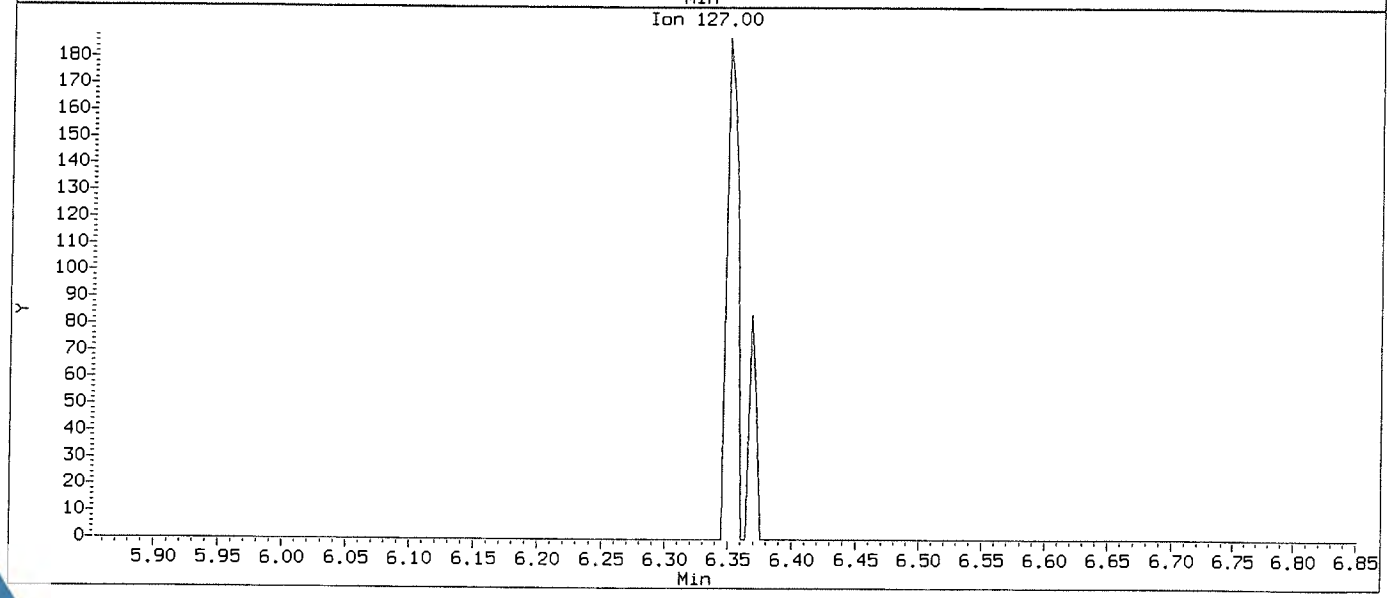
Instrument: VOA9.i
Client Sample ID: VSTD000.5

Compound: Bromodichloromethane
CAS Number: 75-27-4







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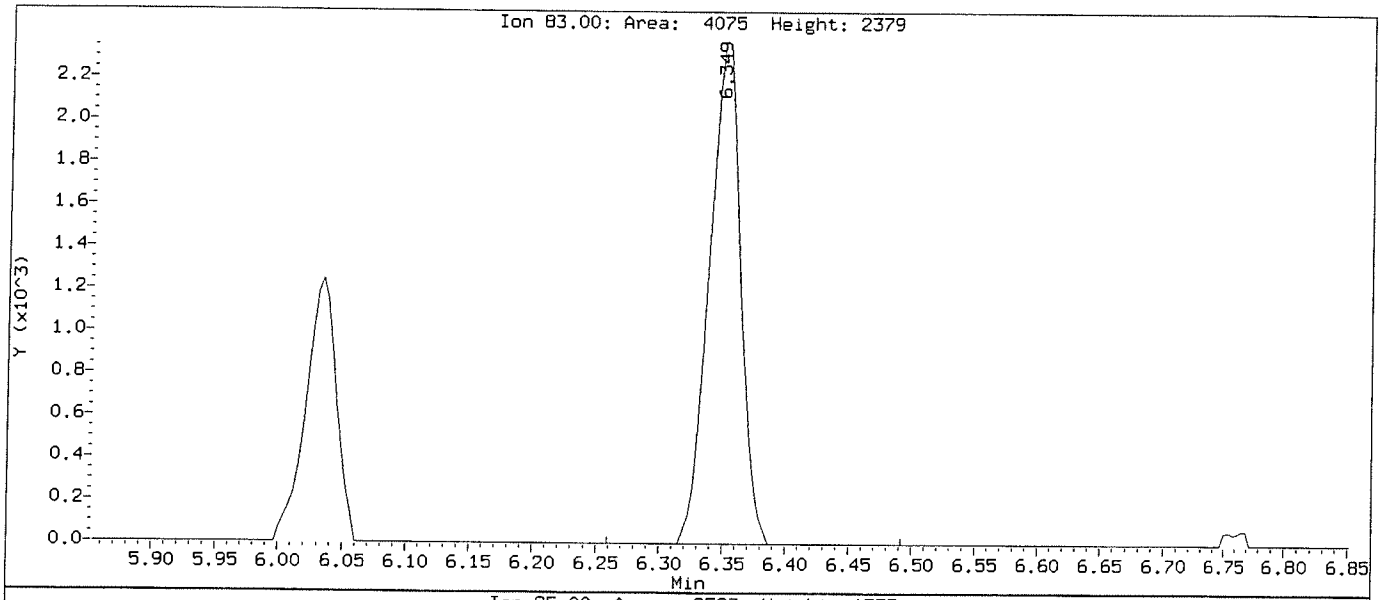
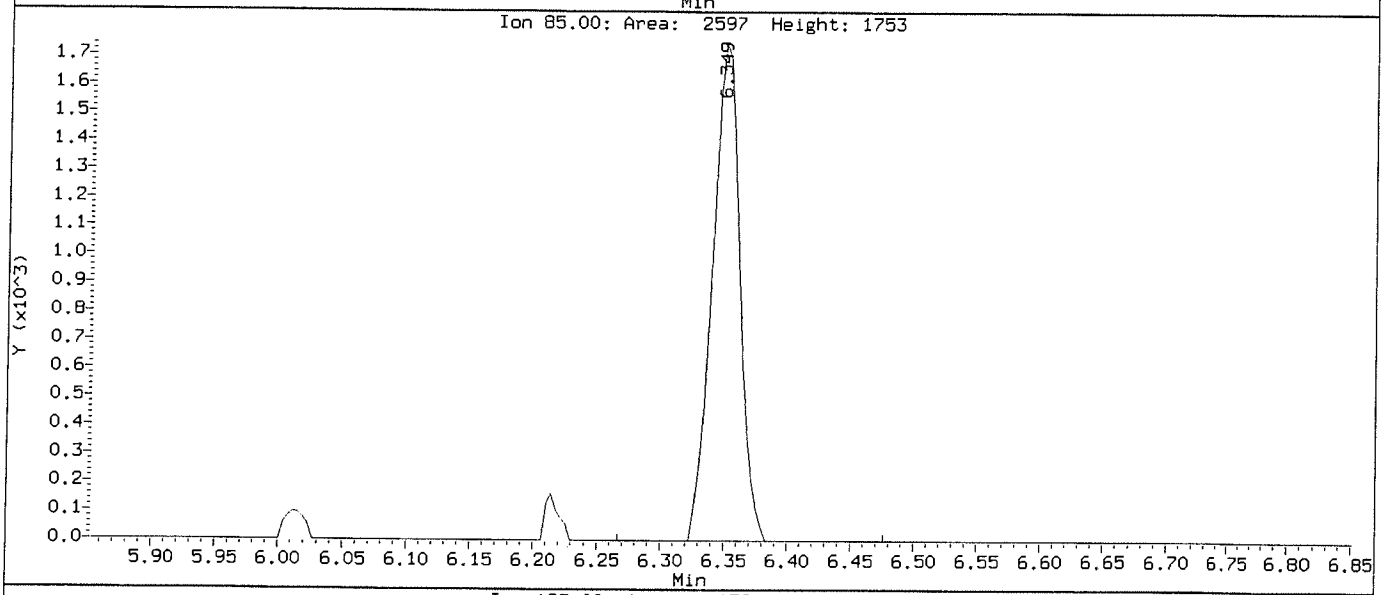
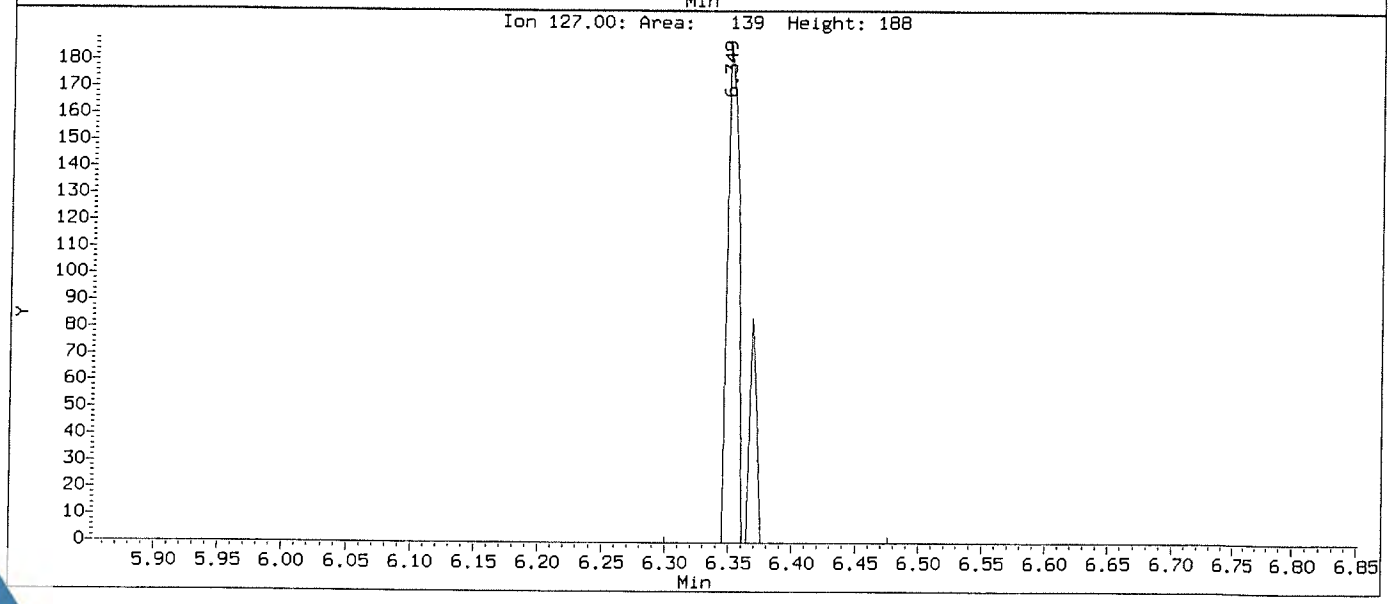
Client Sample ID: VSTD000.5

Compound: Bromodichloromethane
CAS Number: 75-27-4







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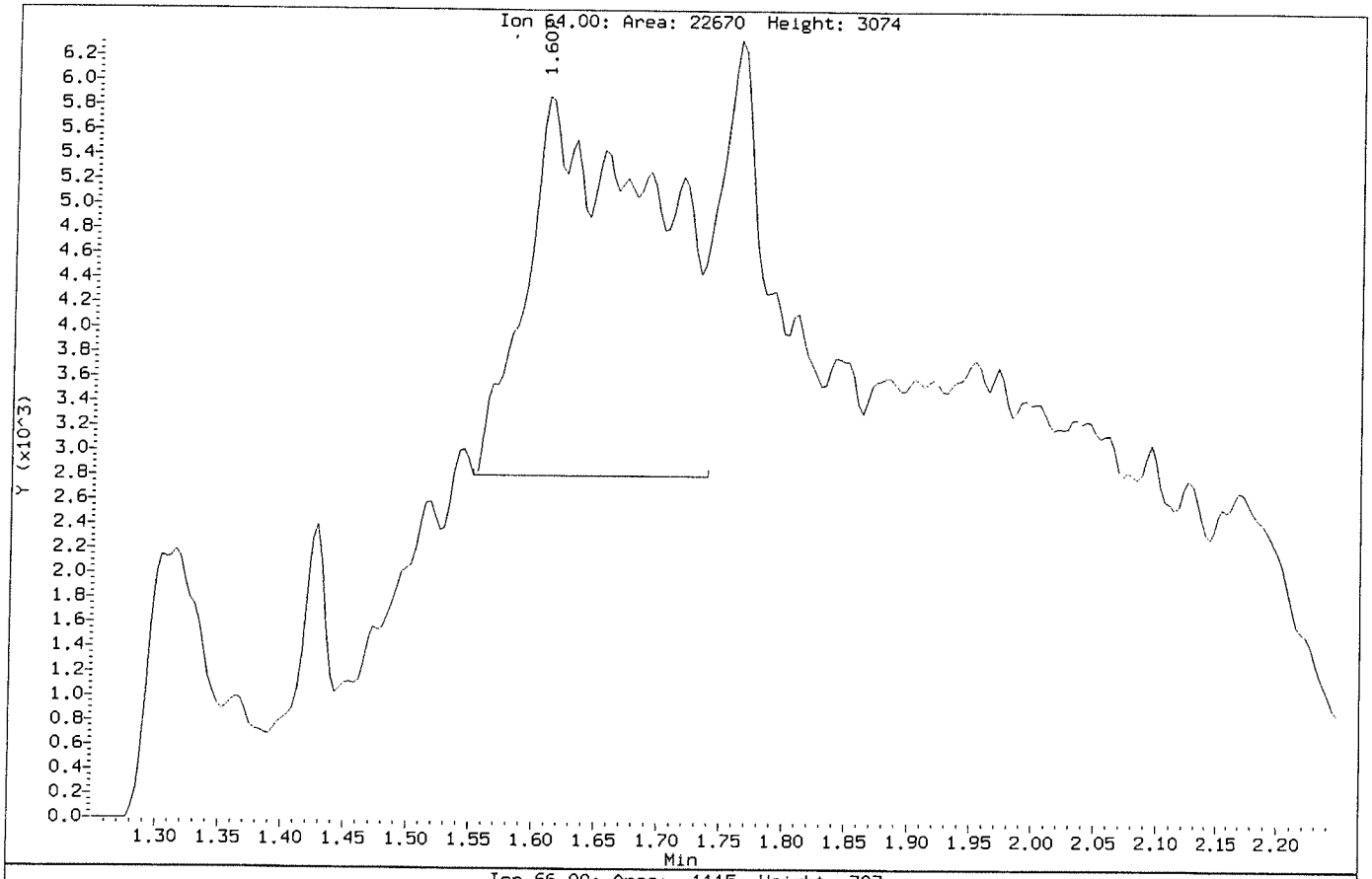
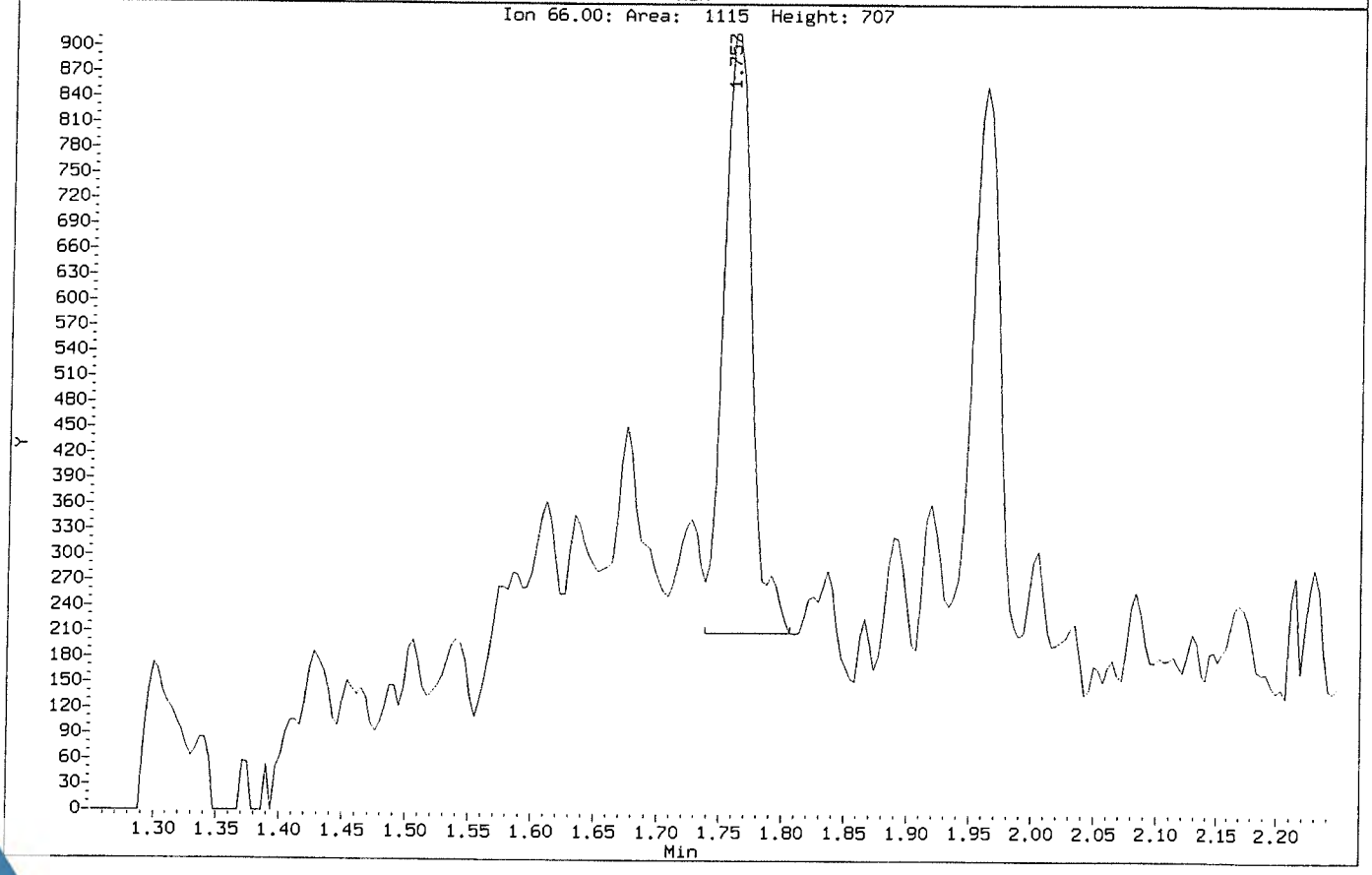
Injection Date: 13-NOV-2018 11:47
Instrument: VOA9.i
Client Sample ID: VSTD000.5

Compound: Chloroethane
CAS Number: 75-00-3





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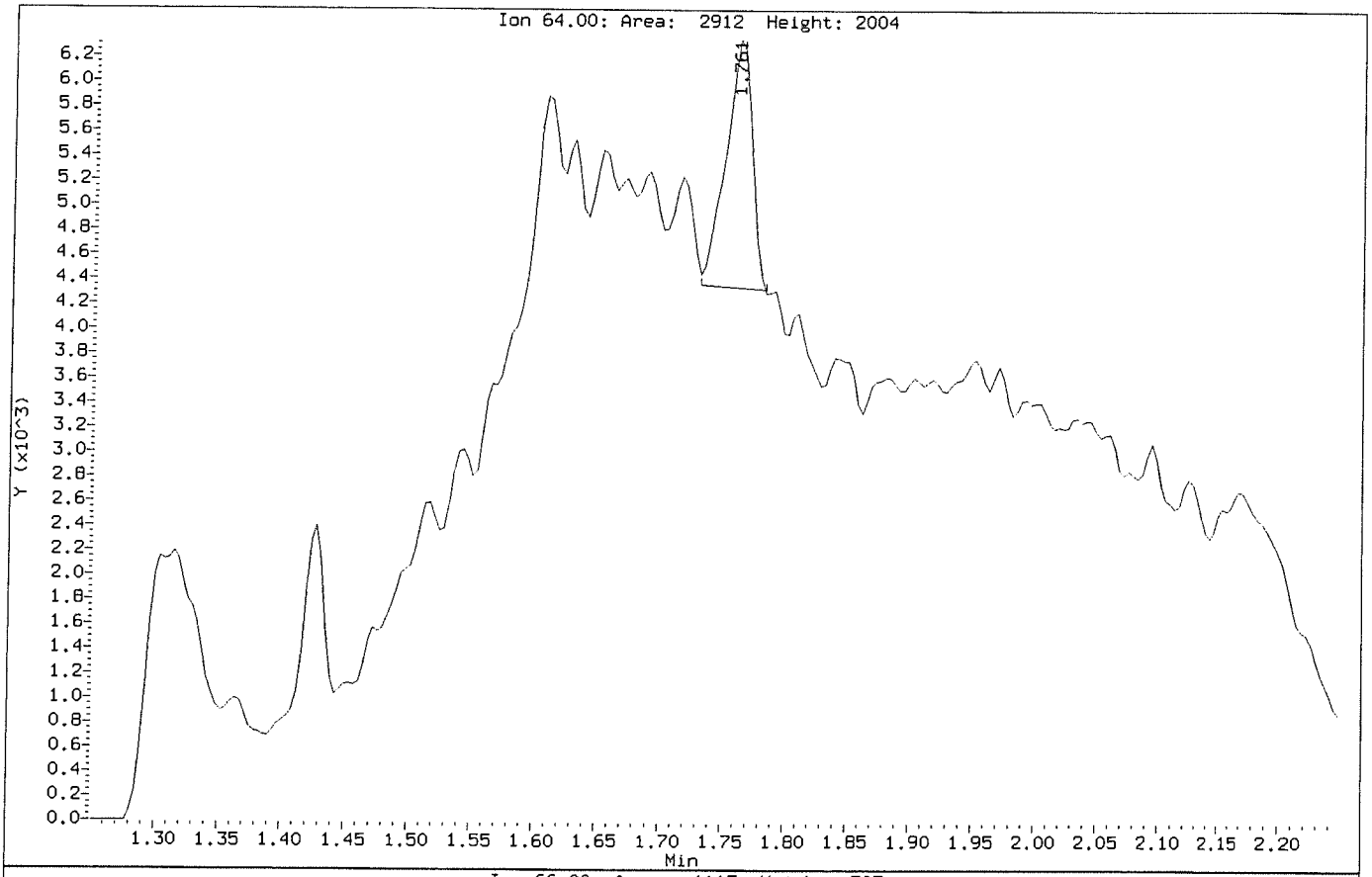
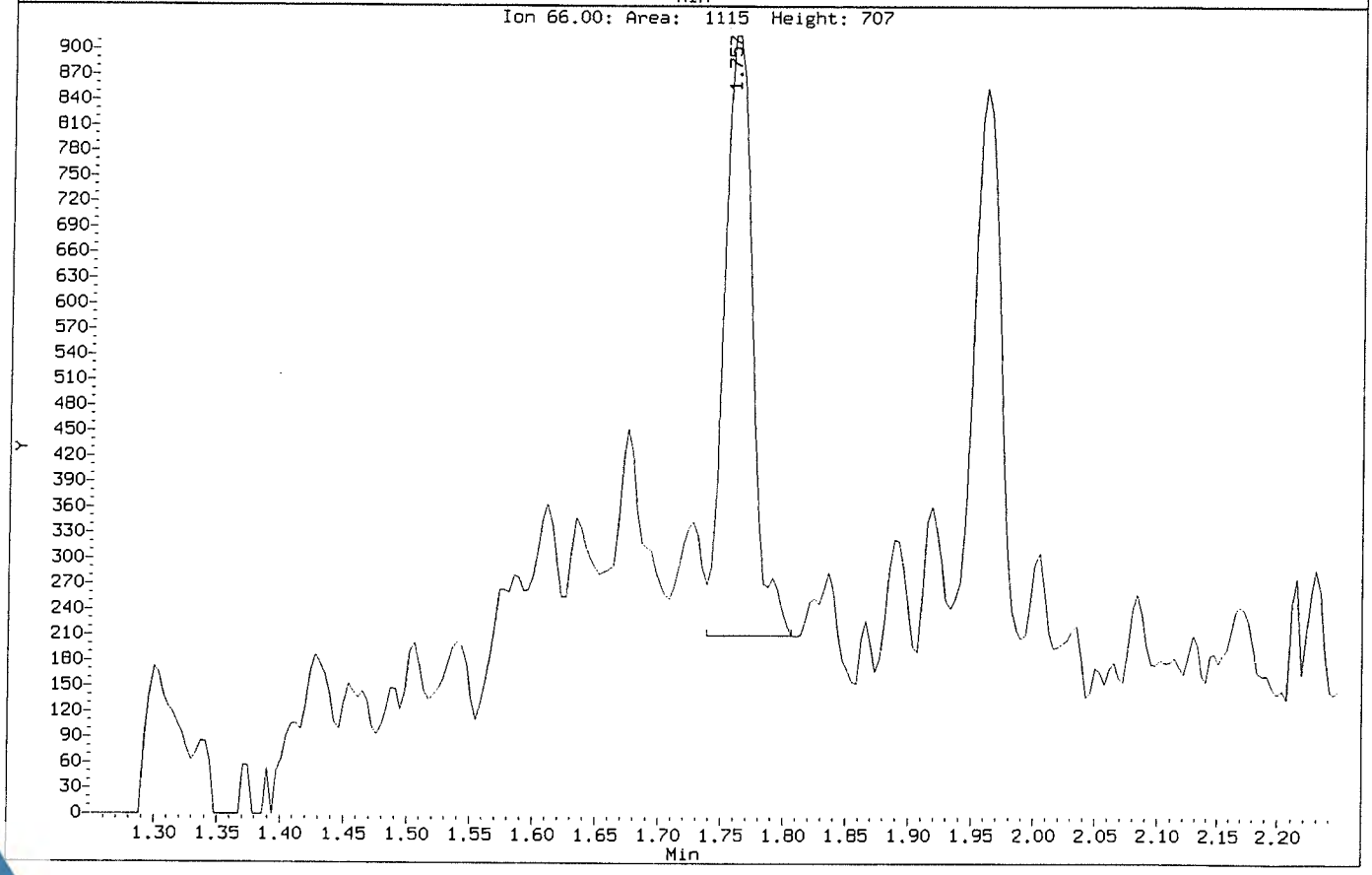
Compound: Chloroethane
CAS Number: 75-00-3





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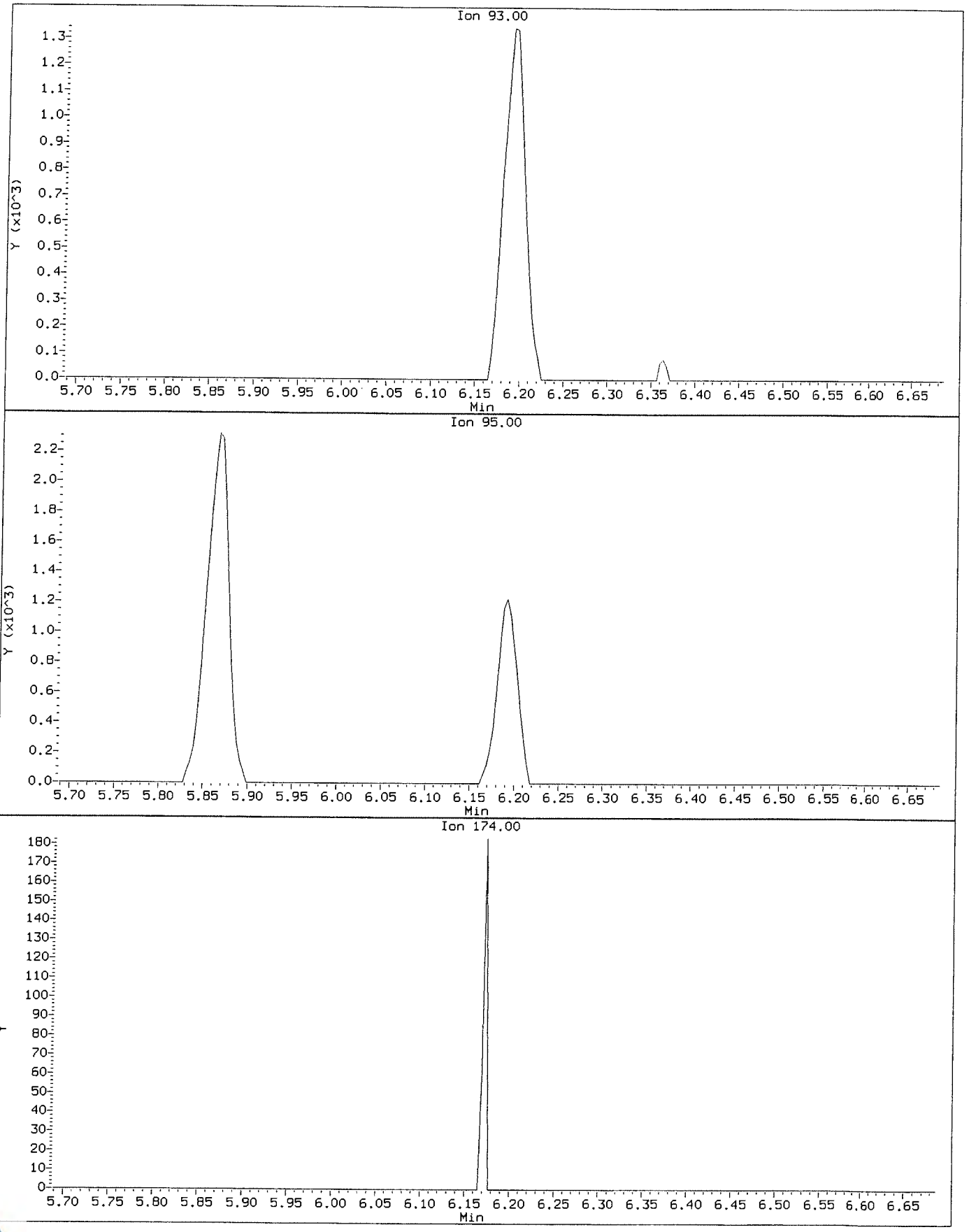
Client Sample ID: VSTD000.5

Compound: Dibromomethane
CAS Number: 74-95-3



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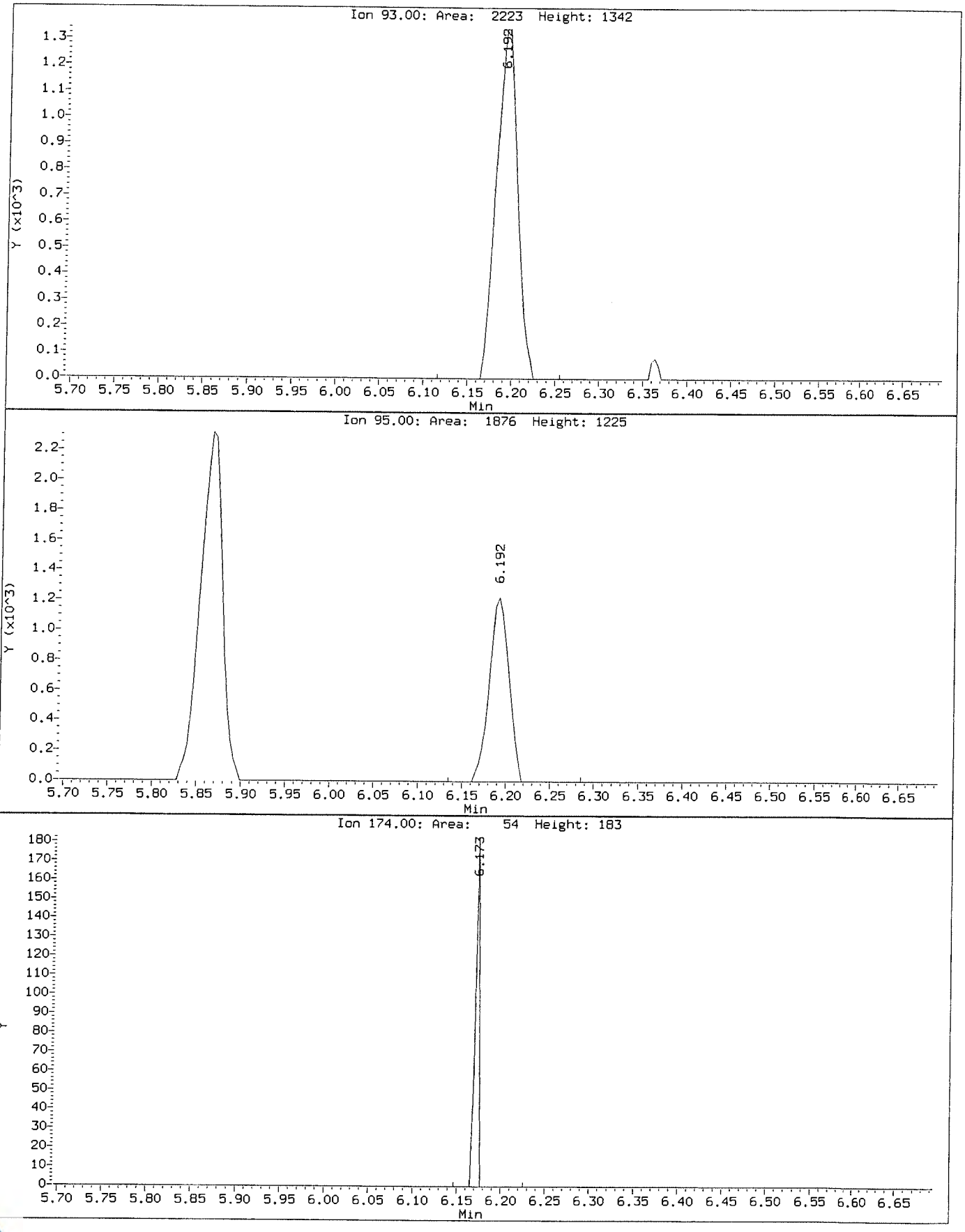
Client Sample ID: VSTD000.5

Compound: Dibromomethane
CAS Number: 74-95-3



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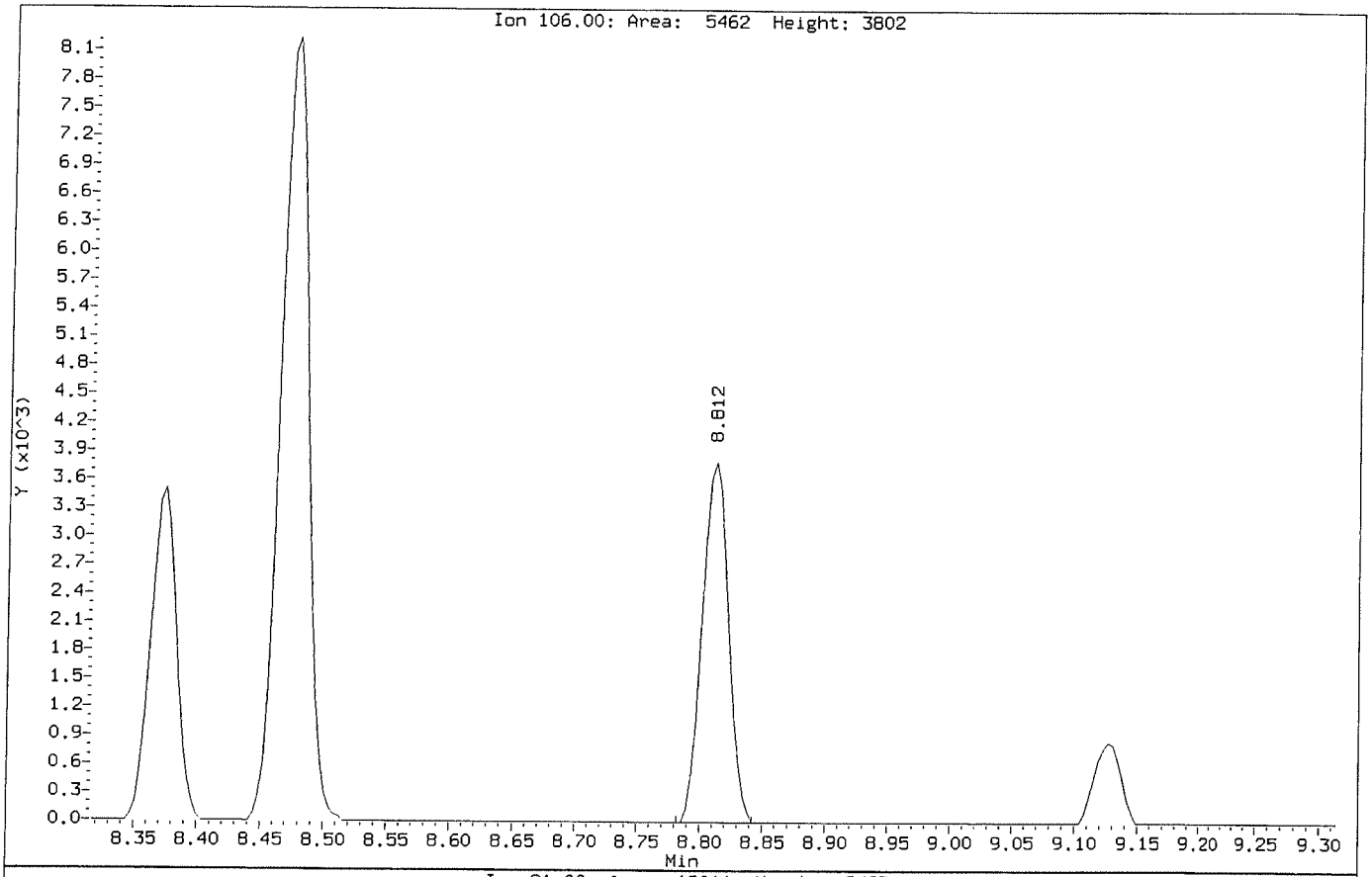
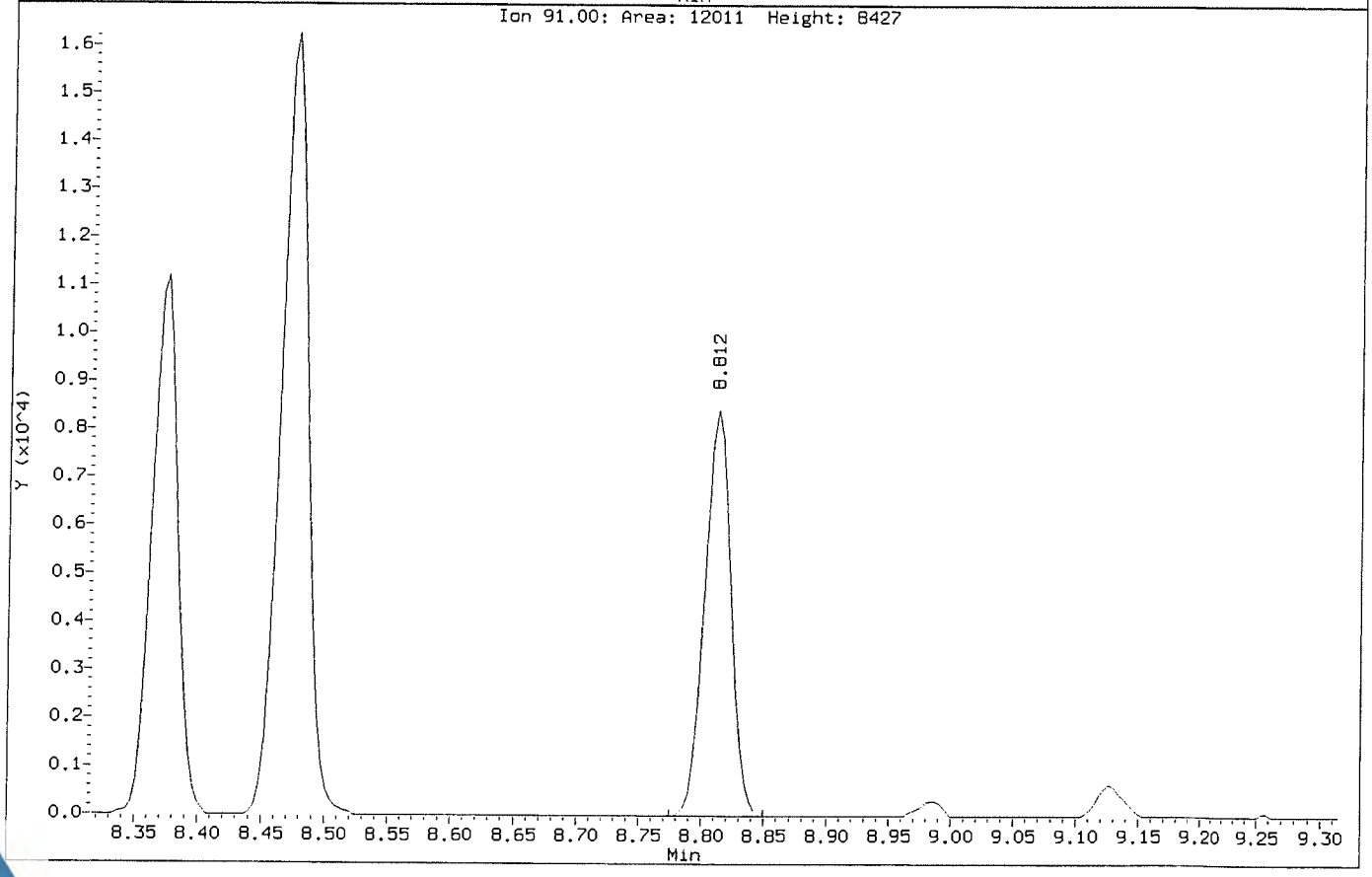
Instrument: VOA9.i
Client Sample ID: VSTD000.5

Compound: o-Xylene
CAS Number: 95-47-6





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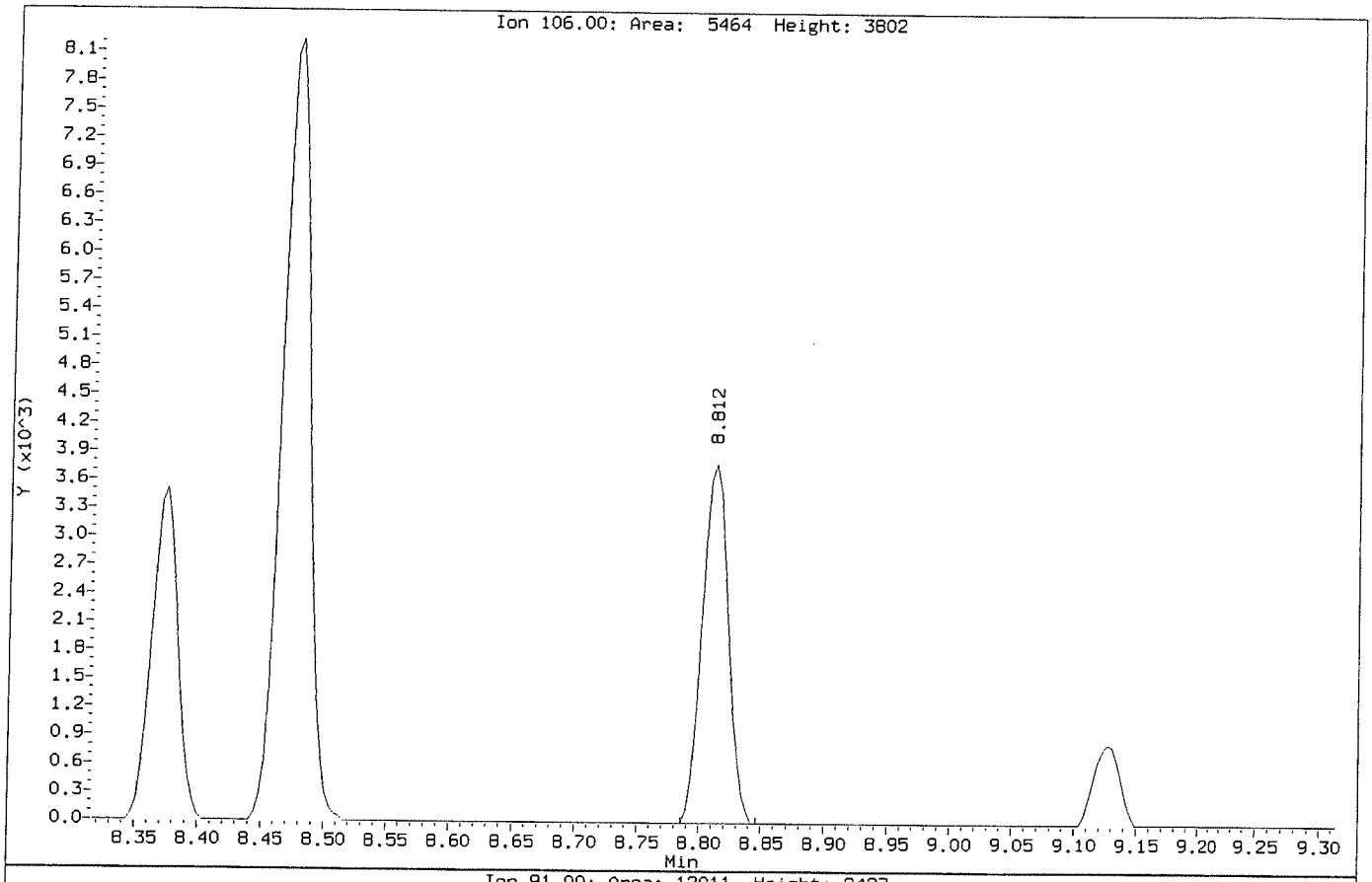
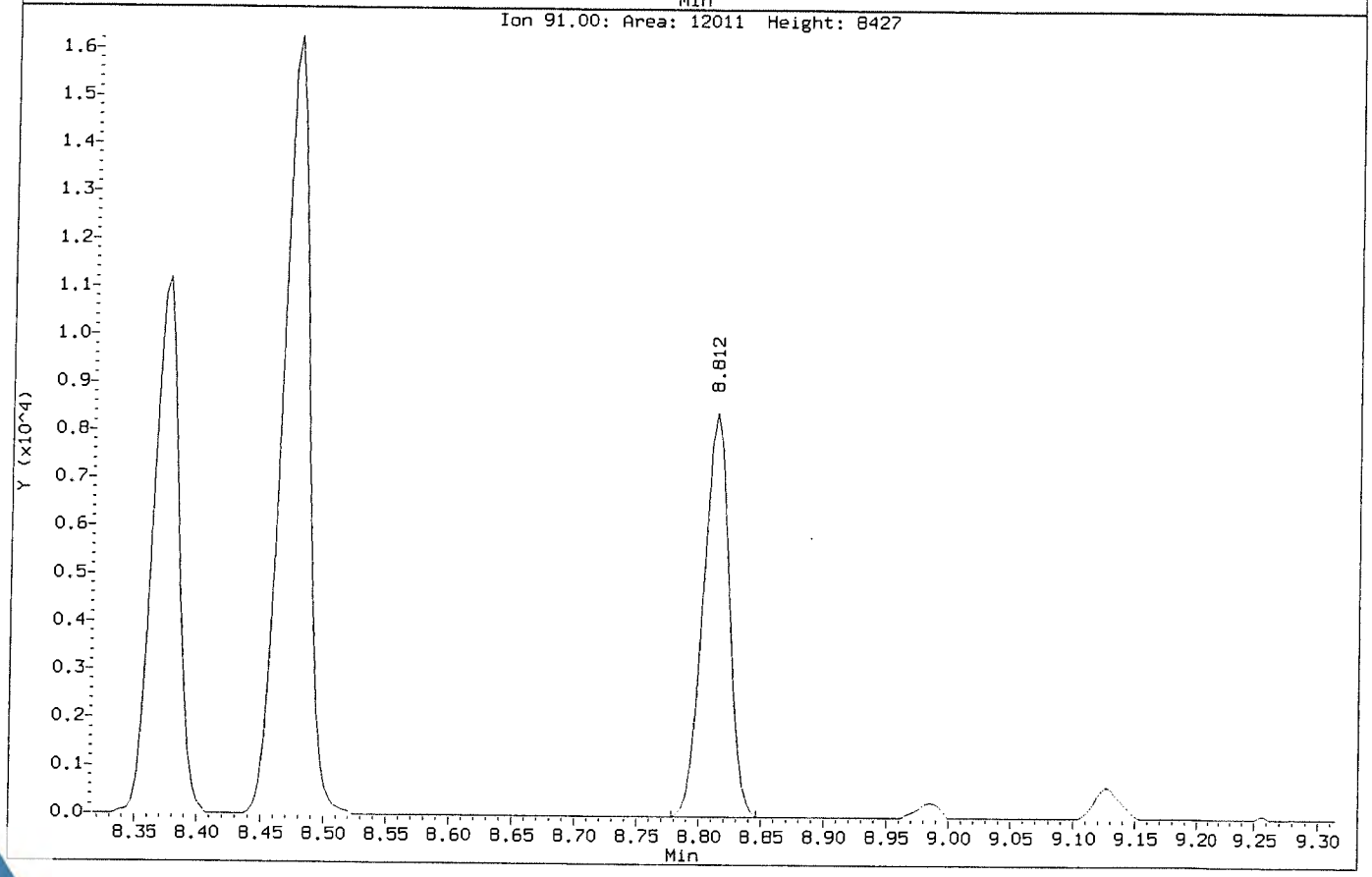
Instrument: VOA9.i
Client Sample ID: VSTD000.5

Compound: o-Xylene
CAS Number: 95-47-6





ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111304.D
Lab Smp Id: VSTD001 Client Smp ID: VSTD001
Inj Date : 13-NOV-2018 12:36
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD001;VSTD001;1;3;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 11:47 Cal File: U111303.D
Als bottle: 5 Calibration Sample, Level: 3
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

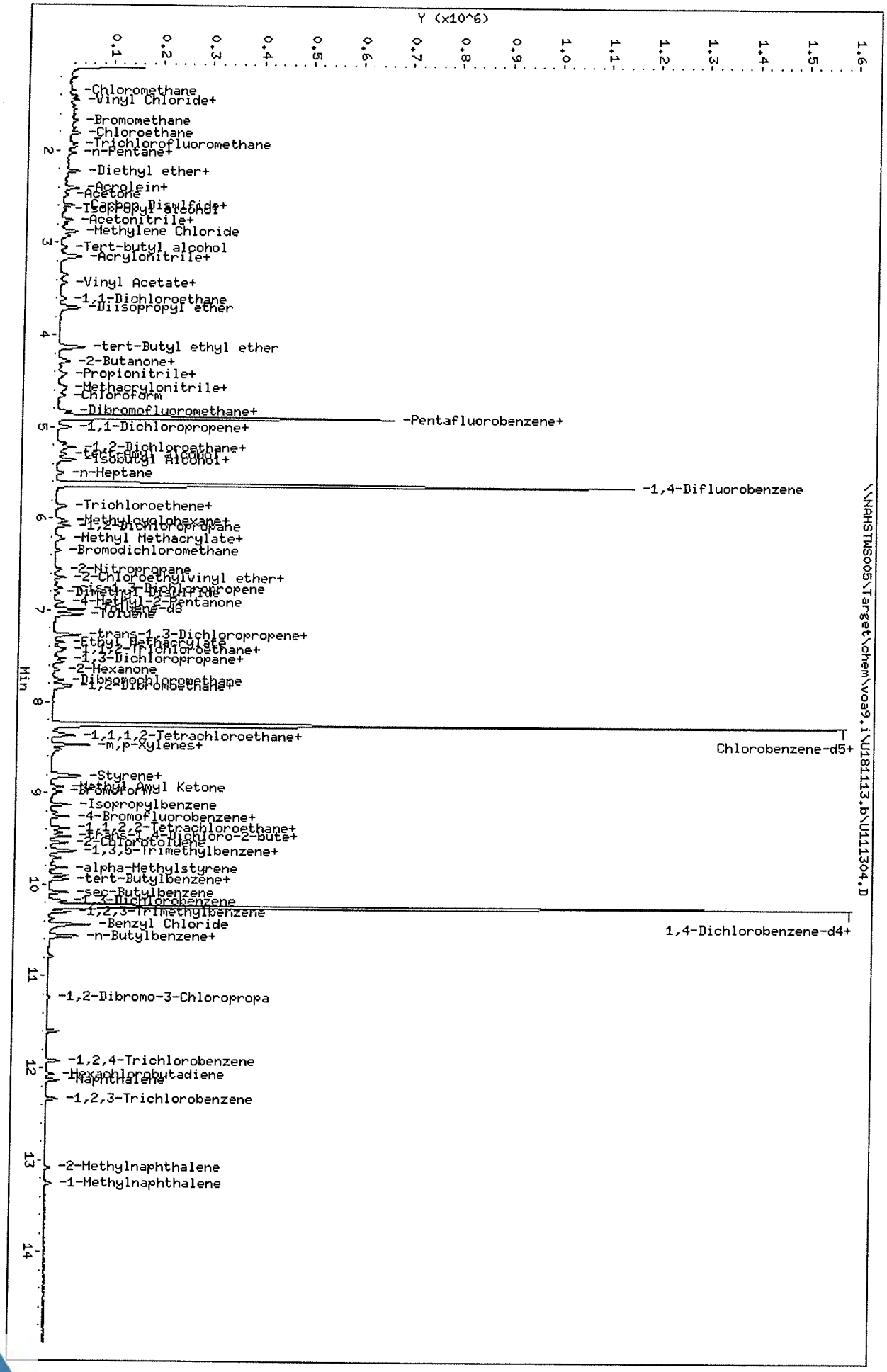
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.898	(1.000)	405565	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	804218	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	748347	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	345100	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.834	(0.987)	7705	1.00000	0.43(a)
$ 35 1,2-Dichloroethane-d4	65	5.179	5.179	(1.057)	11059	1.00000	0.09(a)
$ 48 Toluene-d8	98	6.989	6.989	(0.847)	30489	1.00000	(a)
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	10512	1.00000	0.38(a)
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	4277	1.00000	0.90(a)
31 1,1,1-Trichloroethane	97	4.826	4.826	(0.985)	6795	1.00000	0.95(a)
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	8088	1.00000	0.98(a)
138 Freon TF	101	2.405	2.405	(0.491)	4282	1.00000	1.05(a)
53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	5034	1.00000	1.05(a)
22 1,1-Dichloroethane	63	3.608	3.608	(0.737)	9857	1.00000	1.06(a)
11 1,1-Dichloroethene	96	2.405	2.405	(0.491)	5079	1.00000	1.10(a)
32 1,1-Dichloropropene	75	5.006	5.006	(0.890)	7778	1.00000	1.04(a)
93 1,2,3-Trichlorobenzene	180	12.339	12.339	(1.205)	5356	1.00000	0.82(a)
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	7560	1.00000	0.88(a)
90 1,2,4-Trichlorobenzene	180	11.926	11.926	(1.165)	6307	1.00000	0.92(a)
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	18207	1.00000	0.94(a)
89 1,2-Dibromo-3-Chloropropane	155	11.237	11.237	(1.098)	955	1.00000	1.78(a)
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	5452	1.00000	0.98(a)

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111304.D Page 2
Report Date: 24-Jan-2019 18:55

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.569	10.569	(1.033)	11469	1.00000	1.04(a)
33	1,2-Dichloroethane	62	5.254	5.254	(0.934)	8729	1.00000	1.03(a)
42	1,2-Dichloropropane	63	6.082	6.082	(1.081)	5924	1.00000	1.03(a)
75	1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	17829	1.00000	0.96(a)
83	1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	11288	1.00000	1.03(a)
54	1,3-Dichloropropane	76	7.563	7.563	(0.917)	10633	1.00000	1.04(a)
84	1,4-Dichlorobenzene	146	10.255	10.255	(1.002)	11659	1.00000	1.05(a)
26	2,2-Dichloropropane	77	4.275	4.275	(0.873)	5473	1.00000	0.95(a)
24	2-Butanone	43	4.343	4.343	(0.887)	5794	2.00000	2.03(a)
76	2-Chlorotoluene	91	9.546	9.546	(0.933)	17337	1.00000	1.02(a)
52	2-Hexanone	43	7.653	7.653	(0.928)	7477	2.00000	1.71(a)
77	4-Chlorotoluene	91	9.640	9.640	(0.942)	18812	1.00000	0.96(a)
82	p-Isopropyltoluene	119	10.210	10.210	(0.997)	16467	1.00000	0.87(a)
45	4-Methyl-2-Pentanone	43	6.914	6.914	(0.838)	12236	2.00000	1.96(a)
10	Acetone	43	2.484	2.484	(0.507)	7657	2.00000	(a)
37	Benzene	78	5.220	5.220	(0.928)	23677	1.00000	1.06(a)
74	Bromobenzene	156	9.385	9.385	(0.917)	5602	1.00000	0.98(a)
29	Bromochloromethane	128	4.557	4.557	(0.930)	2347	1.00000	0.98(aM)
39	Bromodichloromethane	83	6.348	6.348	(1.129)	6268	1.00000	0.93(aM)
66	Bromoform	173	8.984	8.984	(1.089)	2470	1.00000	1.89(Ta)
6	Bromomethane	94	1.674	1.674	(0.342)	4167	1.00000	3.09(a)
19	Carbon Disulfide	76	2.592	2.592	(0.529)	28789	2.00000	2.03(a)
34	Carbon Tetrachloride	117	4.999	4.999	(0.889)	5592	1.00000	0.96(a)
59	Chlorobenzene	112	8.275	8.275	(1.003)	16679	1.00000	1.07(a)
7	Chloroethane	64	1.756	1.756	(0.359)	4550	1.00000	1.07(aM)
28	Chloroform	83	4.658	4.658	(0.951)	9975	1.00000	1.06(a)
3	Chloromethane	50	1.344	1.344	(0.274)	6506	1.00000	1.42(a)
27	cis-1,2-Dichloroethene	96	4.290	4.290	(0.876)	6147	1.00000	1.06(a)
46	cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	7263	1.00000	0.86(a)
55	Dibromochloromethane	129	7.758	7.758	(0.940)	3914	1.00000	0.82(a)
44	Dibromomethane	93	6.191	6.191	(1.101)	3612	1.00000	1.00(aM)
2	Dichlorodifluoromethane	85	1.209	1.209	(0.247)	6358	1.00000	2.04(a)
61	Ethylbenzene	106	8.373	8.373	(1.015)	8122	1.00000	1.03(a)
91	Hexachlorobutadiene	225	12.065	12.065	(1.179)	2210	1.00000	1.33(a)
67	Isopropylbenzene	105	9.126	9.126	(1.106)	22125	1.00000	0.97(a)
62	m,p-Xylenes	106	8.474	8.474	(1.027)	18714	2.00000	1.94(a)
17	Methylene Chloride	84	2.877	2.877	(0.587)	7766	1.00000	0.81(a)
87	n-Butylbenzene	91	10.558	10.558	(1.031)	17894	1.00000	1.37(a)
73	n-Propylbenzene	91	9.475	9.475	(0.926)	27227	1.00000	0.99(a)
92	Naphthalene	128	12.133	12.133	(1.185)	17787	1.00000	0.87(a)
63	o-Xylene	106	8.811	8.811	(1.068)	9461	1.00000	0.98(aH)
81	sec-Butylbenzene	105	10.086	10.086	(0.985)	22039	1.00000	0.97(a)
64	Styrene	104	8.826	8.826	(1.070)	14819	1.00000	0.91(a)
78	tert-Butylbenzene	119	9.902	9.902	(0.967)	14832	1.00000	0.93(a)
56	Tetrachloroethene	164	7.525	7.525	(0.912)	4264	1.00000	1.08(a)
50	Toluene	91	7.049	7.049	(0.855)	24363	1.00000	1.02(a)
20	trans-1,2-Dichloroethene	96	3.147	3.147	(0.643)	5480	1.00000	1.09(a)
51	trans-1,3-Dichloropropene	75	7.263	7.263	(1.291)	5482	1.00000	2.11(a)
38	Trichloroethene	130	5.861	5.861	(1.042)	5801	1.00000	1.05(a)
8	Trichlorofluoromethane	101	1.959	1.959	(0.400)	8913	1.00000	1.09(a)
5	Vinyl Chloride	62	1.423	1.423	(0.291)	7374	1.00000	1.61(a)

QC Flag Legend

T - Target compound detected outside RT window.
a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



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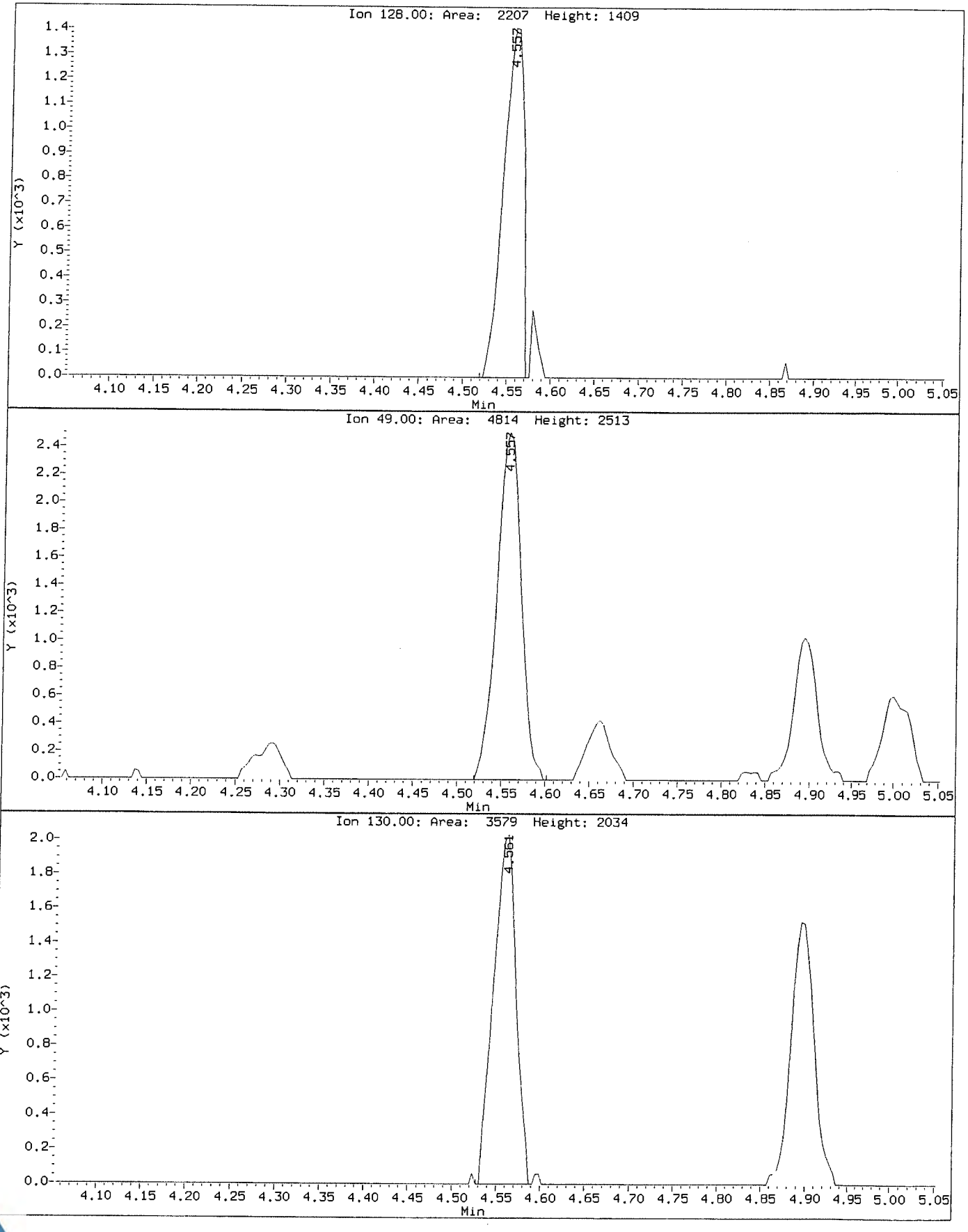
Date : 13-NOV-2018 12:36
Client ID: VSTD001
Sample Info: VSTD001;VSTD001;1;3;
Purge Volume: 5.0
Column phase: DB624

\\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111304.D

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111304.D
Injection Date: 13-NOV-2018 12:36
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: Bromochloromethane
CAS Number: 74-97-5



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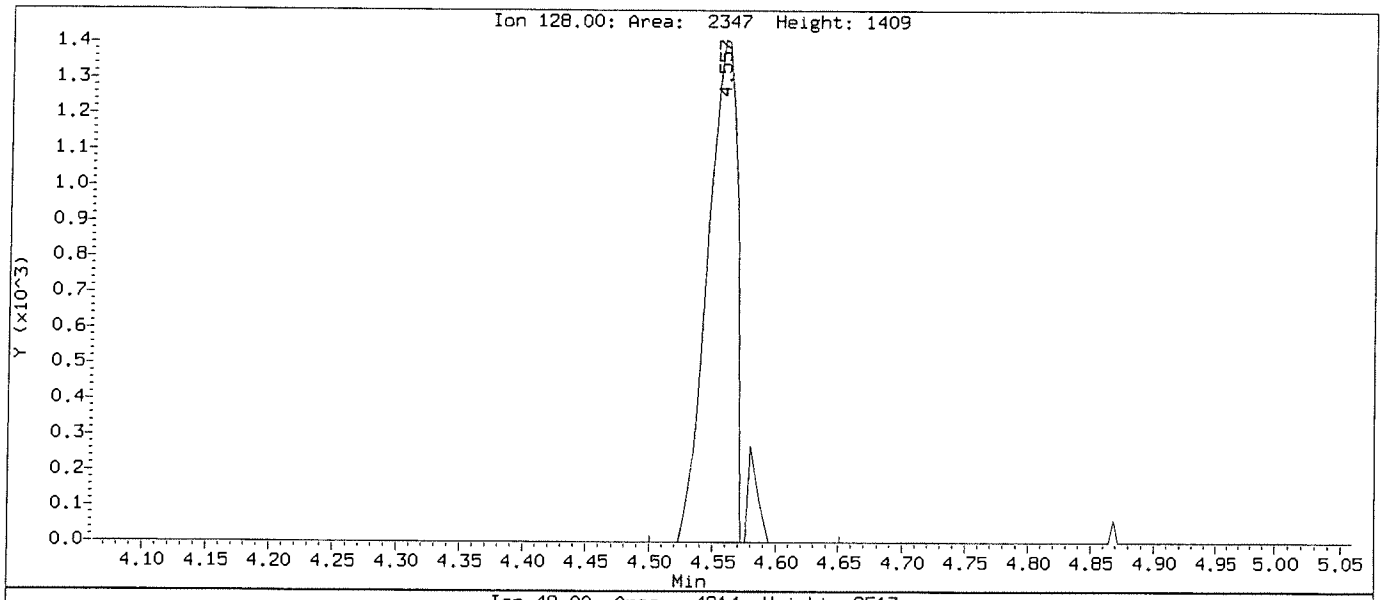
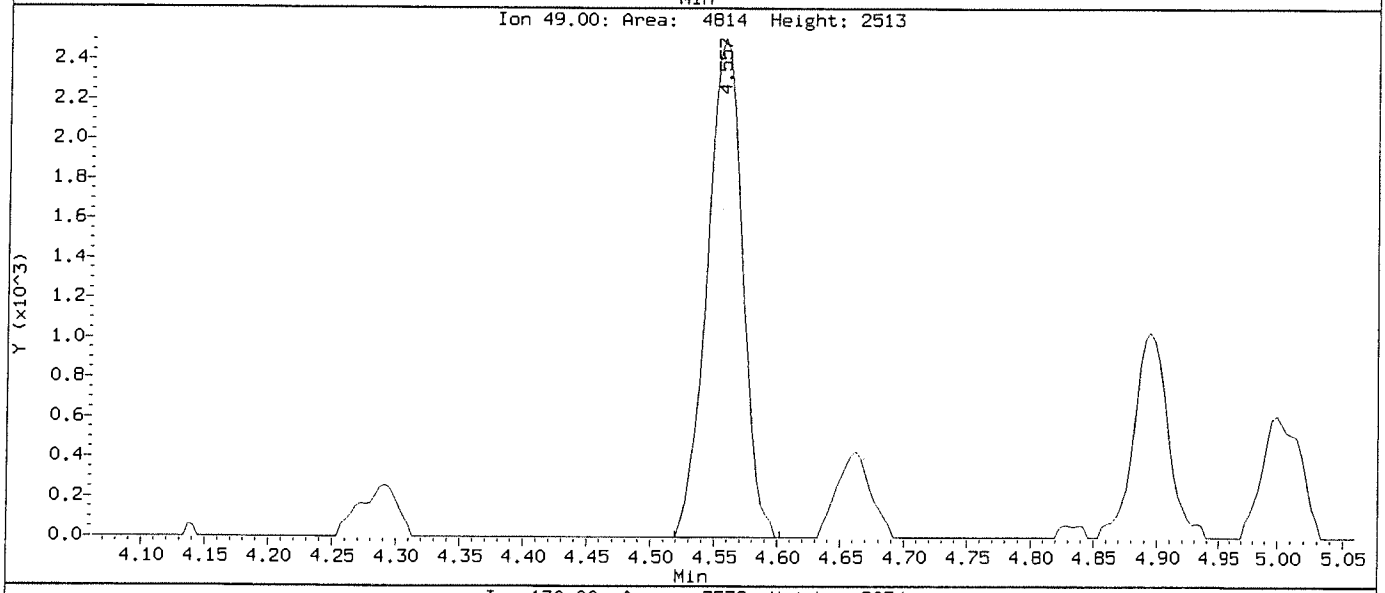
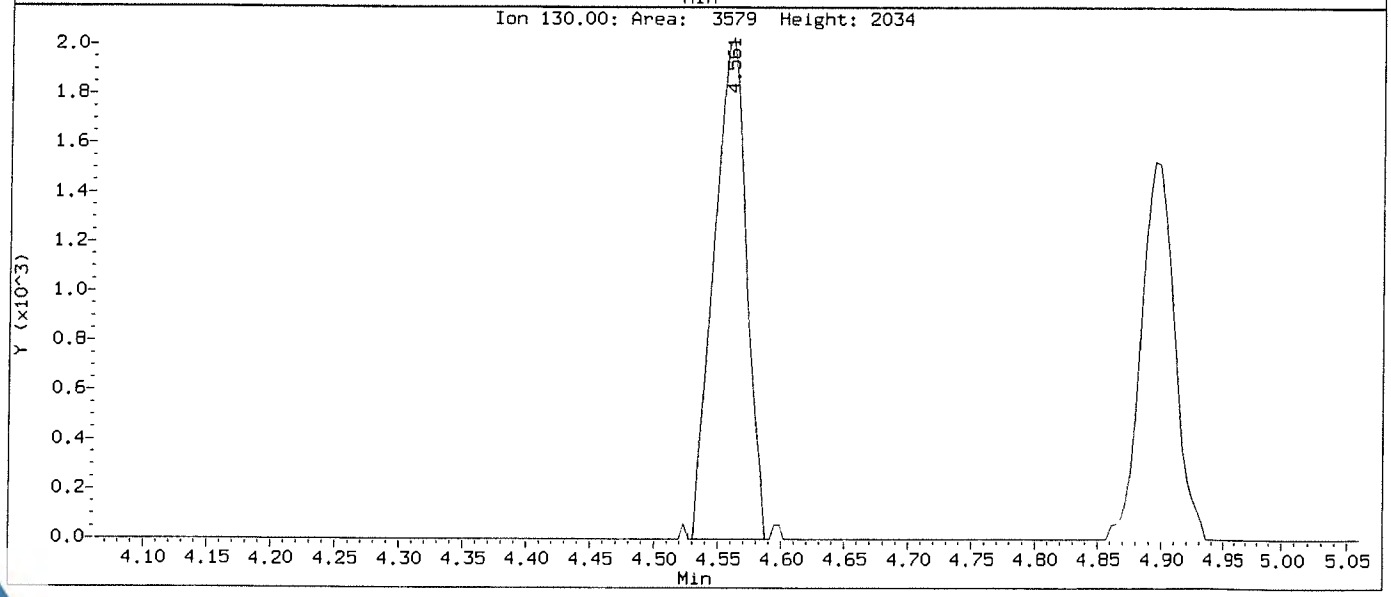
Client Sample ID: VSTD001

Compound: Bromochloromethane
CAS Number: 74-97-5







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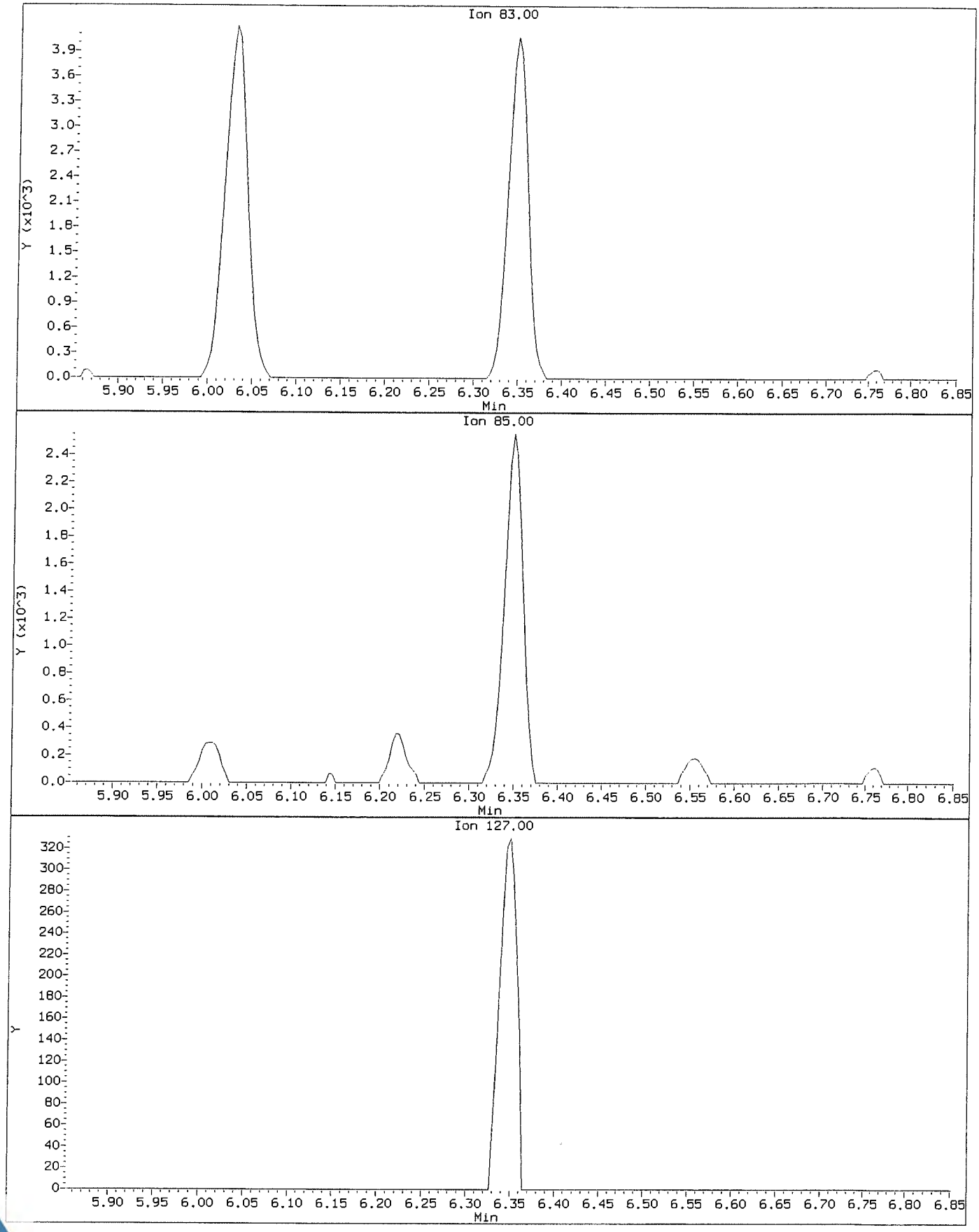
Injection Date: 13-NOV-2018 12:36
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: Bromodichloromethane
CAS Number: 75-27-4



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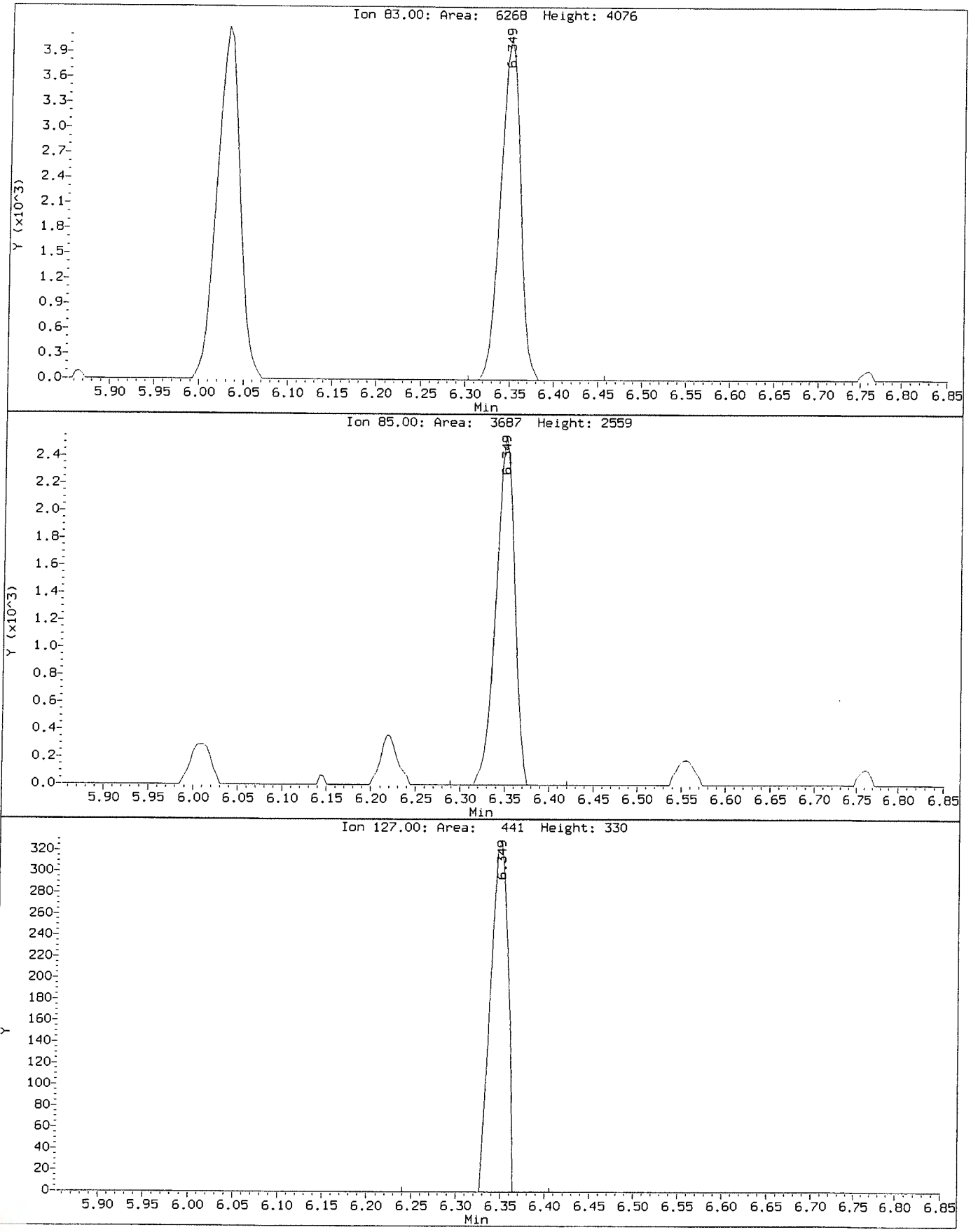
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: Bromodichloromethane
CAS Number: 75-27-4



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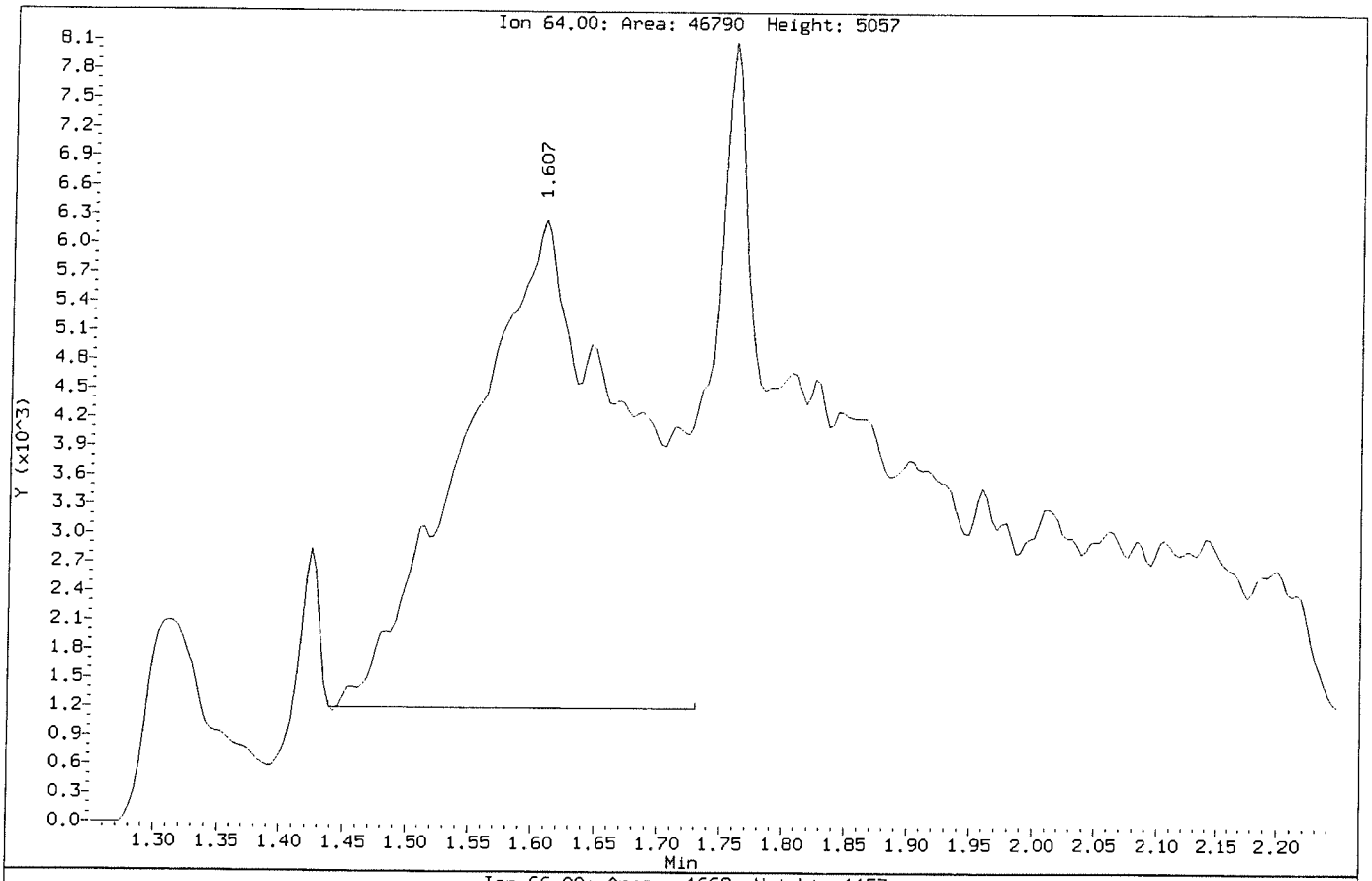
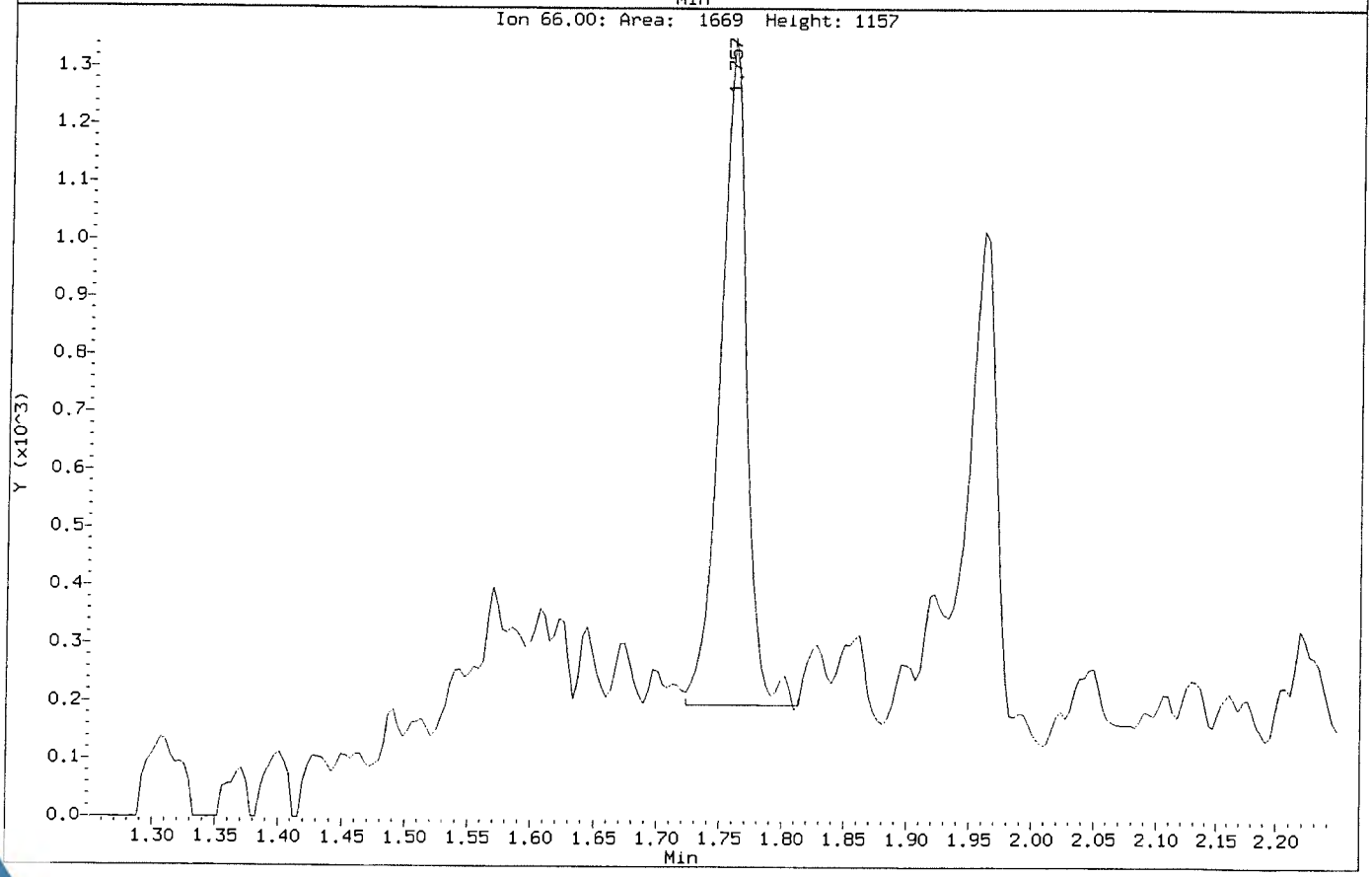
Injection Date: 13-NOV-2018 12:36
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: Chloroethane
CAS Number: 75-00-3





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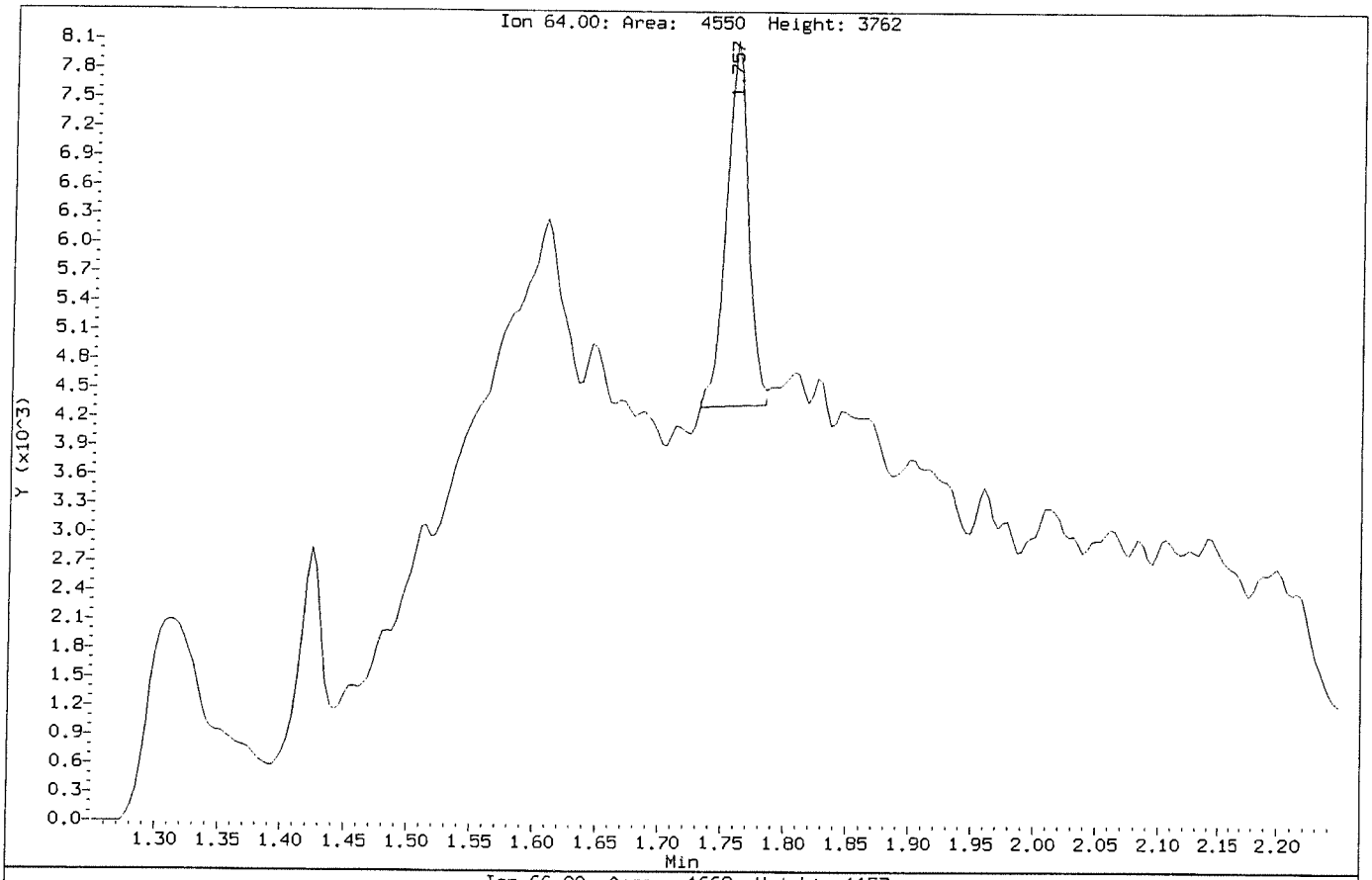
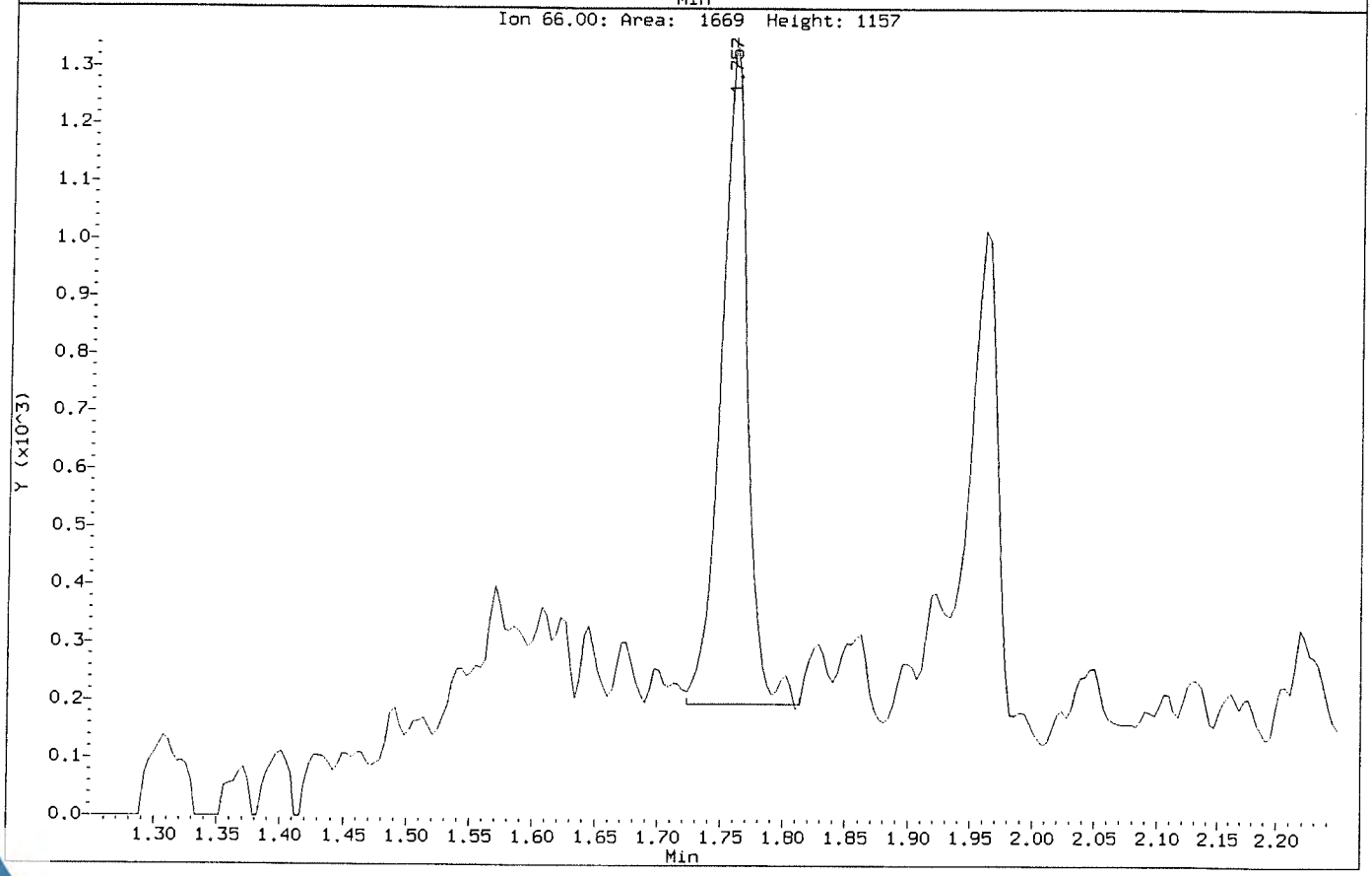
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: Chloroethane
CAS Number: 75-00-3





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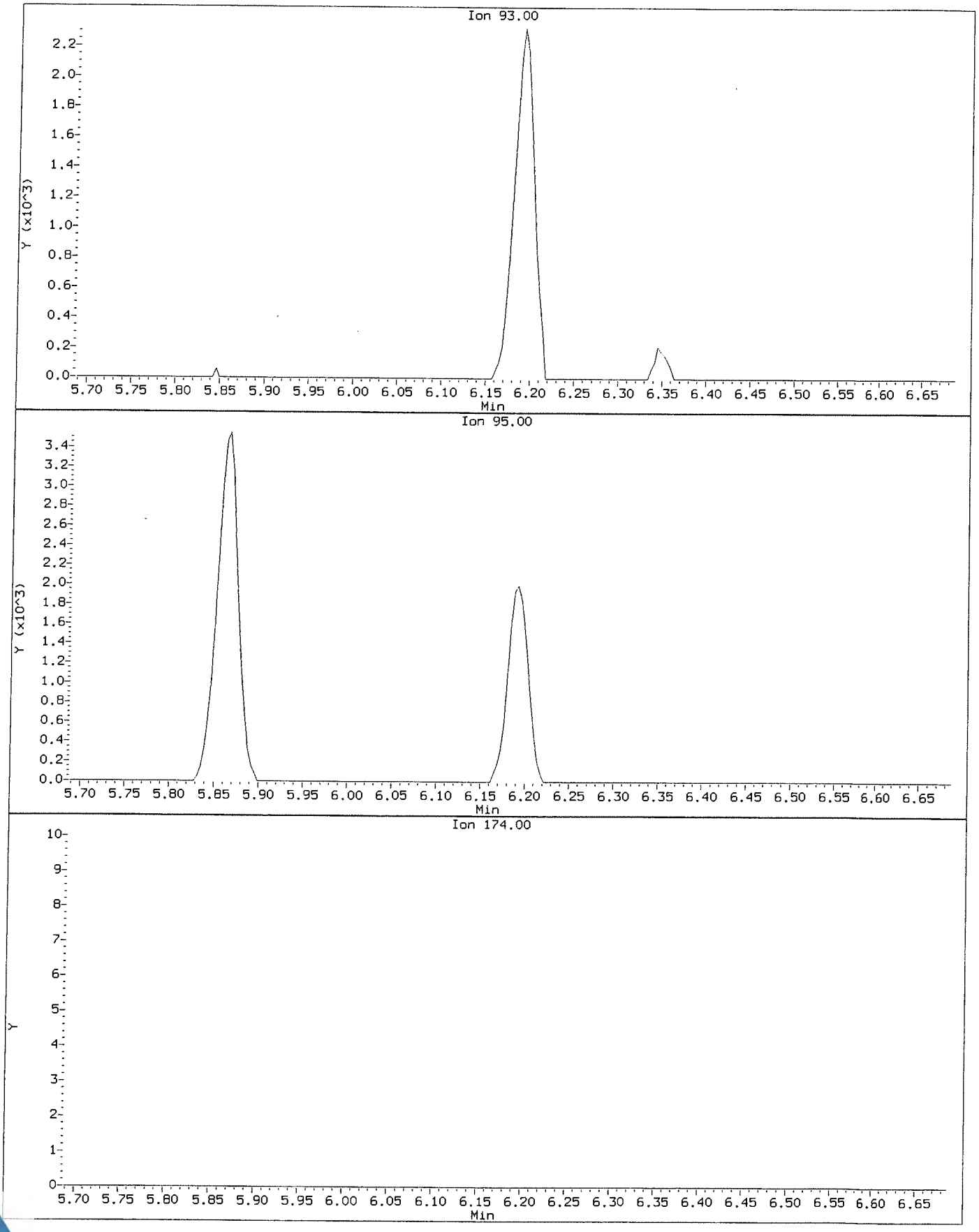
Injection Date: 13-NOV-2018 12:36
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: Dibromomethane
CAS Number: 74-95-3



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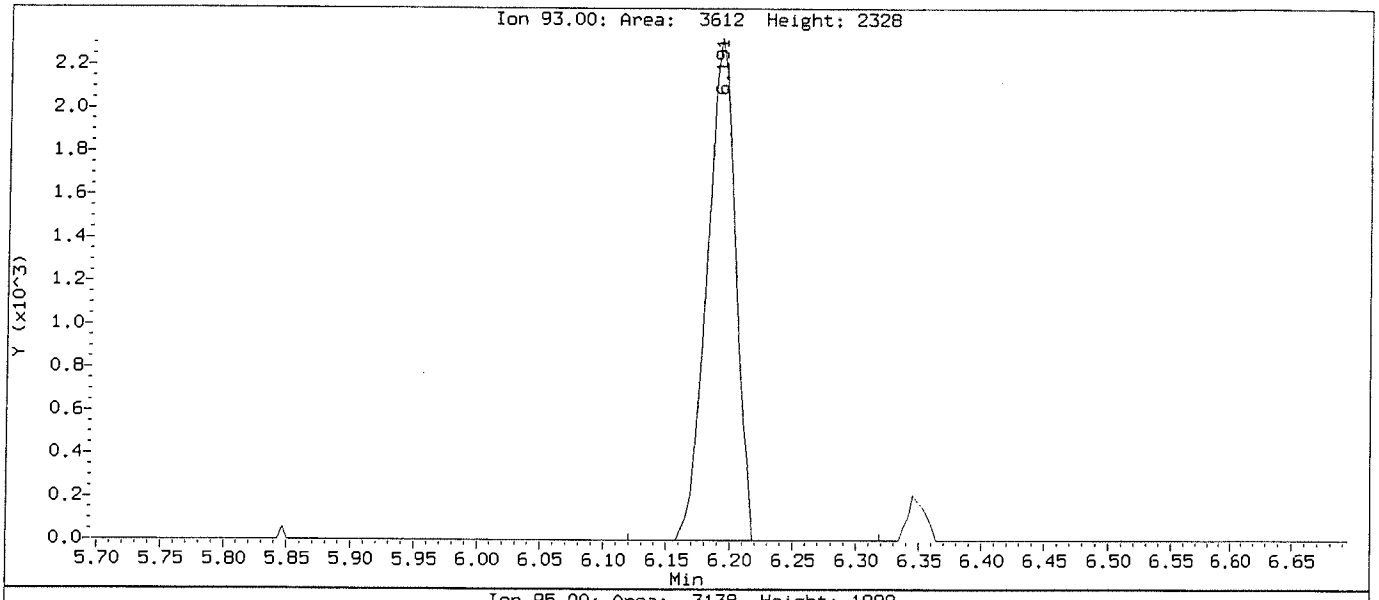
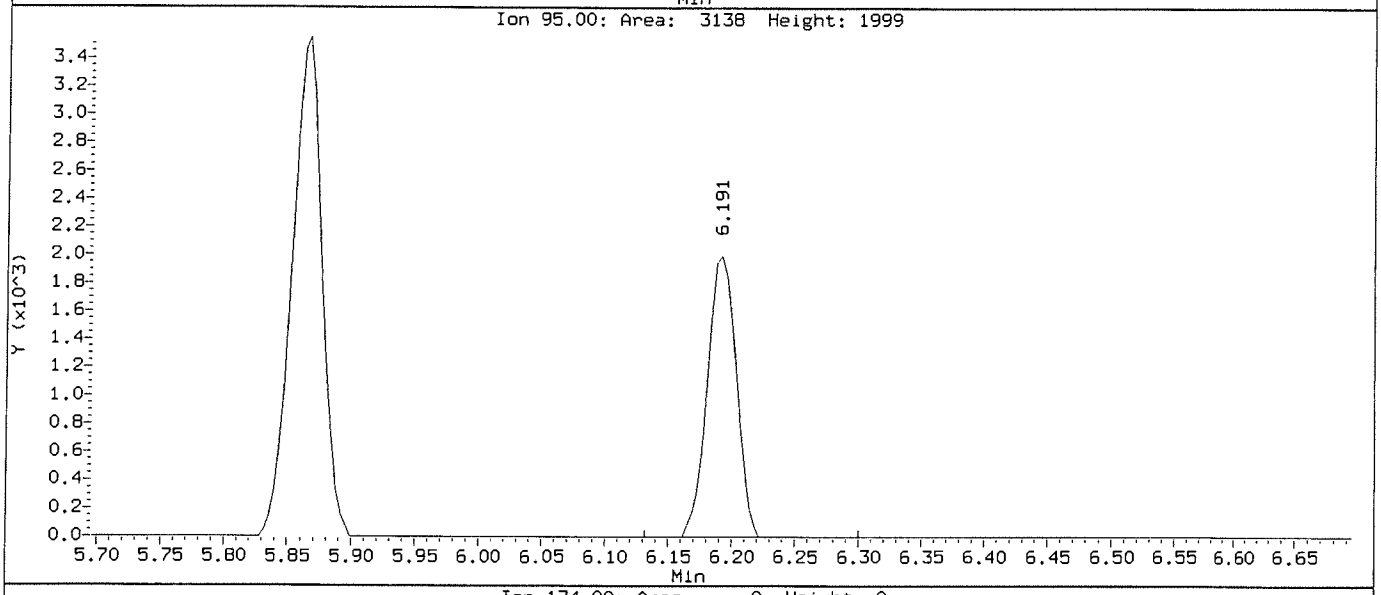
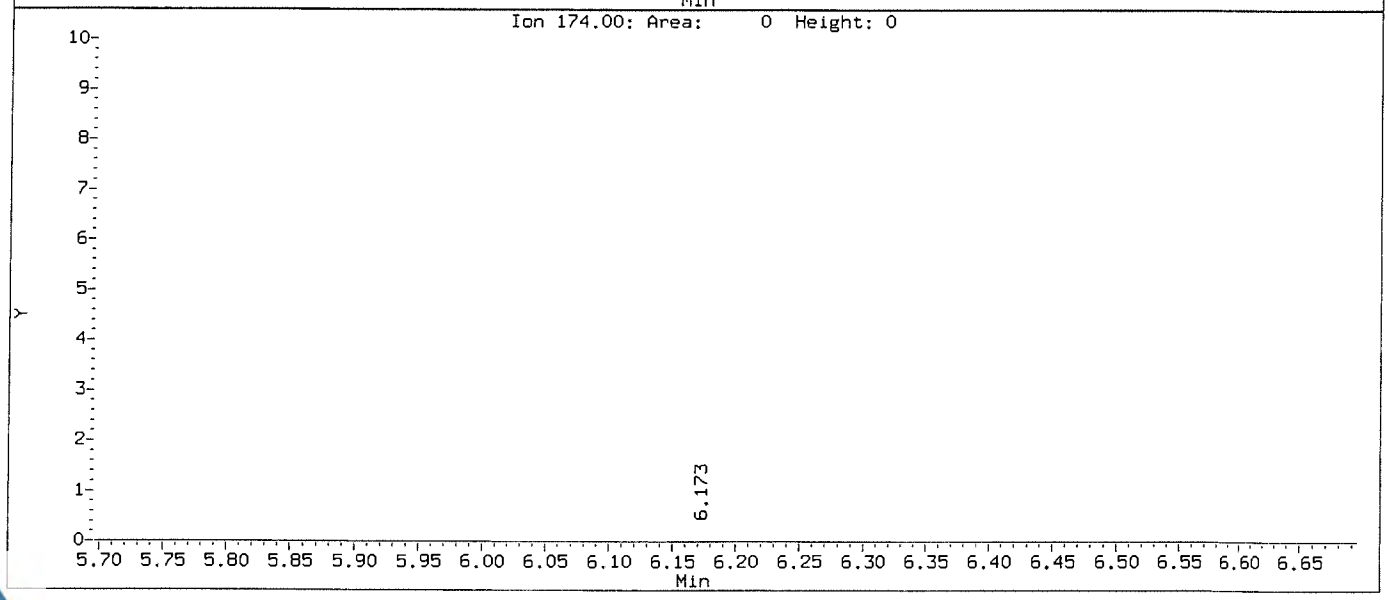
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: Dibromomethane
CAS Number: 74-95-3







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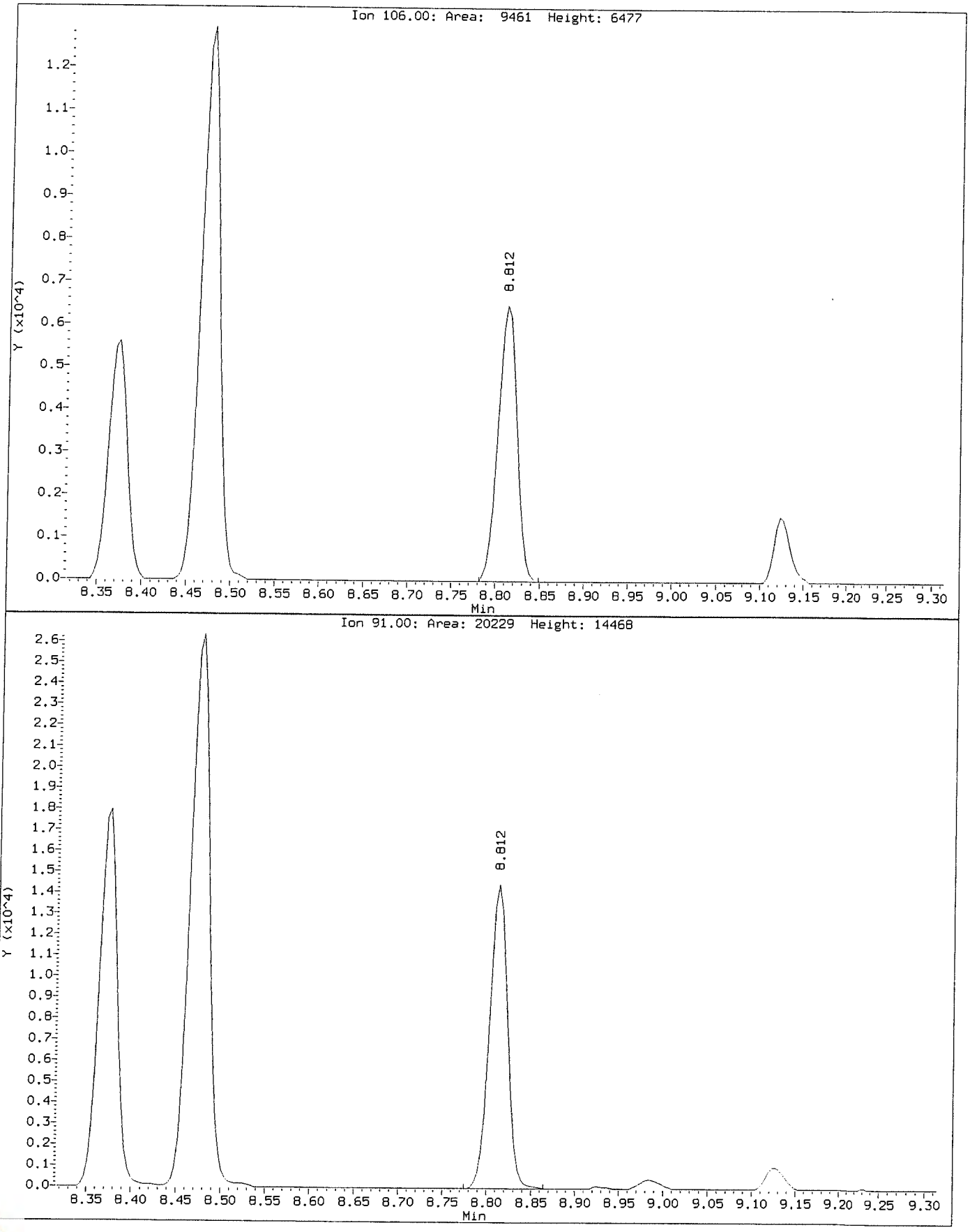
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: o-Xylene
CAS Number: 95-47-6



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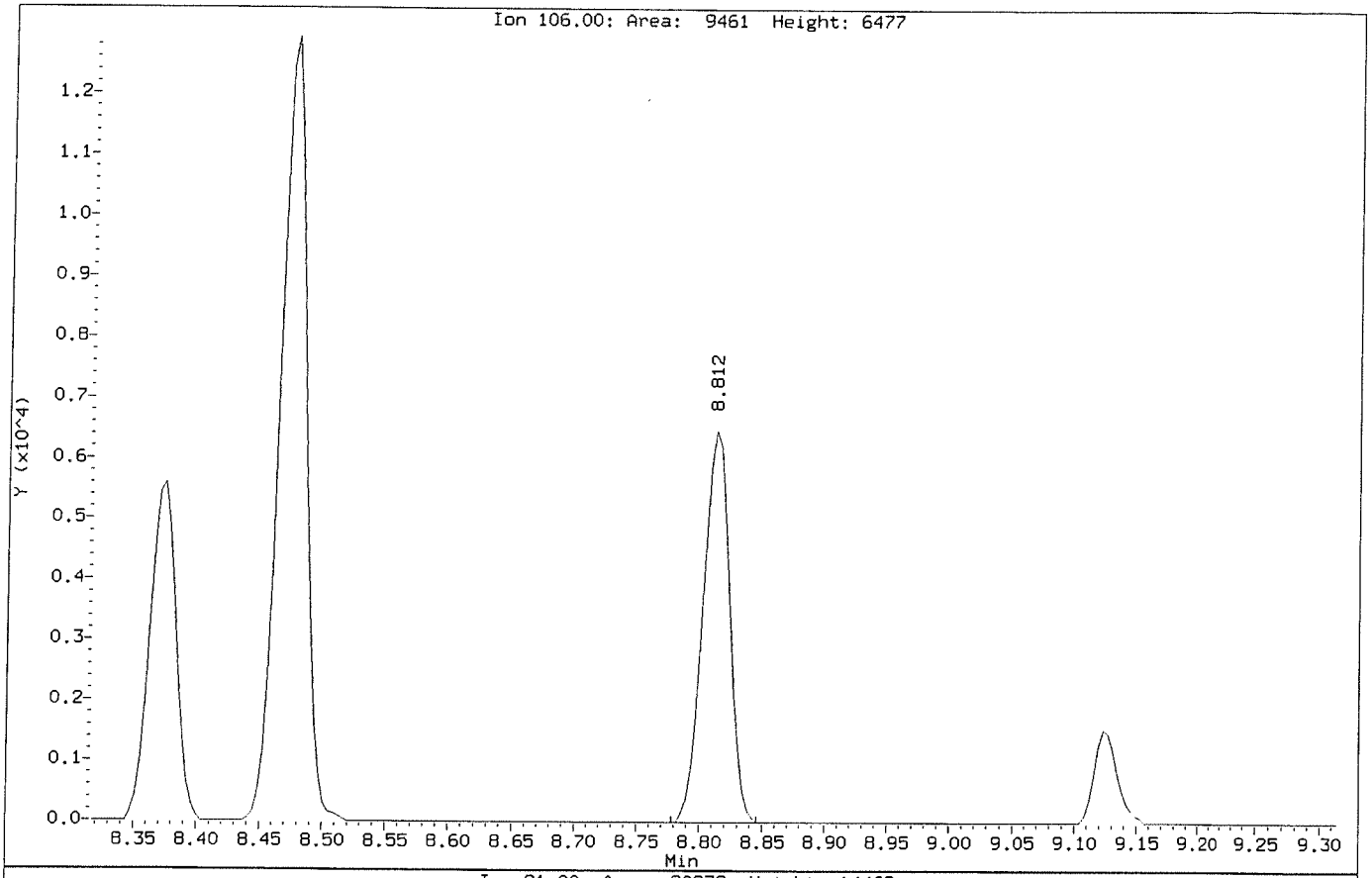
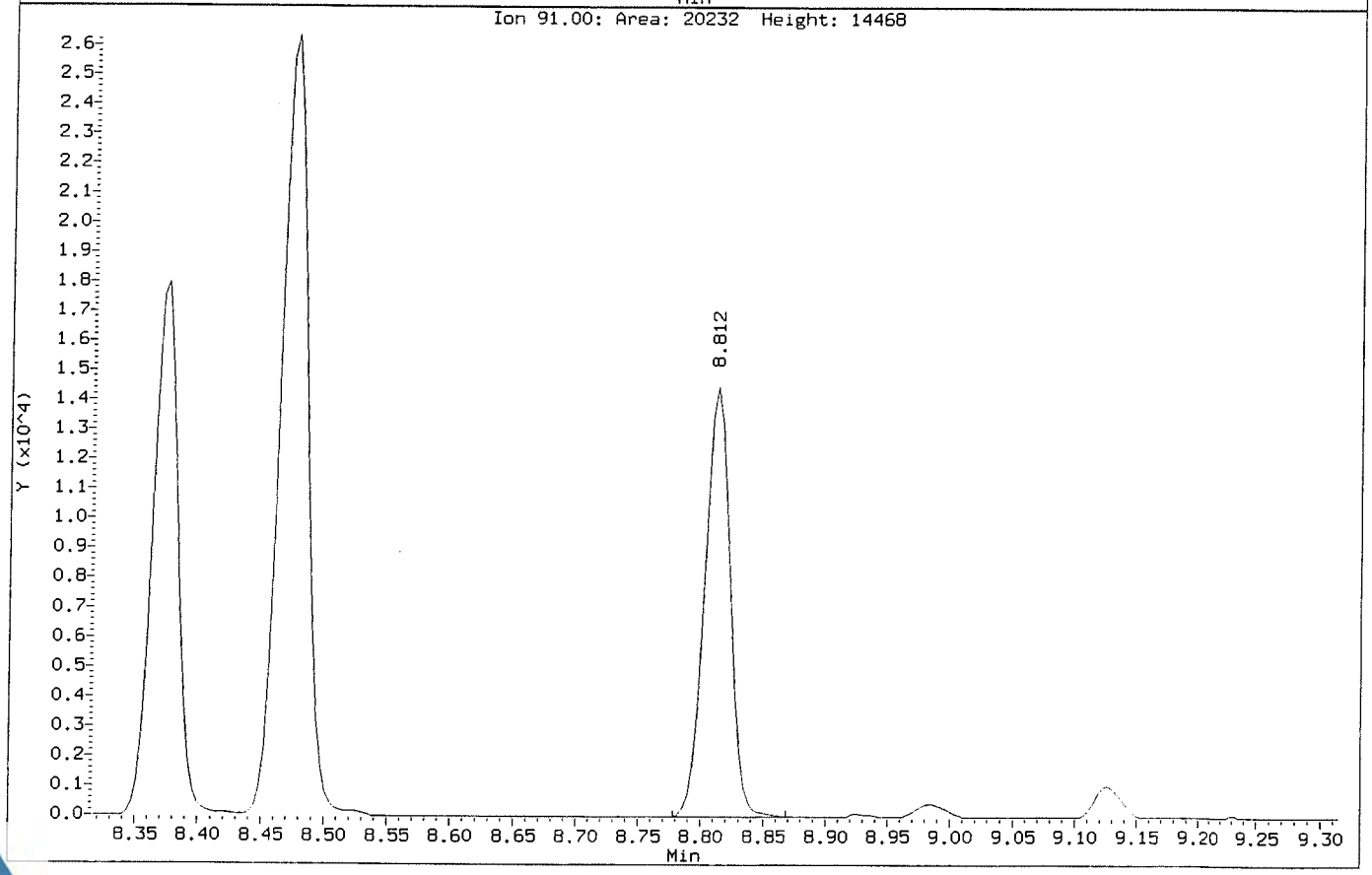
Instrument: VOA9.i
Client Sample ID: VSTD001

Compound: o-Xylene
CAS Number: 95-47-6





Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111305.D Page 1
Report Date: 24-Jan-2019 18:55

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111305.D
Lab Smp Id: VSTD002 Client Smp ID: VSTD002
Inj Date : 13-NOV-2018 13:01
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD002;VSTD002;1;4;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 12:36 Cal File: U111304.D
Als bottle: 6 Calibration Sample, Level: 4
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

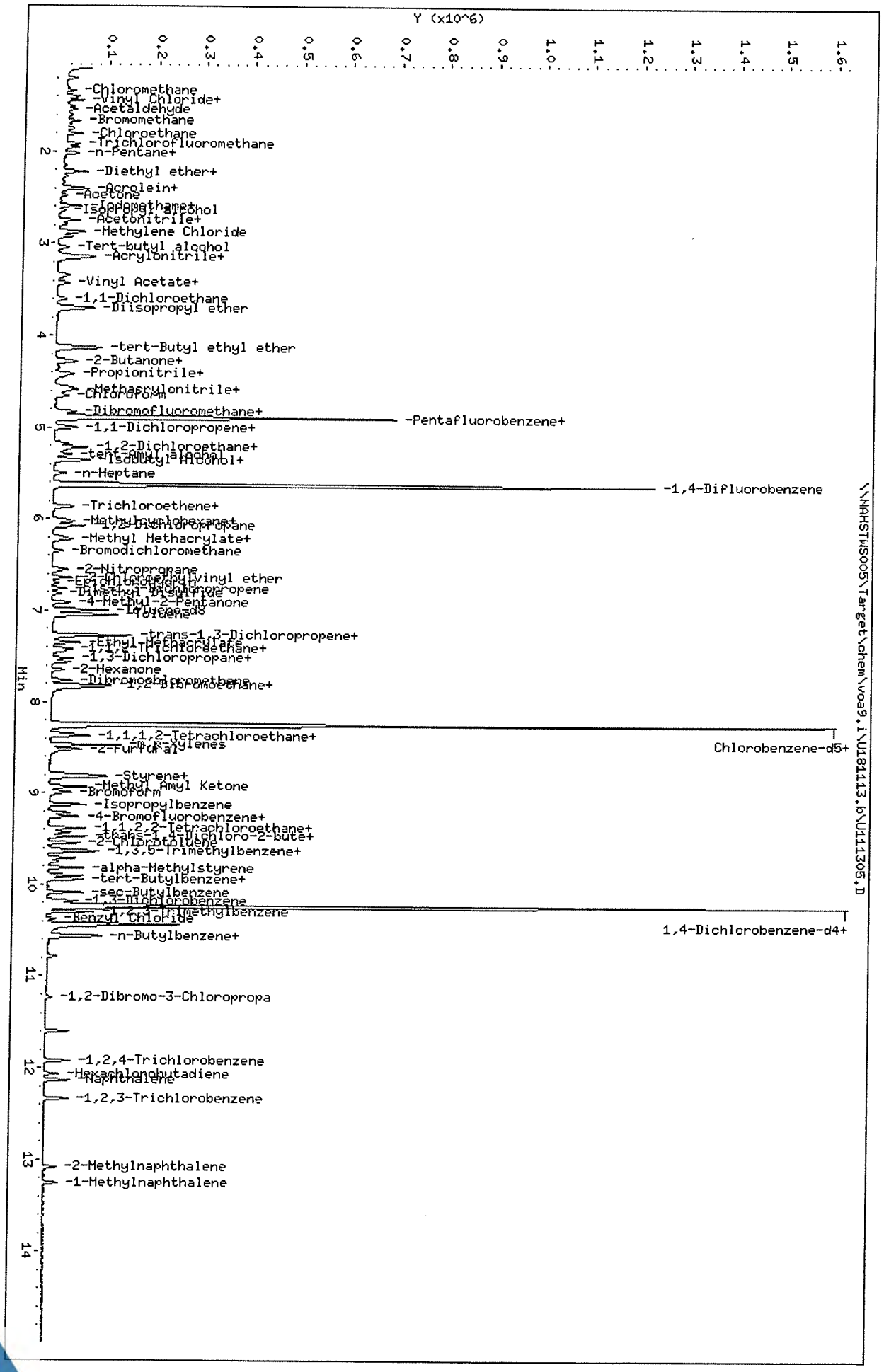
	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	ON-COL (ug/l)
*	1 Pentafluorobenzene	168	4.894	4.894	(1.000)	414744	50.0000	
*	36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	809284	50.0000	
*	47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	755385	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	352080	50.0000	
$	30 Dibromofluoromethane	113	4.830	4.830	(0.987)	12925	2.00000	1.52(a)
$	35 1,2-Dichloroethane-d4	65	5.175	5.175	(1.057)	18531	2.00000	1.28(a)
$	48 Toluene-d8	98	6.990	6.990	(0.847)	51591	2.00000	1.05(a)
$	69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	18827	2.00000	1.50(a)
	60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	8223	2.00000	1.72(a)
	31 1,1,1-Trichloroethane	97	4.827	4.827	(0.986)	14071	2.00000	1.93(a)
	68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	16127	2.00000	1.93(a)
	138 Freon TF	101	2.401	2.401	(0.491)	8834	2.00000	2.12(a)
	53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	9196	2.00000	1.91(a)
	22 1,1-Dichloroethane	63	3.604	3.604	(0.737)	18719	2.00000	1.96(a)
	11 1,1-Dichloroethene	96	2.397	2.397	(0.490)	9368	2.00000	2.00(a)
	32 1,1-Dichloropropene	75	5.003	5.003	(0.889)	14736	2.00000	1.97(a)
	93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	12553	2.00000	1.88(a)
	71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	15506	2.00000	1.78(a)
	90 1,2,4-Trichlorobenzene	180	11.927	11.927	(1.165)	12849	2.00000	1.85(a)
	79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	36765	2.00000	1.88(a)
	89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	1762	2.00000	2.38(a)
	57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	10196	2.00000	1.83(a)

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111305.D Page 2
Report Date: 24-Jan-2019 18:55

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	21603	2.00000	1.92(a)
33 1,2-Dichloroethane	62	5.250	5.250	(0.933)	17243	2.00000	2.03(a)
42 1,2-Dichloropropane	63	6.082	6.082	(1.081)	10957	2.00000	1.90(a)
75 1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	35537	2.00000	1.87(a)
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	21971	2.00000	1.98(a)
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	19816	2.00000	1.92(a)
84 1,4-Dichlorobenzene	146	10.255	10.255	(1.002)	22453	2.00000	2.02(a)
26 2,2-Dichloropropane	77	4.275	4.275	(0.874)	10687	2.00000	1.81(a)
24 2-Butanone	43	4.343	4.343	(0.887)	10886	4.00000	3.73(a)
76 2-Chlorotoluene	91	9.546	9.546	(0.933)	33012	2.00000	1.91(a)
52 2-Hexanone	43	7.649	7.649	(0.927)	15967	4.00000	3.63(a)
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	38540	2.00000	1.93(a)
82 p-Isopropyltoluene	119	10.210	10.210	(0.997)	36591	2.00000	1.89(a)
45 4-Methyl-2-Pentanone	43	6.915	6.915	(0.838)	23062	4.00000	3.65(a)
10 Acetone	43	2.480	2.480	(0.507)	12023	4.00000	2.16(a)
37 Benzene	78	5.216	5.216	(0.927)	43114	2.00000	1.92(a)
74 Bromobenzene	156	9.381	9.381	(0.917)	10831	2.00000	1.87(a)
29 Bromochloromethane	128	4.553	4.553	(0.930)	5091	2.00000	2.08(a)
39 Bromodichloromethane	83	6.348	6.348	(1.129)	12072	2.00000	1.79(a)
66 Bromoform	173	8.984	8.984	(1.089)	4530	2.00000	2.48(Ta)
6 Bromomethane	94	1.670	1.670	(0.341)	7606	2.00000	4.02(a)
19 Carbon Disulfide	76	2.589	2.589	(0.529)	55277	4.00000	3.82(a)
34 Carbon Tetrachloride	117	4.995	4.995	(0.888)	10688	2.00000	1.83(a)
59 Chlorobenzene	112	8.275	8.275	(1.003)	29617	2.00000	1.89(a)
7 Chloroethane	64	1.749	1.749	(0.357)	9074	2.00000	2.09(aM)
28 Chloroform	83	4.658	4.658	(0.952)	18550	2.00000	1.94(a)
3 Chloromethane	50	1.336	1.336	(0.273)	12000	2.00000	2.38(a)
27 cis-1,2-Dichloroethene	96	4.283	4.283	(0.875)	11719	2.00000	1.99(a)
46 cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	13722	2.00000	1.62(a)
55 Dibromochloromethane	129	7.758	7.758	(0.940)	7733	2.00000	1.61(a)
44 Dibromomethane	93	6.191	6.191	(1.101)	7013	2.00000	1.94(aM)
2 Dichlorodifluoromethane	85	1.202	1.202	(0.246)	12615	2.00000	3.01(a)
61 Ethylbenzene	106	8.373	8.373	(1.015)	14817	2.00000	1.87(a)
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	4667	2.00000	2.48(a)
67 Isopropylbenzene	105	9.126	9.126	(1.106)	44094	2.00000	1.92(a)
62 m,p-Xylenes	106	8.474	8.474	(1.027)	36359	4.00000	3.74(a)
17 Methylene Chloride	84	2.870	2.870	(0.586)	13586	2.00000	1.90(a)
87 n-Butylbenzene	91	10.558	10.558	(1.031)	36189	2.00000	2.36(a)
73 n-Propylbenzene	91	9.475	9.475	(0.926)	53805	2.00000	1.93(a)
92 Naphthalene	128	12.133	12.133	(1.185)	35700	2.00000	1.71(a)
63 o-Xylene	106	8.811	8.811	(1.068)	18379	2.00000	1.89(aH)
81 sec-Butylbenzene	105	10.086	10.086	(0.985)	43610	2.00000	1.88(a)
64 Styrene	104	8.826	8.826	(1.070)	30570	2.00000	1.86(a)
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	31095	2.00000	1.92(a)
56 Tetrachloroethene	164	7.526	7.526	(0.912)	7936	2.00000	2.00(a)
50 Toluene	91	7.046	7.046	(0.854)	47615	2.00000	1.98(a)
20 trans-1,2-Dichloroethene	96	3.143	3.143	(0.642)	10067	2.00000	1.96(a)
51 trans-1,3-Dichloropropene	75	7.263	7.263	(1.291)	10881	2.00000	2.73(a)
38 Trichloroethene	130	5.861	5.861	(1.042)	10685	2.00000	1.93(a)
8 Trichlorofluoromethane	101	1.951	1.951	(0.399)	17301	2.00000	2.08(a)
5 Vinyl Chloride	62	1.415	1.415	(0.289)	13465	2.00000	2.47(a)

QC Flag Legend

T - Target compound detected outside RT window.
a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



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Sample Info: VSTD002;VSTD002;1;4;
Purge Volume: 5.0
Column phase: DB624

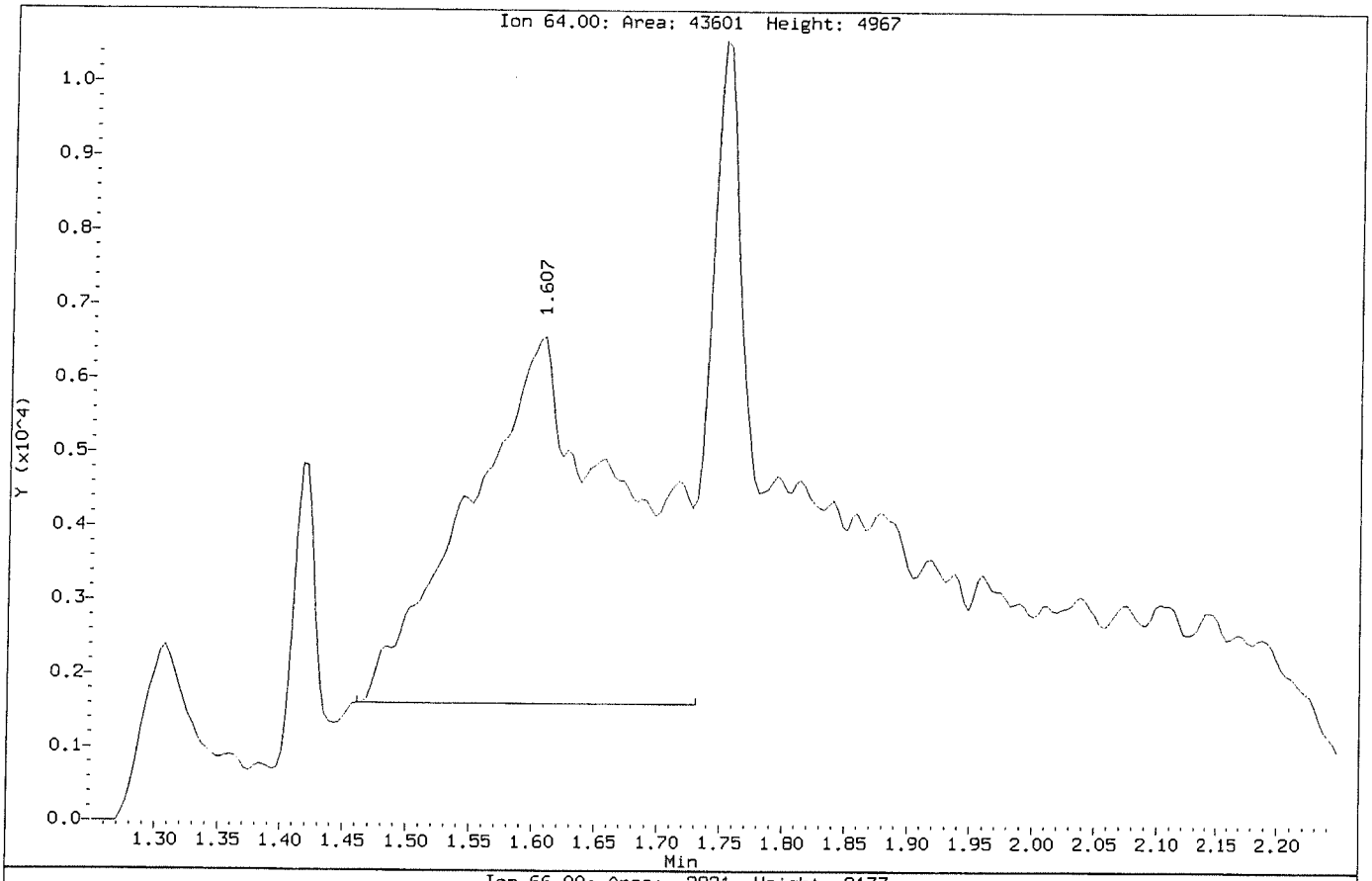
\\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111305.D

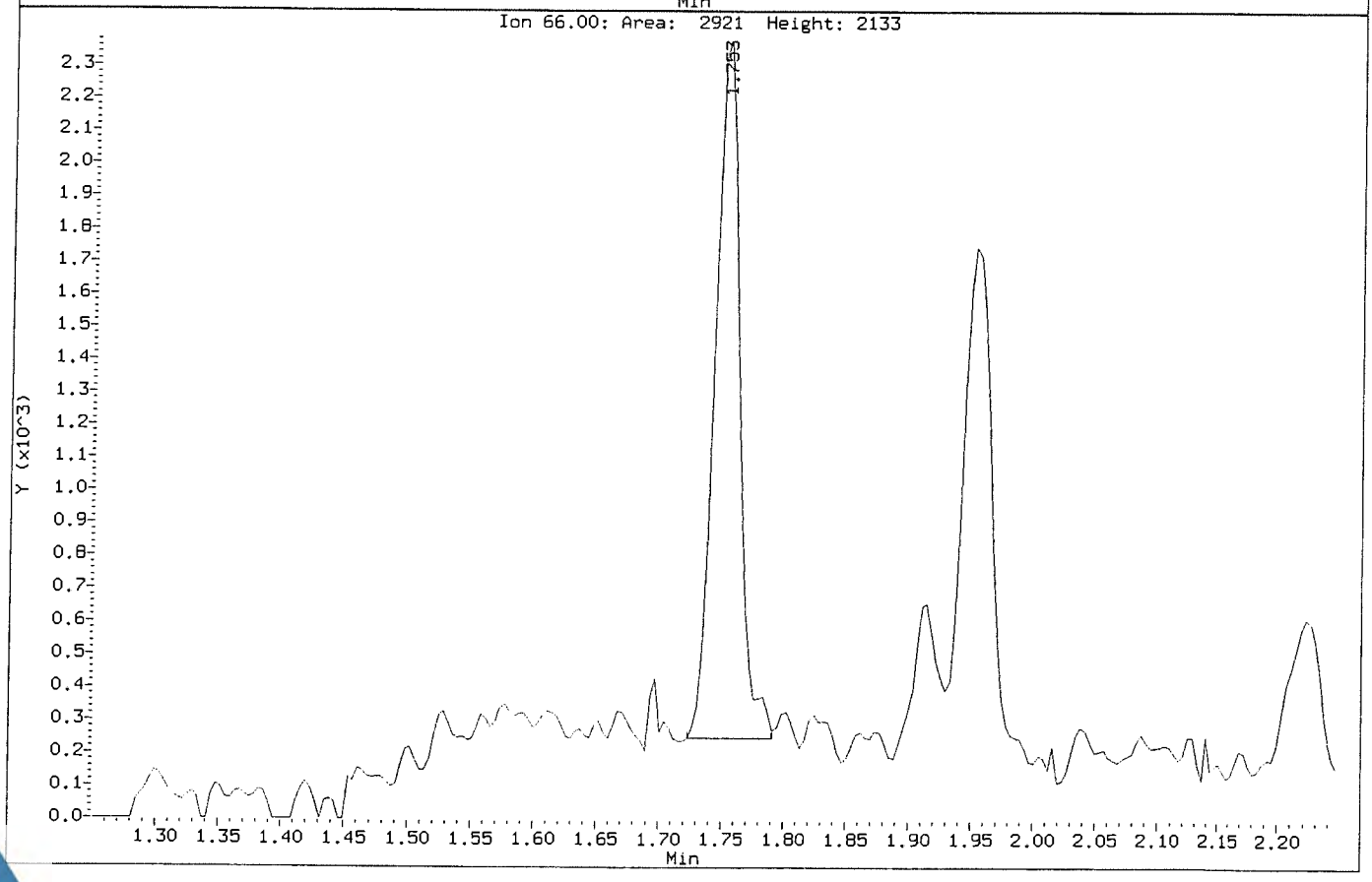
Instrument: VOA9.i

Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111305.D
Injection Date: 13-NOV-2018 13:01
Instrument: VOA9.i
Client Sample ID: VSTD002

Compound: Chloroethane
CAS Number: 75-00-3





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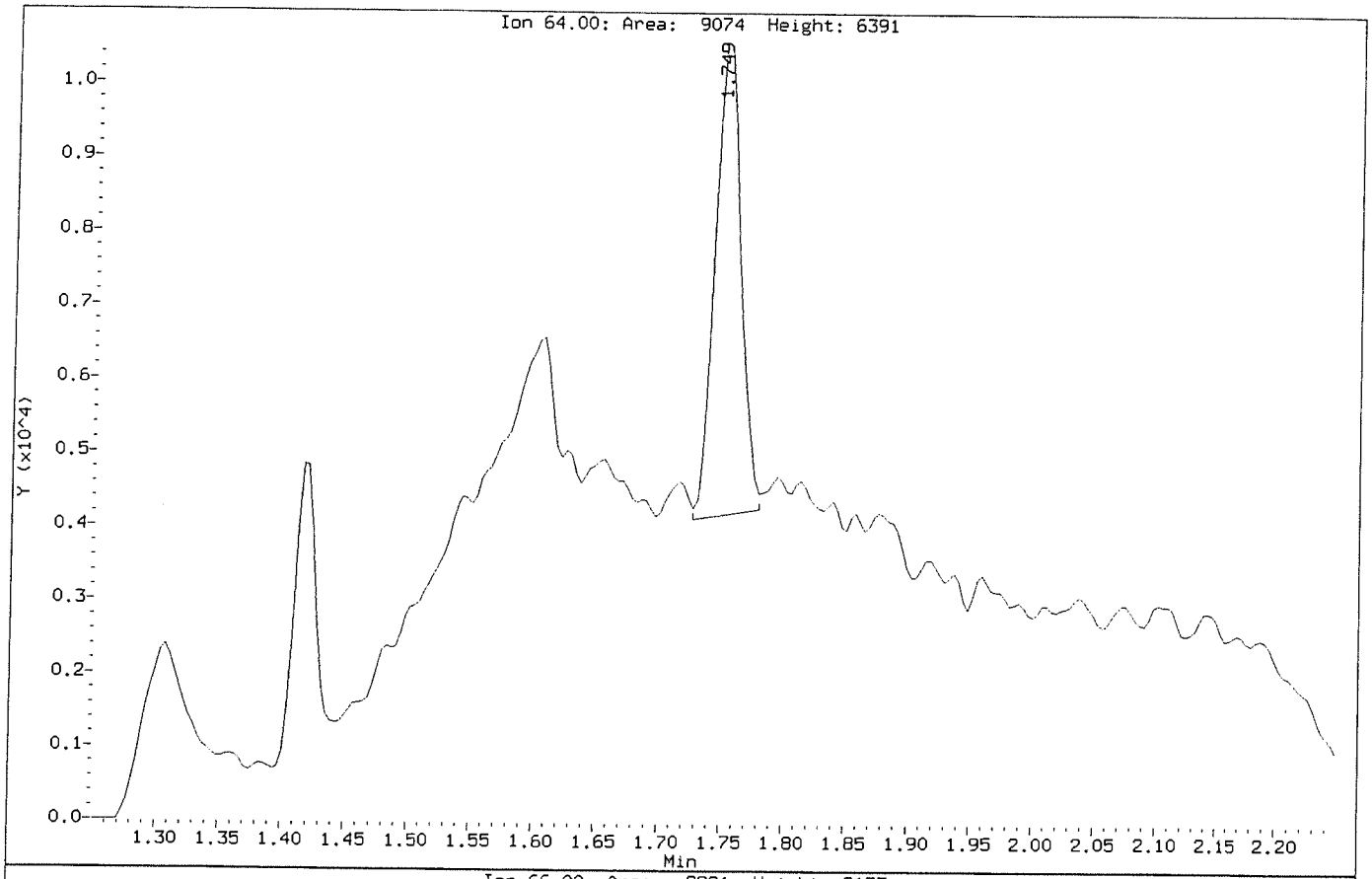
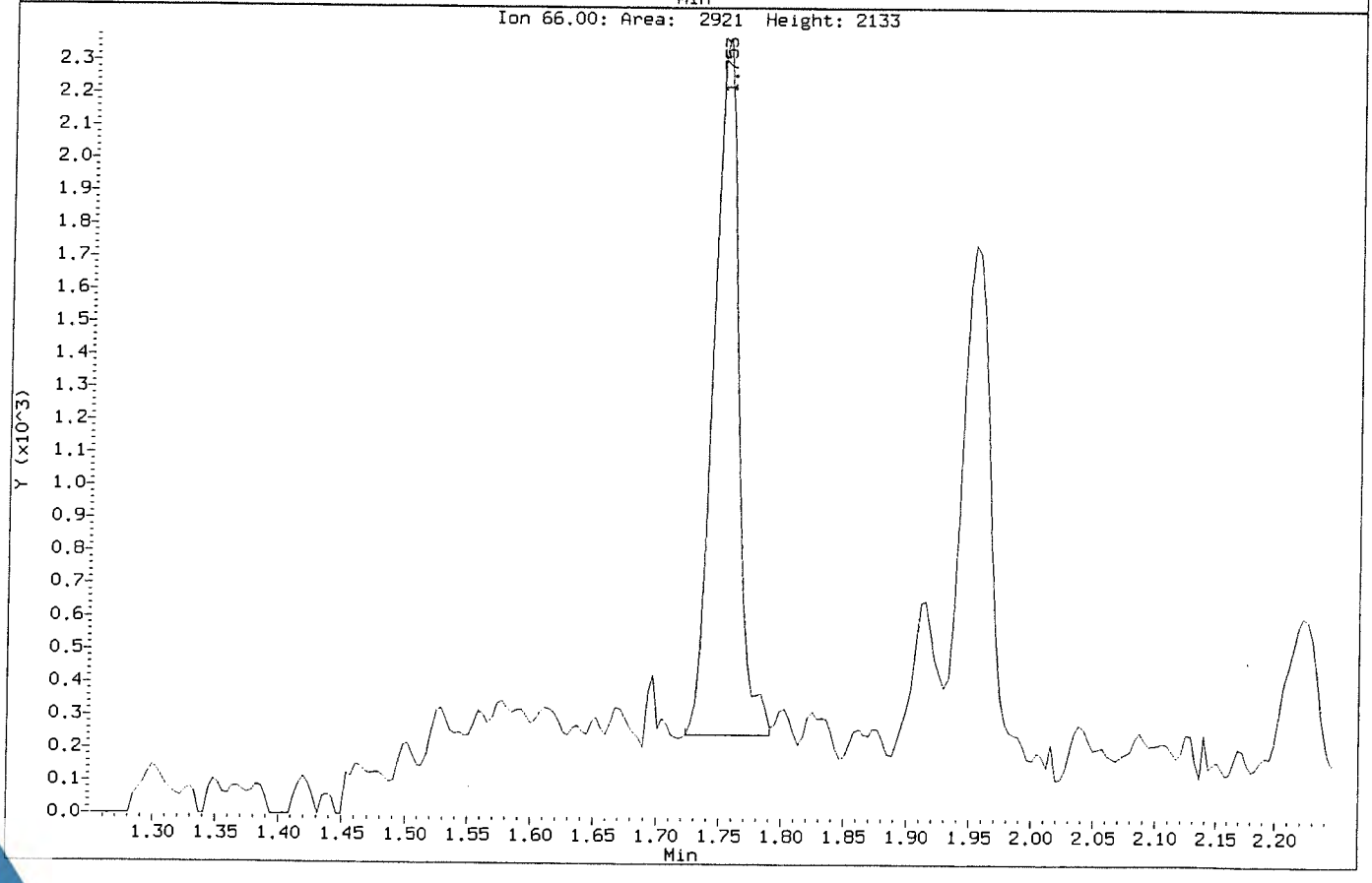
Instrument: VOA9.i
Client Sample ID: VSTD002

Compound: Chloroethane
CAS Number: 75-00-3





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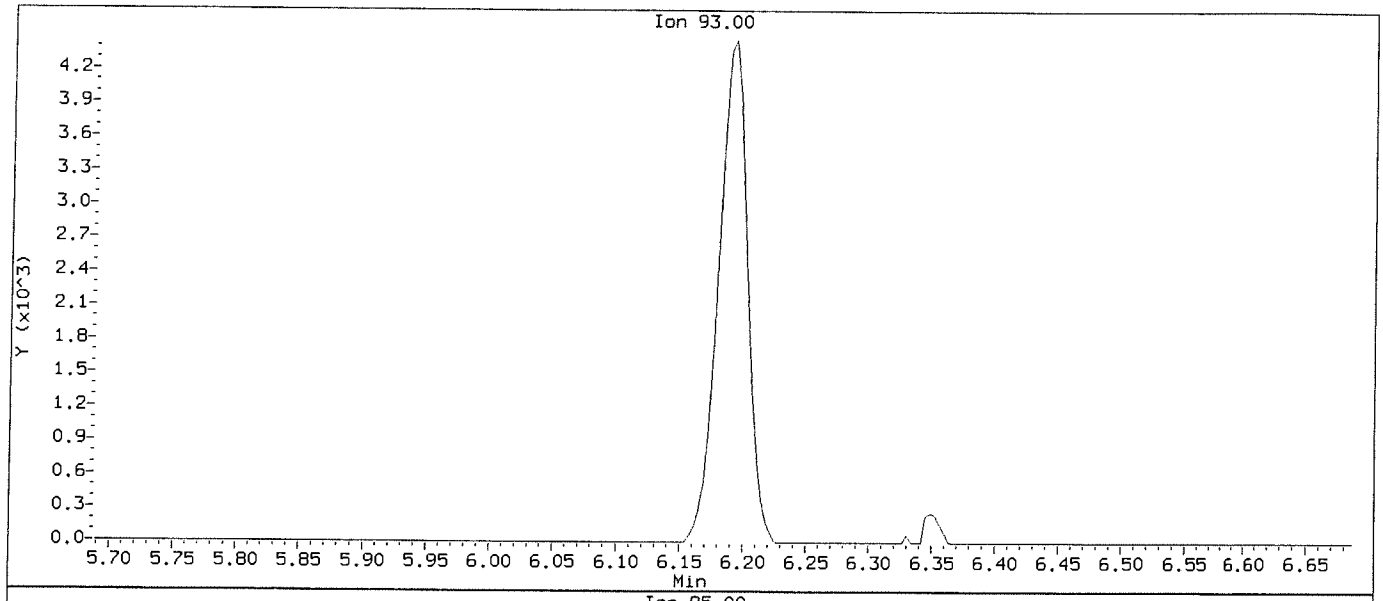
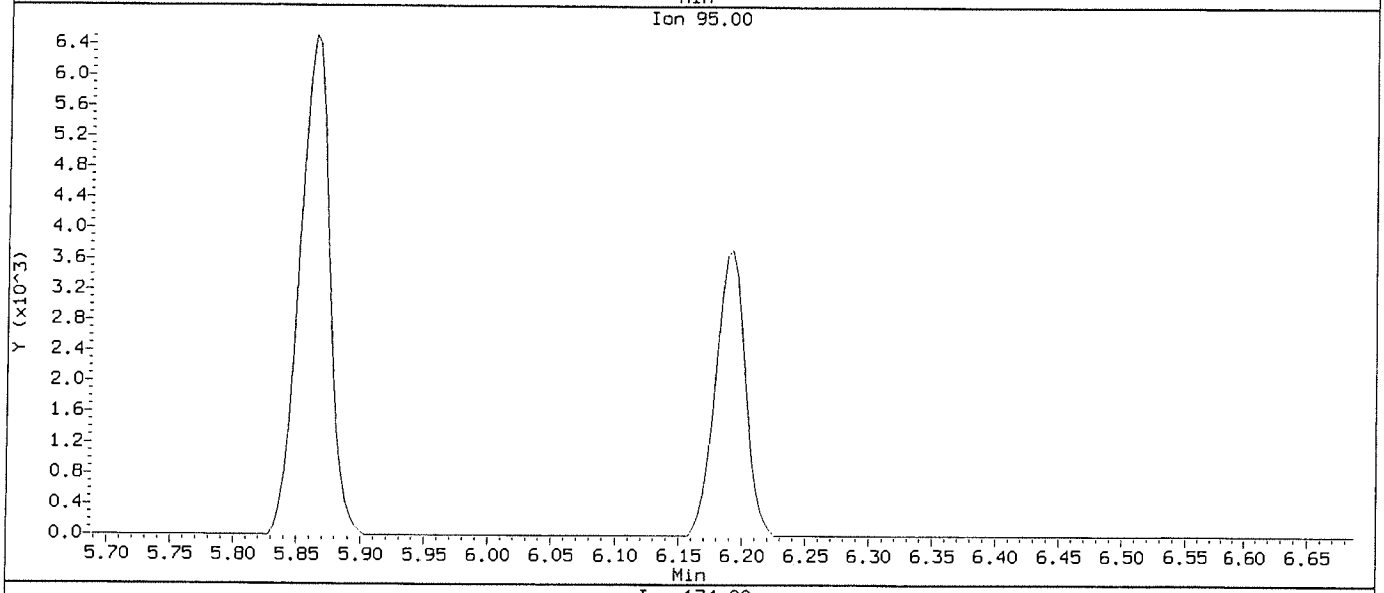
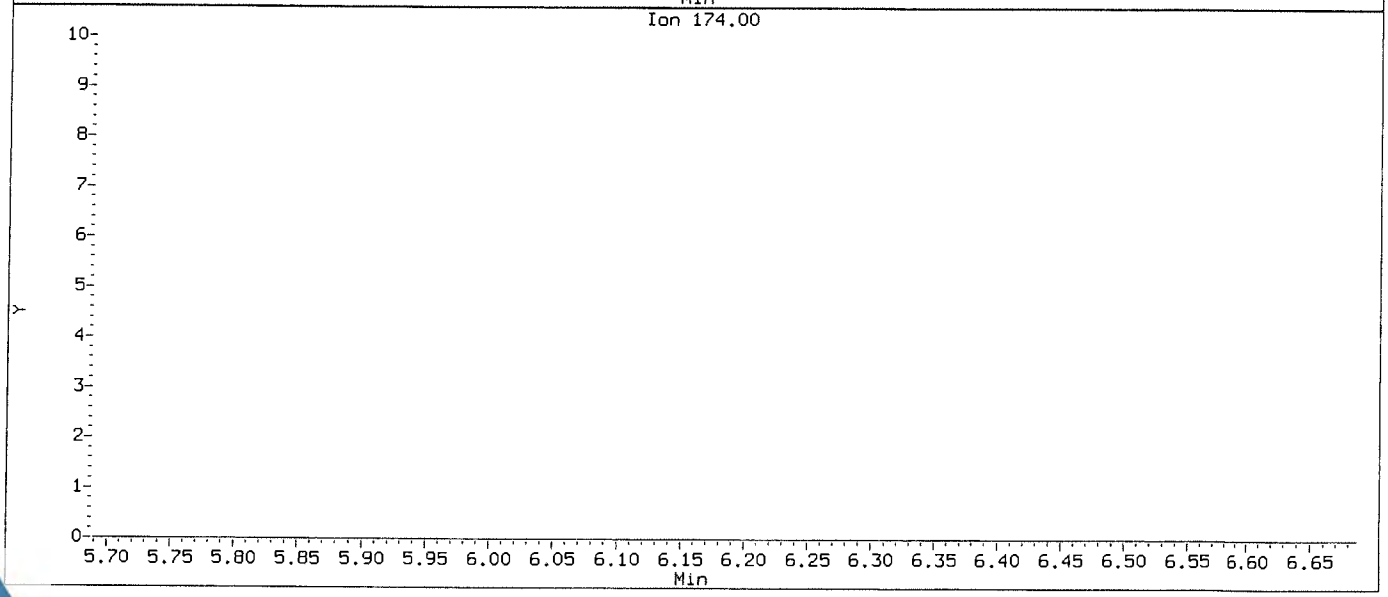
Injection Date: 13-NOV-2018 13:01
Instrument: VOA9.i
Client Sample ID: VSTD002

Compound: Dibromomethane
CAS Number: 74-95-3







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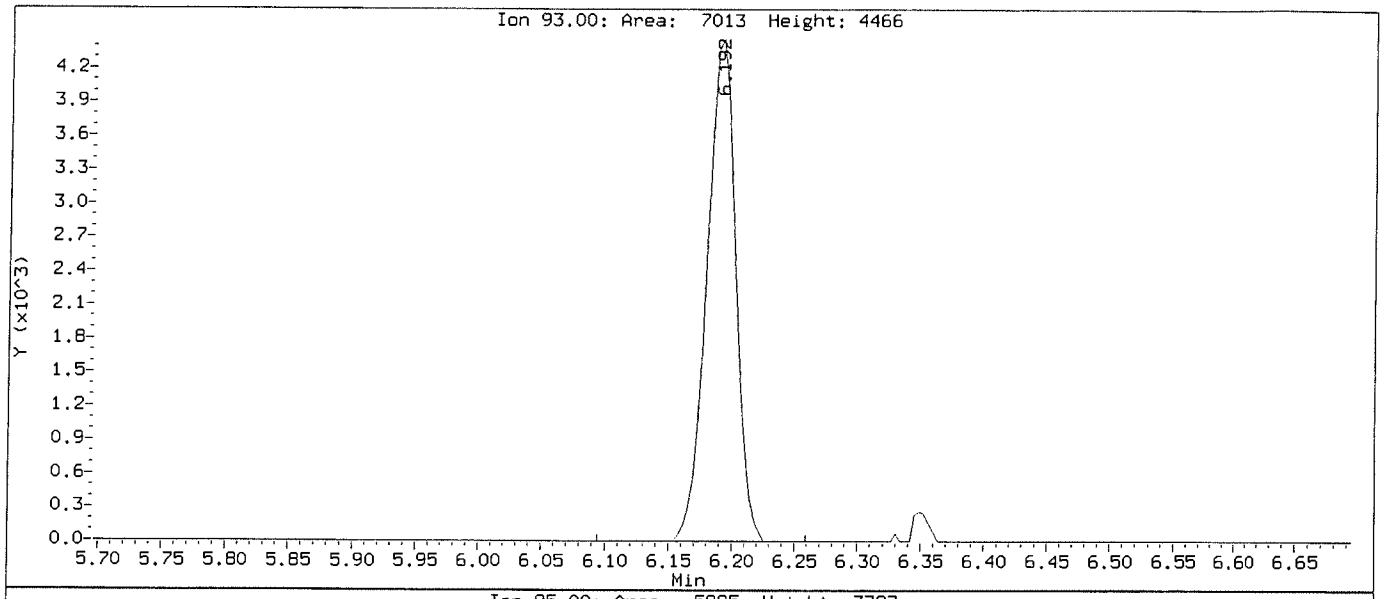
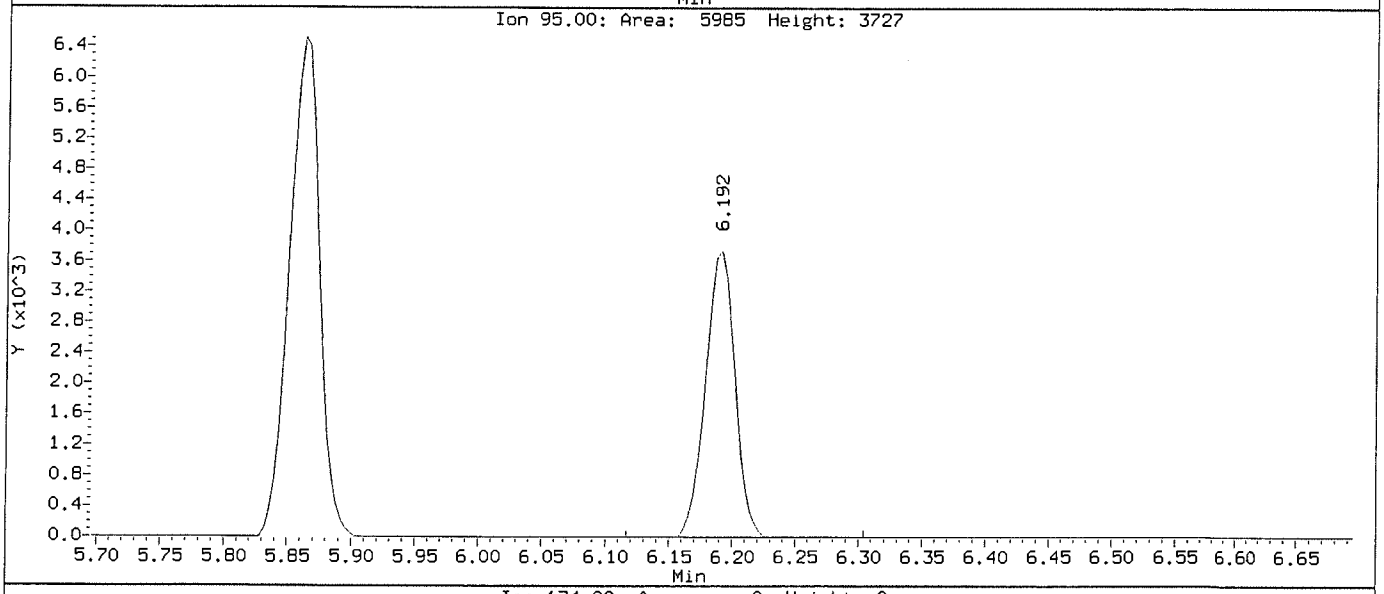
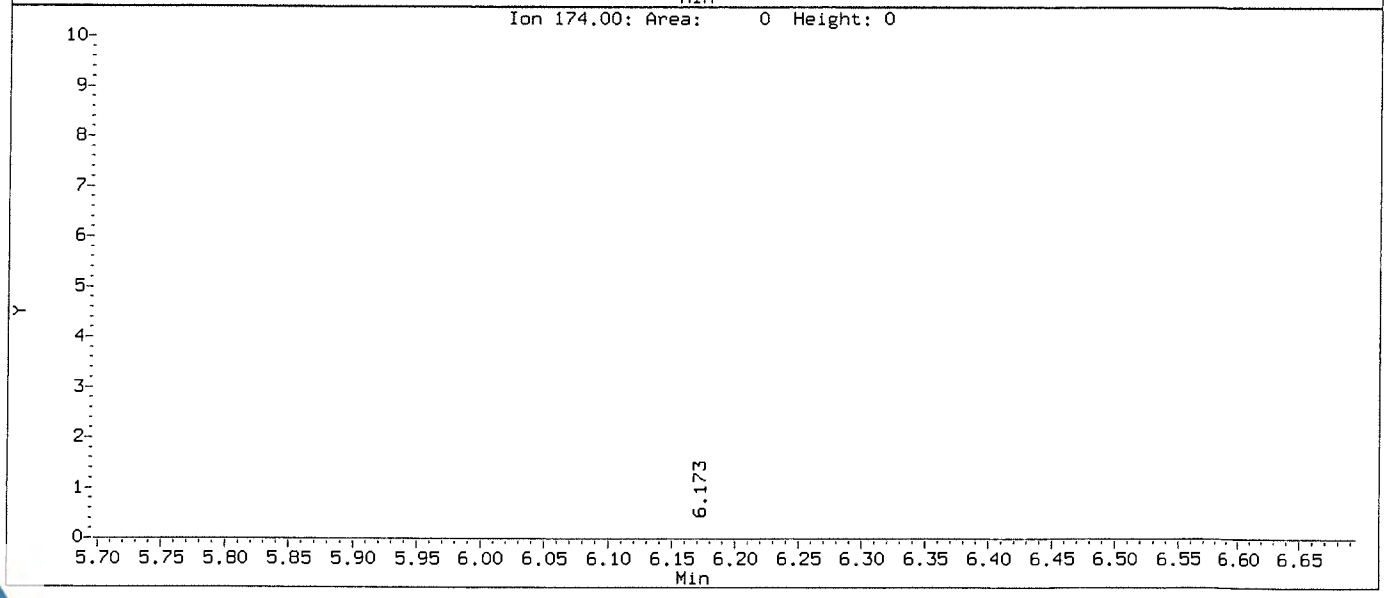
Instrument: VOA9.i
Client Sample ID: VSTD002

Compound: Dibromomethane
CAS Number: 74-95-3







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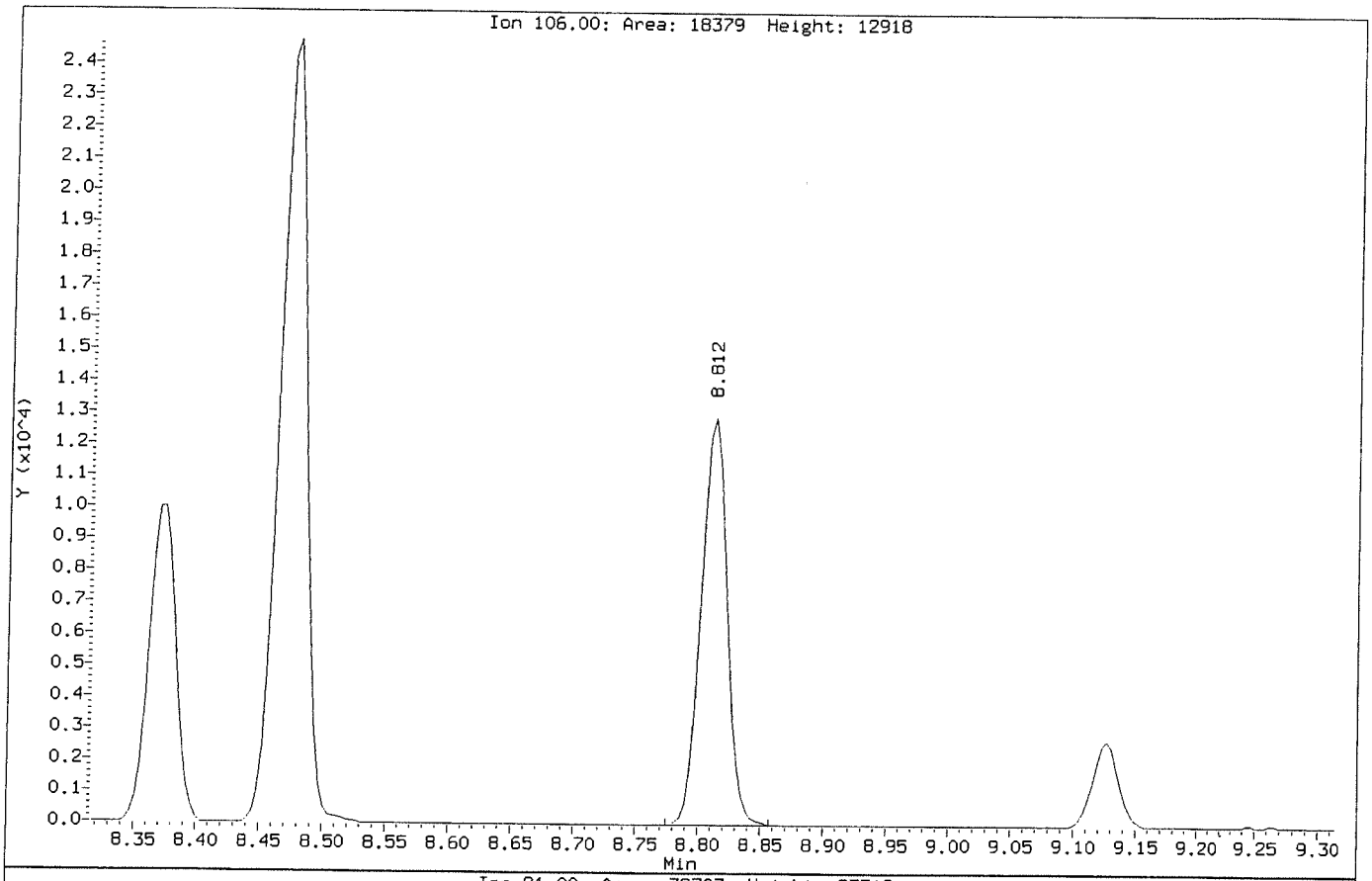
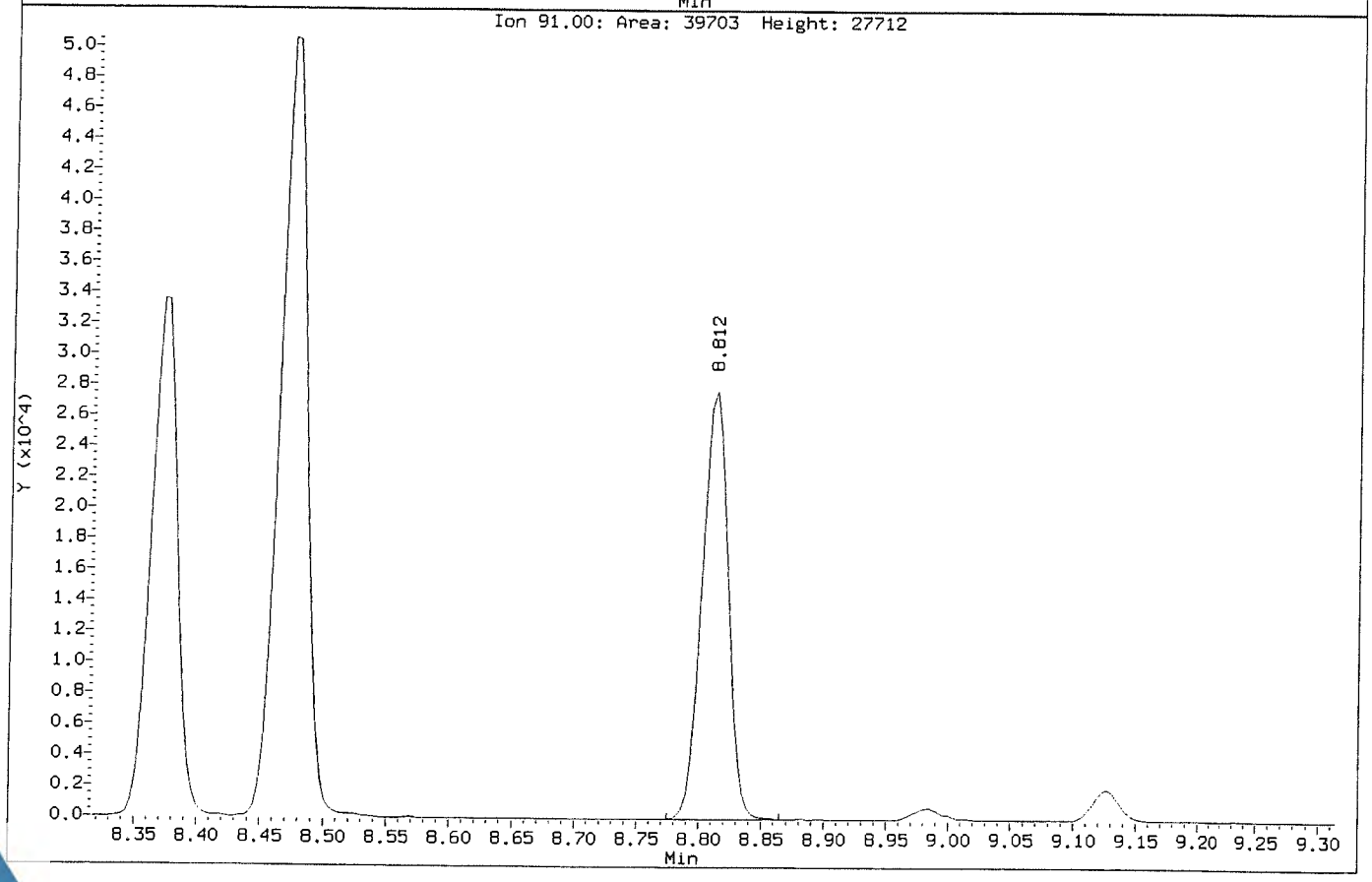
Instrument: VOA9.i
Client Sample ID: VSTD002

Compound: o-Xylene
CAS Number: 95-47-6





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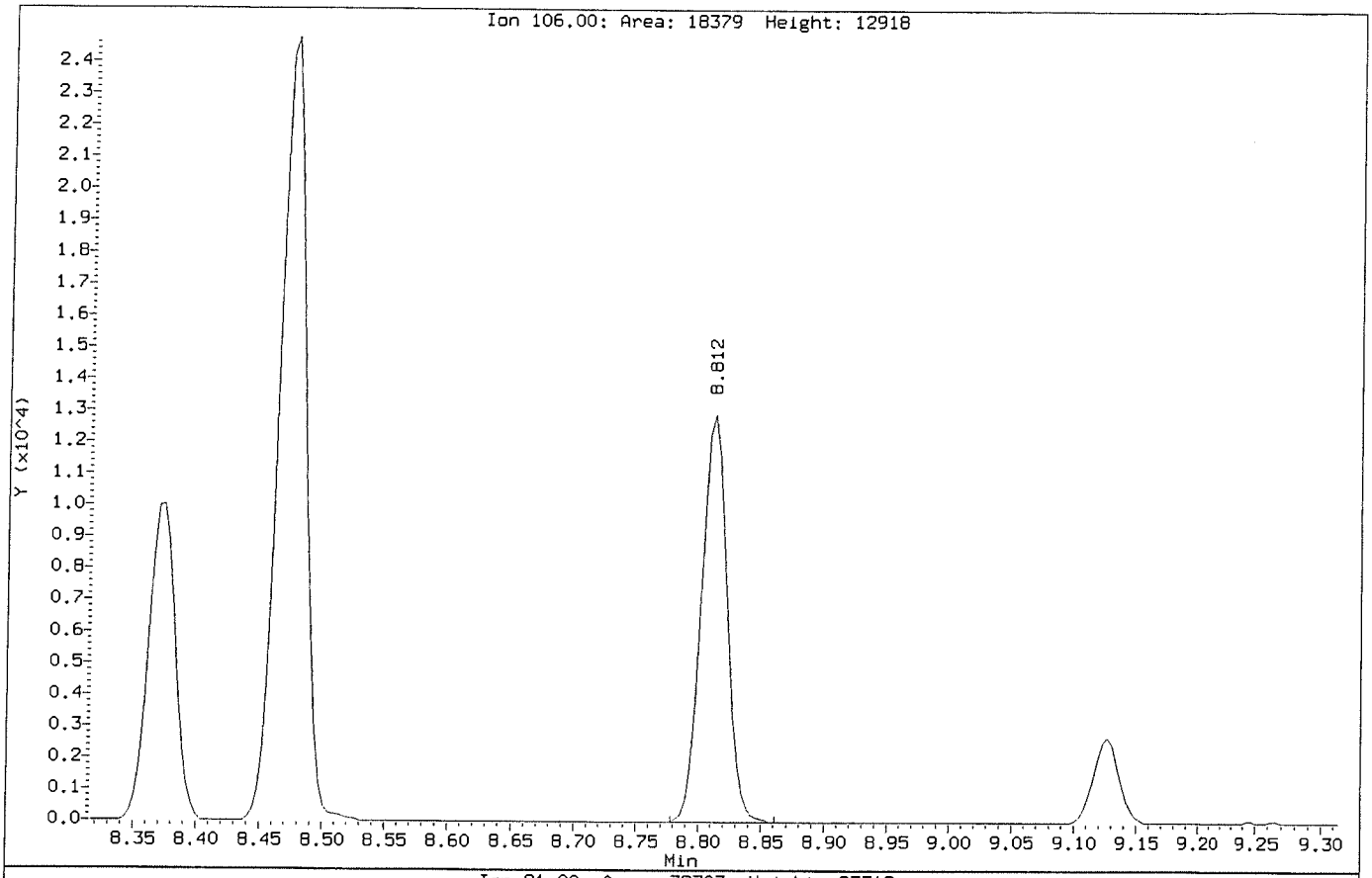
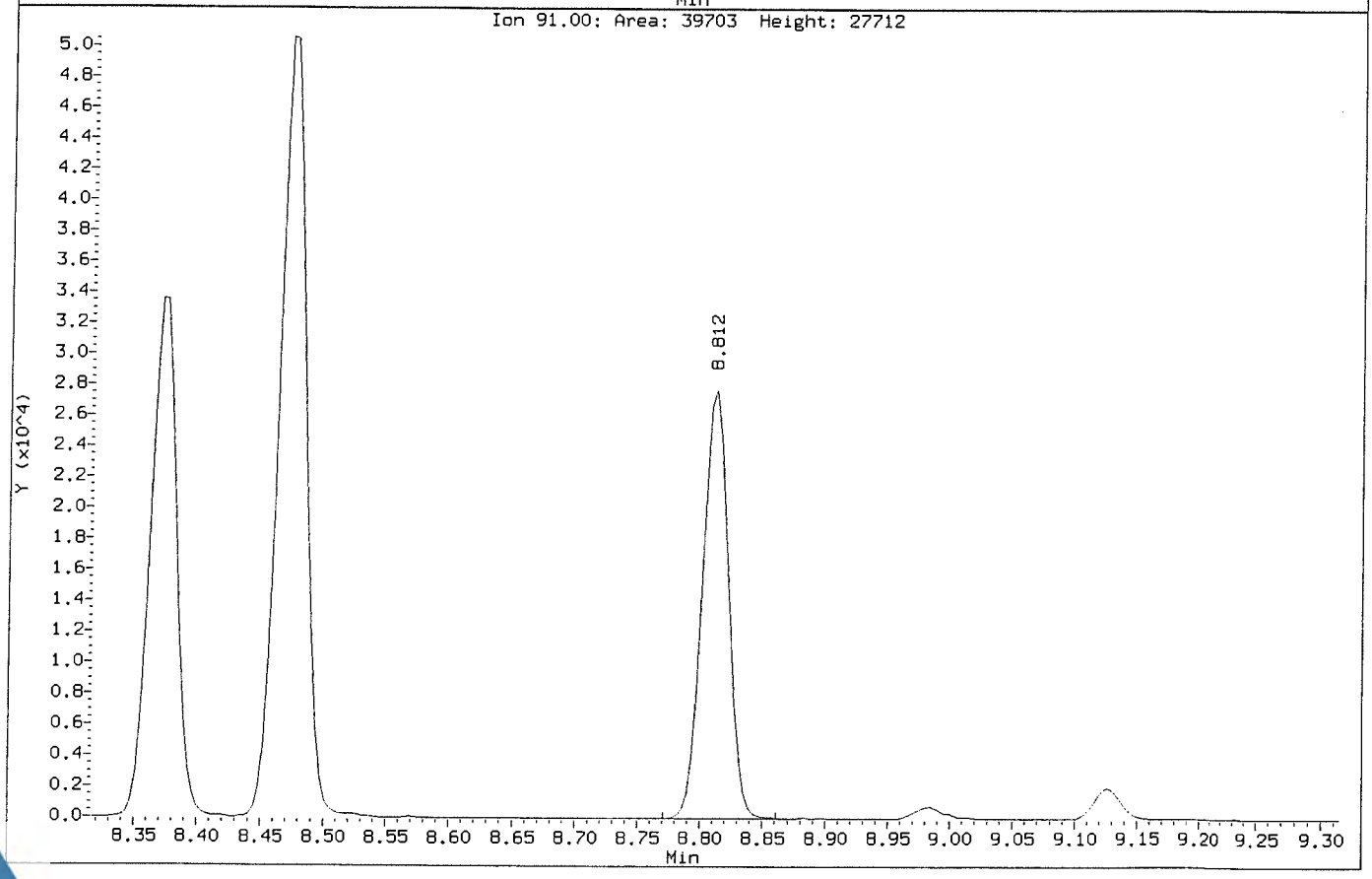
Instrument: VOA9.i
Client Sample ID: VSTD002

Compound: o-Xylene
CAS Number: 95-47-6





Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111306.D Page 1
Report Date: 24-Jan-2019 18:55

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111306.D
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Inj Date : 13-NOV-2018 13:25
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD005;VSTD005;1;5;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 13:01 Cal File: U111305.D
Als bottle: 7 Calibration Sample, Level: 5
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

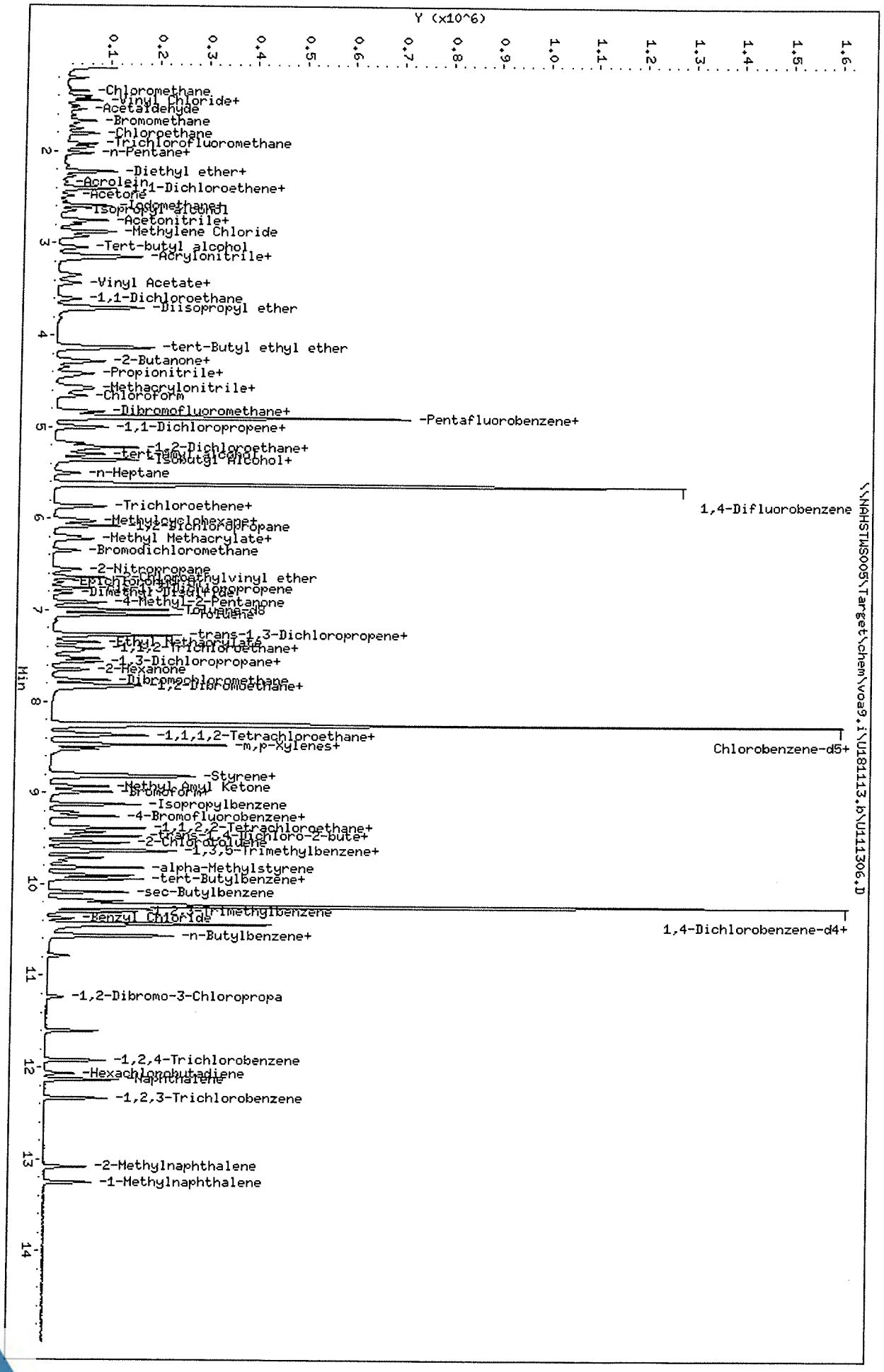
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	422530	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	813180	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	744948	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	348698	50.0000	
$ 30 Dibromofluoromethane	113	4.830	4.830	(0.987)	27004	5.00000	4.44(a)
$ 35 1,2-Dichloroethane-d4	65	5.175	5.175	(1.057)	38984	5.00000	4.54(a)
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	112942	5.00000	4.42(a)
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	41214	5.00000	4.64(a)
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	21915	5.00000	4.66(a)
31 1,1,1-Trichloroethane	97	4.827	4.827	(0.986)	31327	5.00000	4.22(a)
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	42360	5.00000	5.12
138 Freon TF	101	2.405	2.405	(0.491)	17279	5.00000	4.08(a)
53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	23401	5.00000	4.94(a)
22 1,1-Dichloroethane	63	3.604	3.604	(0.737)	45506	5.00000	4.69(a)
11 1,1-Dichloroethene	96	2.401	2.401	(0.491)	20013	5.00000	4.19(a)
32 1,1-Dichloropropene	75	5.006	5.006	(0.890)	33087	5.00000	4.40(a)
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	31782	5.00000	4.82(a)
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	42556	5.00000	4.93(a)
90 1,2,4-Trichlorobenzene	180	11.927	11.927	(1.165)	31441	5.00000	4.58(a)
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	93787	5.00000	4.84(a)
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	5351	5.00000	5.17
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	27191	5.00000	4.95(a)

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111306.D Page 2
Report Date: 24-Jan-2019 18:55

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	55248	5.00000	4.96(a)
33 1,2-Dichloroethane	62	5.254	5.254	(0.934)	41764	5.00000	4.90(a)
42 1,2-Dichloropropane	63	6.082	6.082	(1.081)	27675	5.00000	4.78(a)
75 1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	88227	5.00000	4.70(a)
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	52374	5.00000	4.77(a)
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	51002	5.00000	5.01
84 1,4-Dichlorobenzene	146	10.255	10.255	(1.002)	55298	5.00000	5.11
26 2,2-Dichloropropane	77	4.275	4.275	(0.874)	25227	5.00000	4.20(a)
24 2-Butanone	43	4.343	4.343	(0.887)	30016	10.0000	10.10
76 2-Chlorotoluene	91	9.546	9.546	(0.933)	82685	5.00000	4.84(a)
52 2-Hexanone	43	7.653	7.653	(0.928)	44101	10.0000	10.18
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	97151	5.00000	4.93(a)
82 p-Isopropyltoluene	119	10.210	10.210	(0.997)	85956	5.00000	4.50(a)
45 4-Methyl-2-Pentanone	43	6.915	6.915	(0.838)	62316	10.0000	10.02
10 Acetone	43	2.484	2.484	(0.508)	24249	10.0000	8.62
37 Benzene	78	5.220	5.220	(0.928)	105397	5.00000	4.68(a)
74 Bromobenzene	156	9.381	9.381	(0.917)	27842	5.00000	4.86(a)
29 Bromochloromethane	128	4.557	4.557	(0.931)	12948	5.00000	5.19
39 Bromodichloromethane	83	6.349	6.349	(1.129)	30775	5.00000	4.55(a)
66 Bromoform	173	8.984	8.984	(1.089)	13391	5.00000	5.07(T)
6 Bromomethane	94	1.674	1.674	(0.342)	17760	5.00000	6.77
19 Carbon Disulfide	76	2.592	2.592	(0.530)	124164	10.0000	8.43
34 Carbon Tetrachloride	117	4.995	4.995	(0.888)	23569	5.00000	4.01(a)
59 Chlorobenzene	112	8.275	8.275	(1.003)	72938	5.00000	4.74(a)
7 Chloroethane	64	1.756	1.756	(0.359)	19233	5.00000	4.36(aMH)
28 Chloroform	83	4.658	4.658	(0.952)	45918	5.00000	4.72(a)
3 Chloromethane	50	1.340	1.340	(0.274)	26431	5.00000	4.89(a)
27 cis-1,2-Dichloroethene	96	4.290	4.290	(0.877)	27696	5.00000	4.62(a)
46 cis-1,3-Dichloropropene	75	6.761	6.761	(1.202)	37232	5.00000	4.37(a)
55 Dibromochloromethane	129	7.758	7.758	(0.940)	21374	5.00000	4.53(a)
44 Dibromomethane	93	6.191	6.191	(1.101)	17227	5.00000	4.74(aM)
2 Dichlorodifluoromethane	85	1.205	1.205	(0.246)	24157	5.00000	4.79(a)
61 Ethylbenzene	106	8.373	8.373	(1.015)	35416	5.00000	4.55(a)
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	8782	5.00000	4.49(a)
67 Isopropylbenzene	105	9.126	9.126	(1.106)	106616	5.00000	4.70(a)
62 m,p-Xylenes	106	8.474	8.474	(1.027)	89708	10.0000	9.36
17 Methylene Chloride	84	2.873	2.873	(0.587)	29126	5.00000	4.77(a)
87 n-Butylbenzene	91	10.558	10.558	(1.031)	79206	5.00000	4.76(a)
73 n-Propylbenzene	91	9.475	9.475	(0.926)	128990	5.00000	4.68(a)
92 Naphthalene	128	12.133	12.133	(1.185)	100680	5.00000	4.87(a)
63 o-Xylene	106	8.811	8.811	(1.068)	46119	5.00000	4.81(aH)
81 sec-Butylbenzene	105	10.086	10.086	(0.985)	99437	5.00000	4.34(a)
64 Styrene	104	8.826	8.826	(1.070)	78010	5.00000	4.81(a)
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	73015	5.00000	4.57(a)
56 Tetrachloroethene	164	7.526	7.526	(0.912)	17447	5.00000	4.47(a)
50 Toluene	91	7.050	7.050	(0.855)	113936	5.00000	4.81(a)
20 trans-1,2-Dichloroethene	96	3.143	3.143	(0.642)	23739	5.00000	4.54(a)
51 trans-1,3-Dichloropropene	75	7.259	7.259	(1.291)	30108	5.00000	4.94(a)
38 Trichloroethene	130	5.861	5.861	(1.042)	24849	5.00000	4.48(a)
8 Trichlorofluoromethane	101	1.955	1.955	(0.400)	34539	5.00000	4.08(a)
5 Vinyl Chloride	62	1.419	1.419	(0.290)	29718	5.00000	4.77(a)

QC Flag Legend

T - Target compound detected outside RT window.
a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111306.D
Date : 13-NOV-2018 13:25
Client ID: VSTD005
Sample Info: VSTD005;VSTD005;1;5;
Purge Volume: 5.0
Column phase: DB624

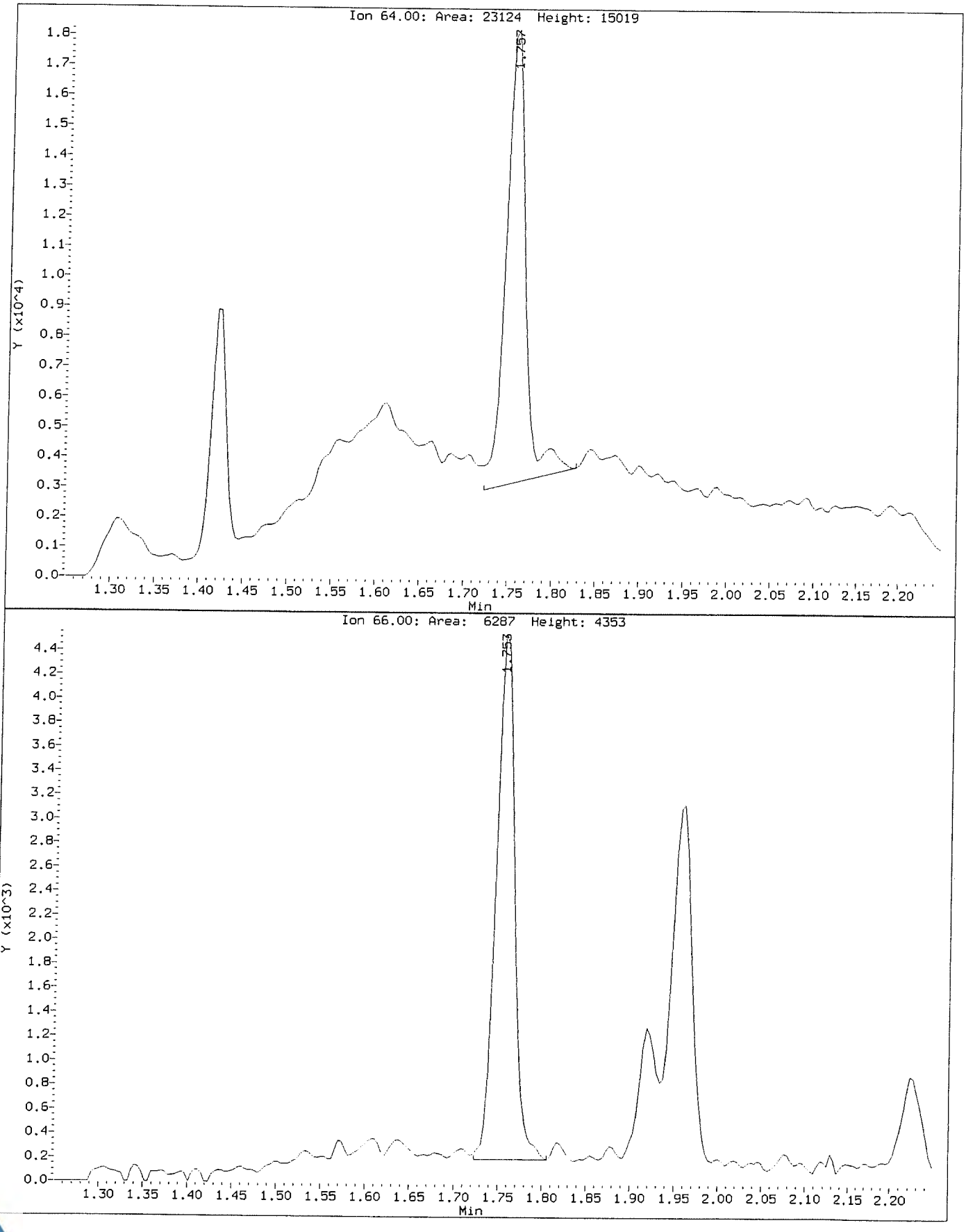
\\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111306.D

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

Page 4

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111306.D
Injection Date: 13-NOV-2018 13:25
Instrument: VOA9.i
Client Sample ID: VSTD005

Compound: Chloroethane
CAS Number: 75-00-3



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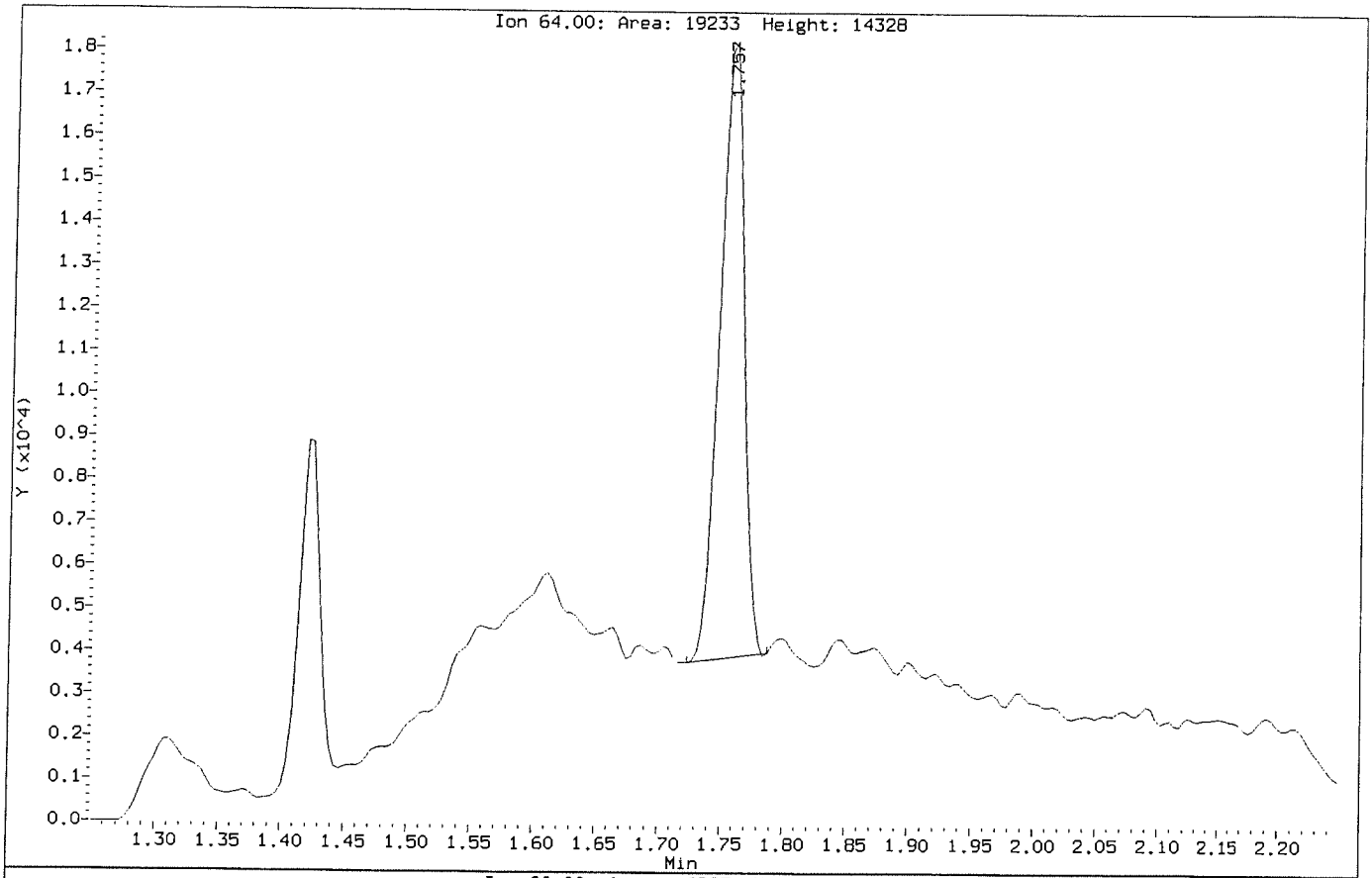
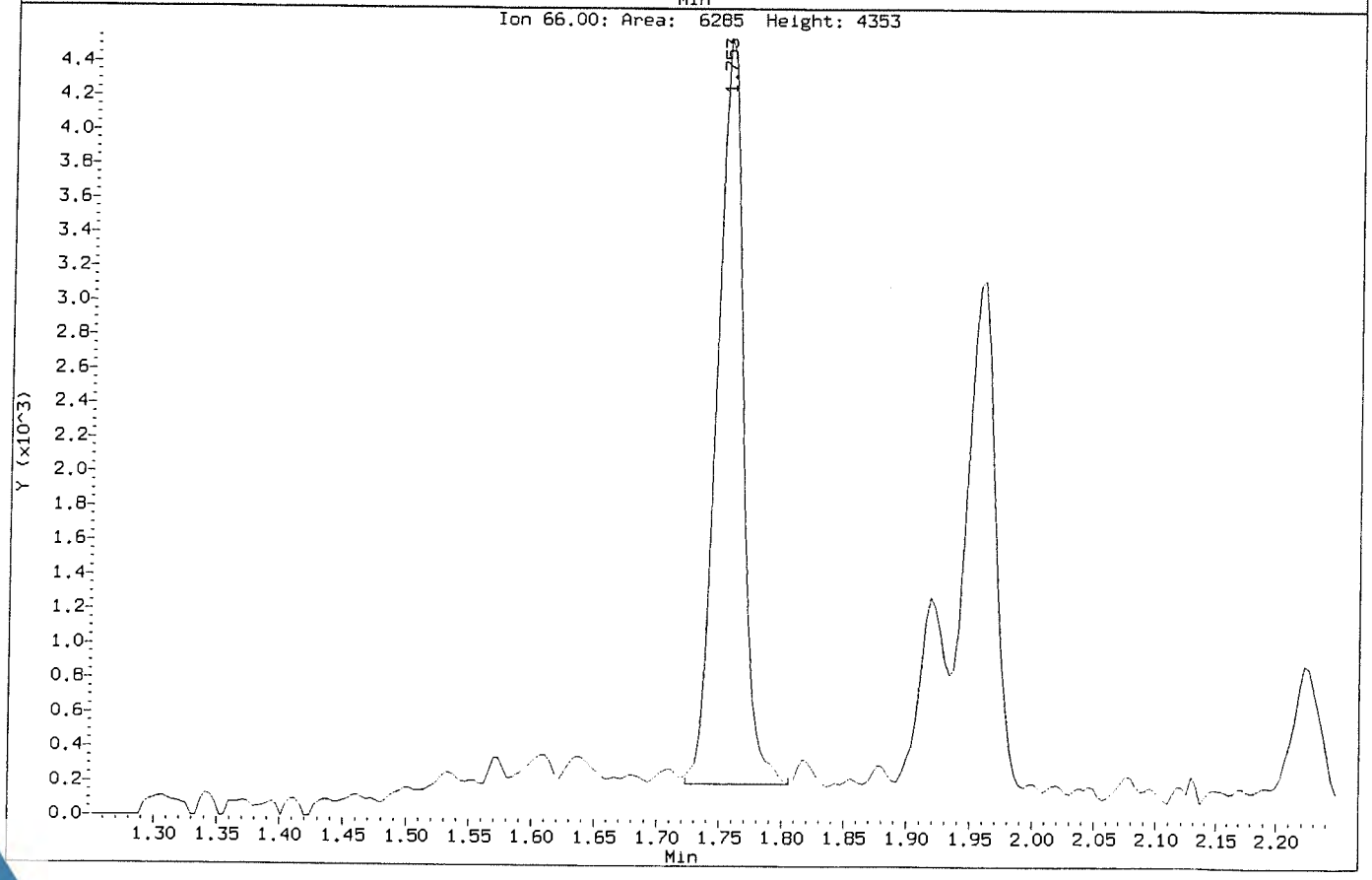
Instrument: VOA9.i
Client Sample ID: VSTD005

Compound: Chloroethane
CAS Number: 75-00-3





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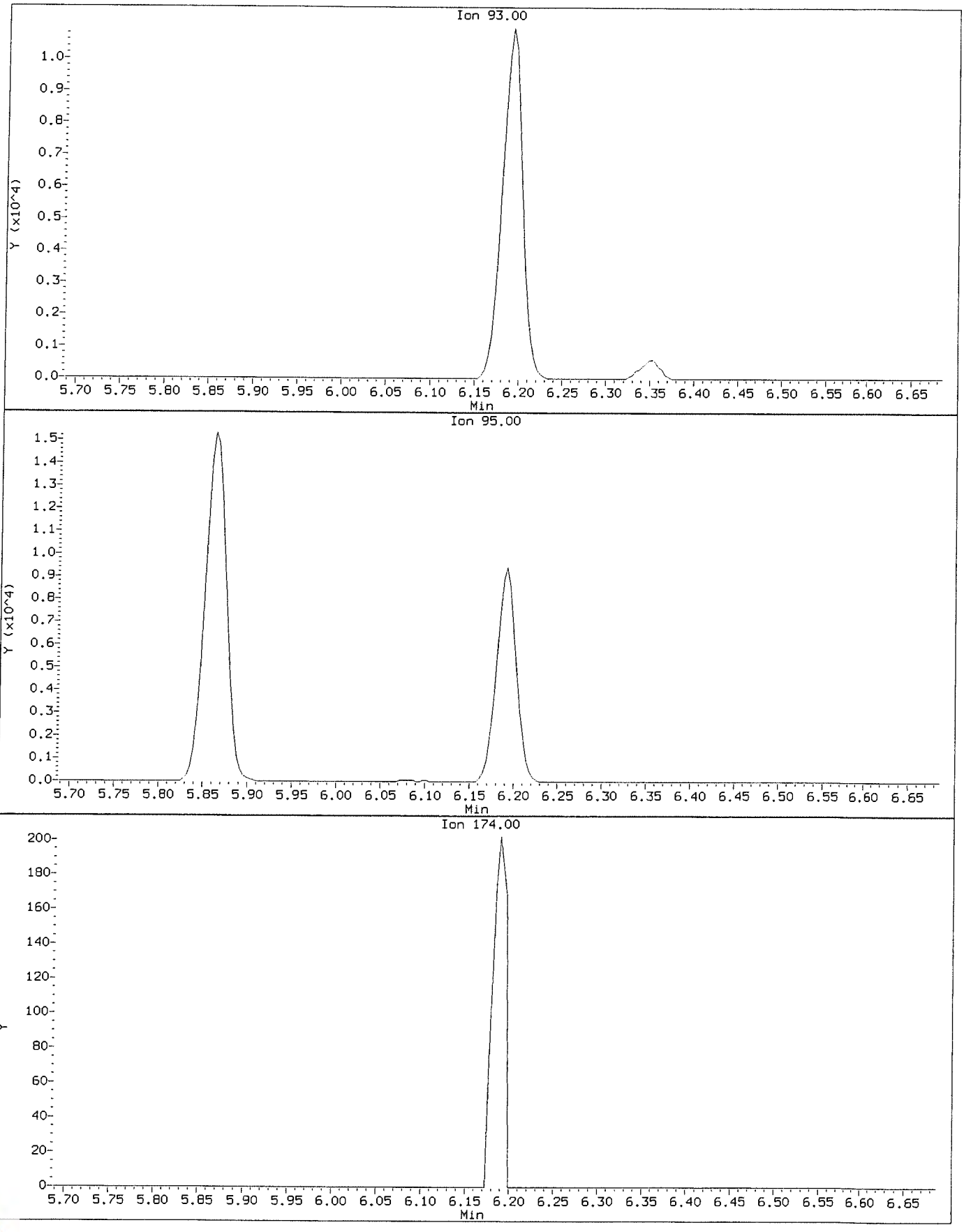
Instrument: VOA9.i
Client Sample ID: VSTD005

Compound: Dibromomethane
CAS Number: 74-95-3



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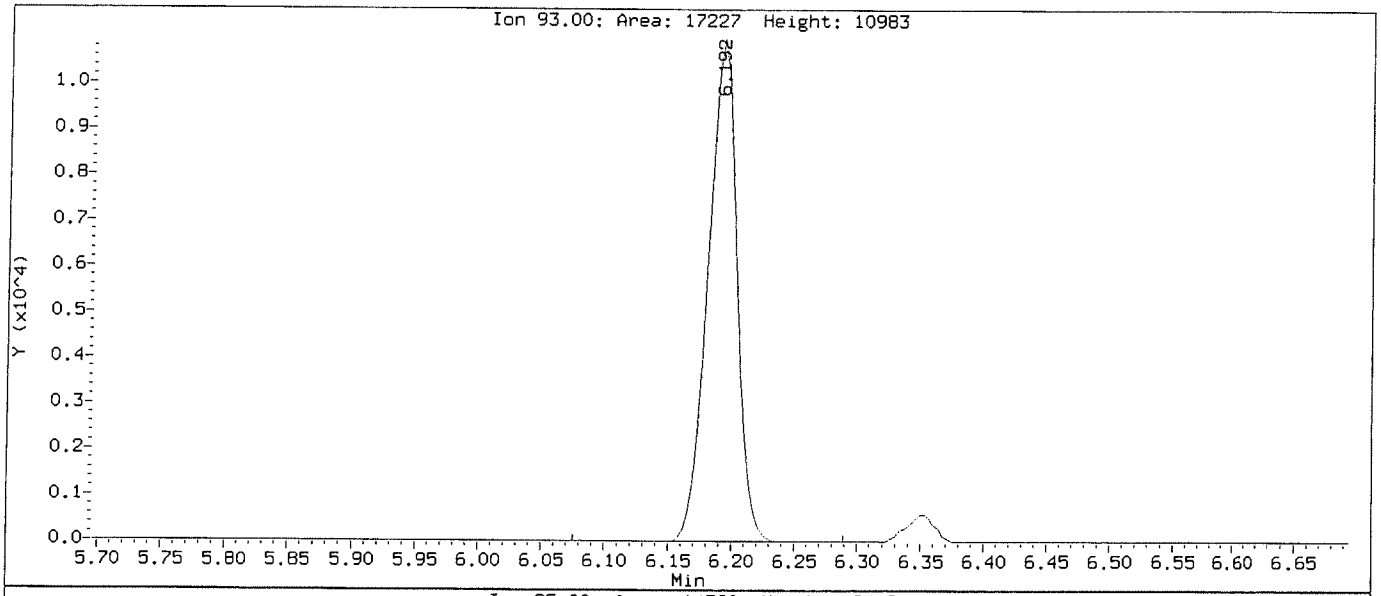
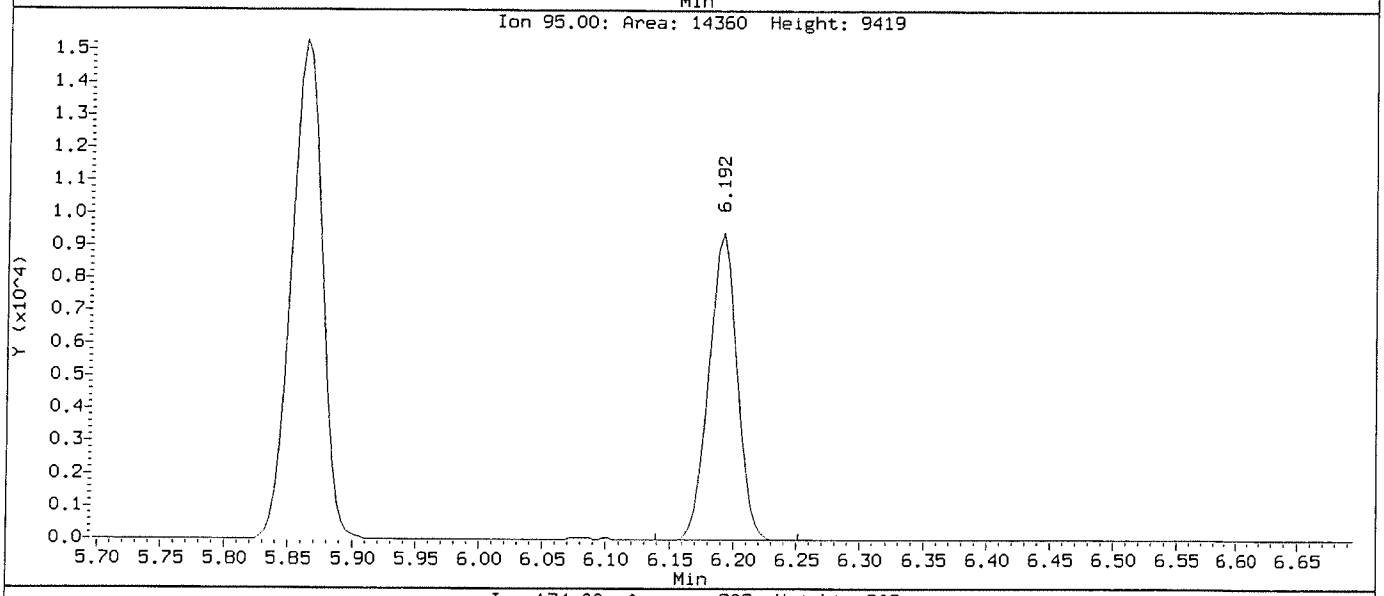
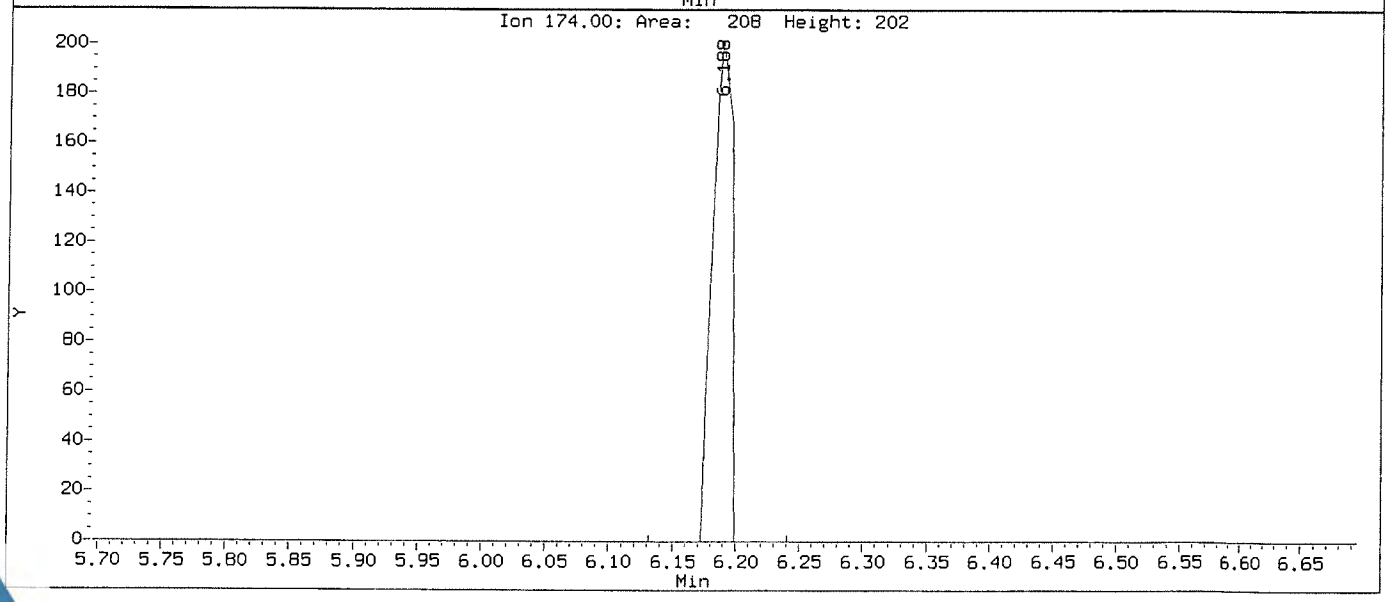
Injection Date: 13-NOV-2018 13:25
Instrument: VOA9.i
Client Sample ID: VSTD005

Compound: Dibromomethane
CAS Number: 74-95-3







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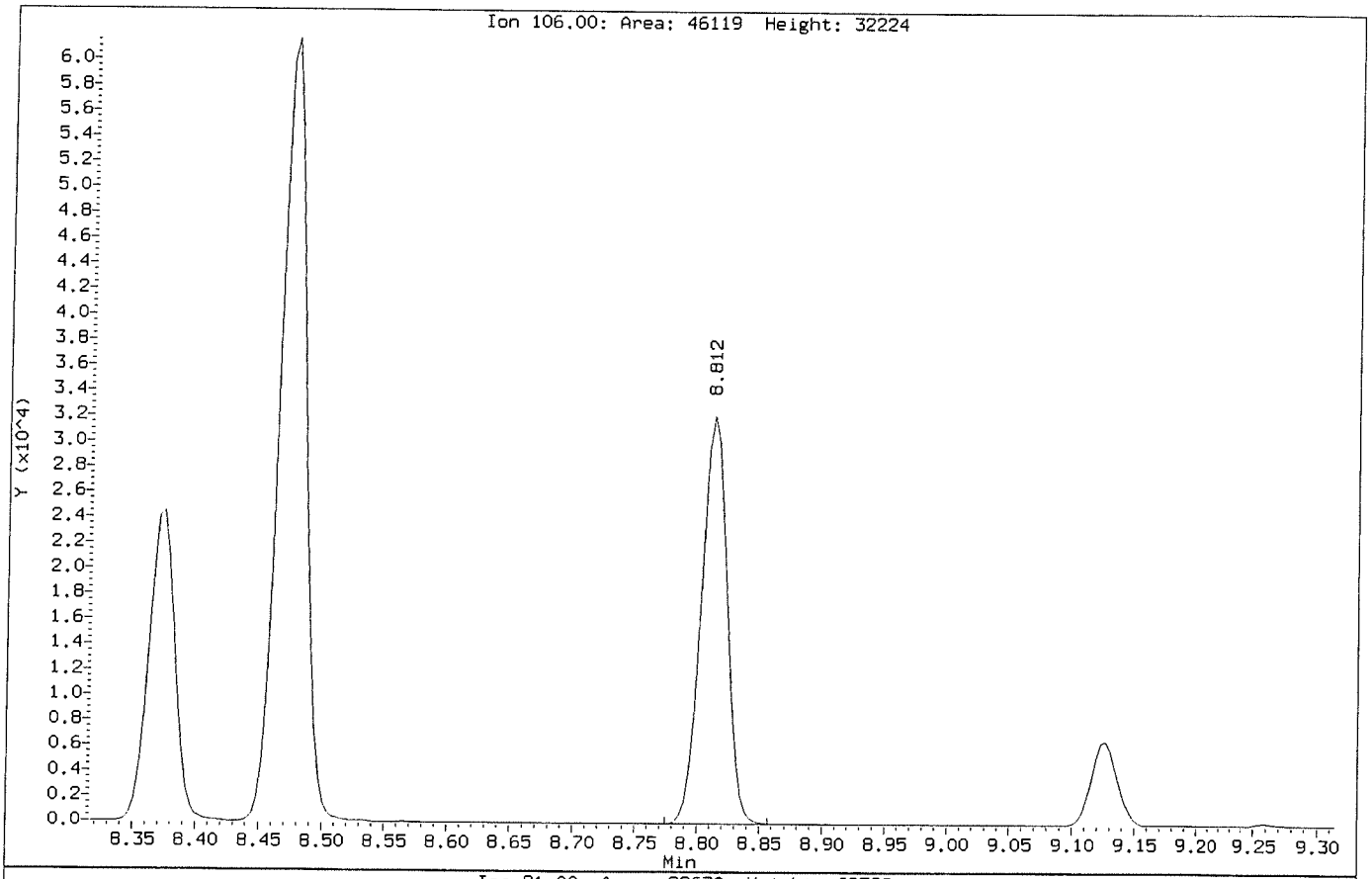
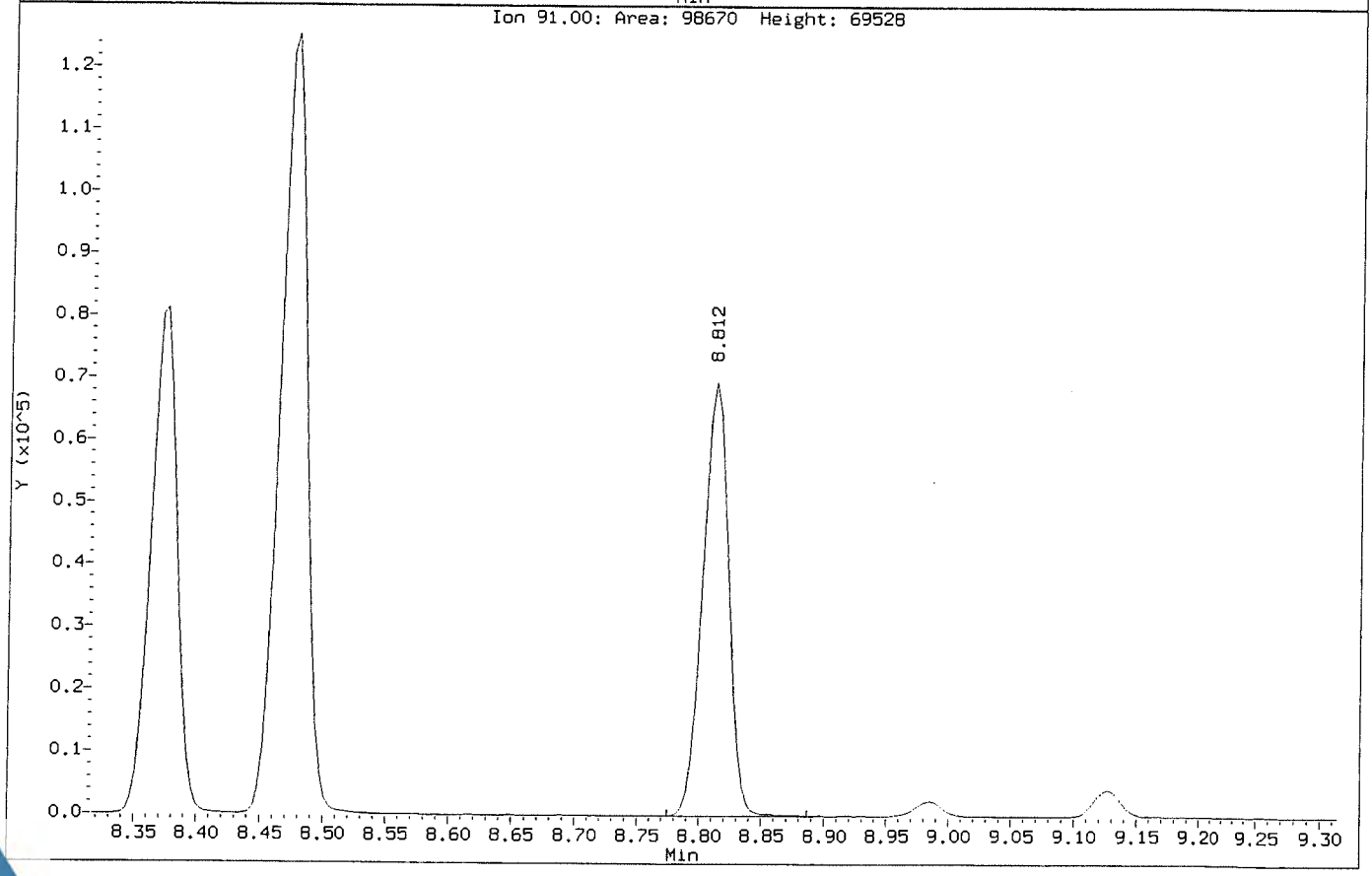
Injection Date: 13-NOV-2018 13:25
Instrument: VOA9.i
Client Sample ID: VSTD005

Compound: o-Xylene
CAS Number: 95-47-6





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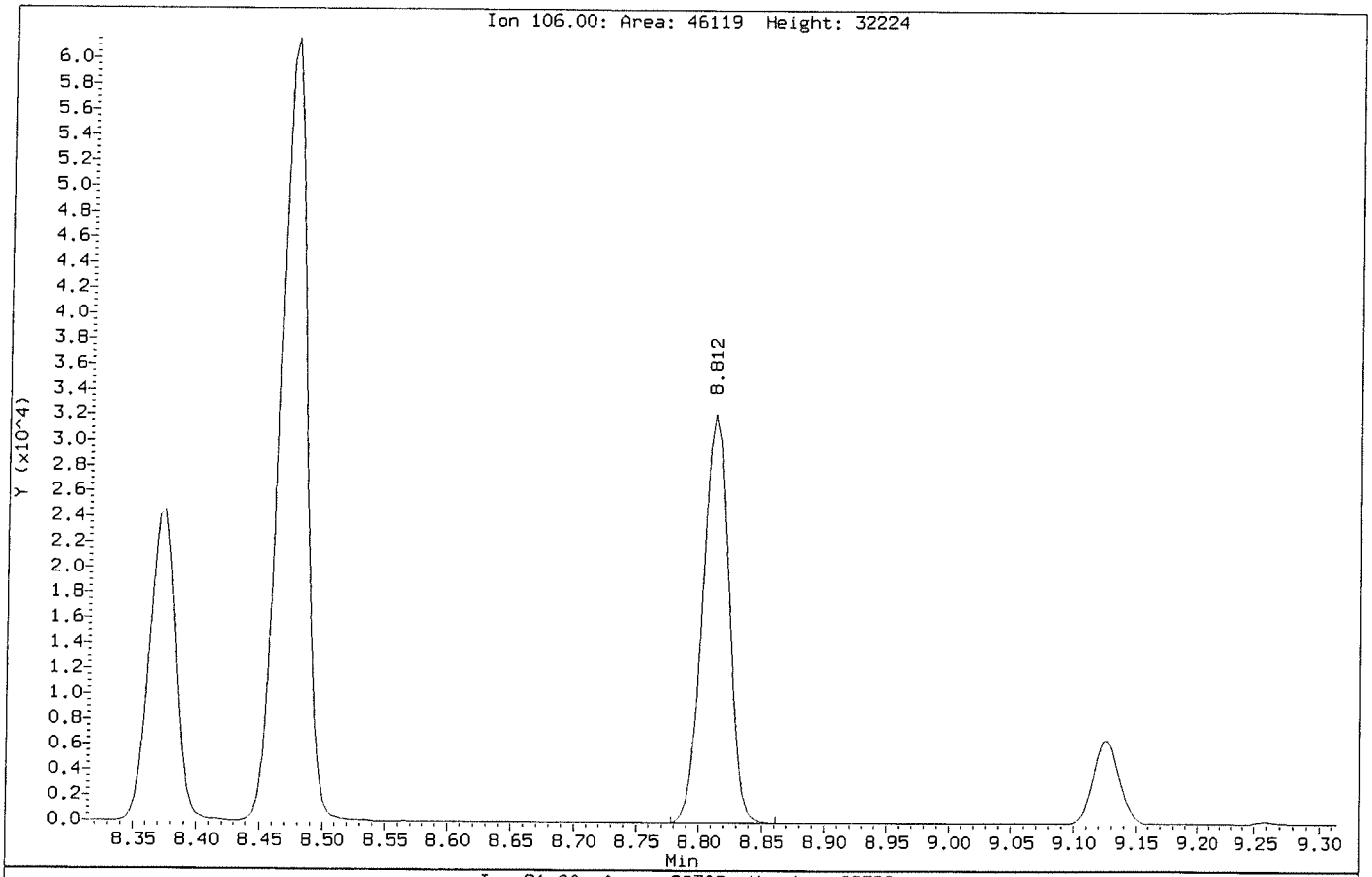
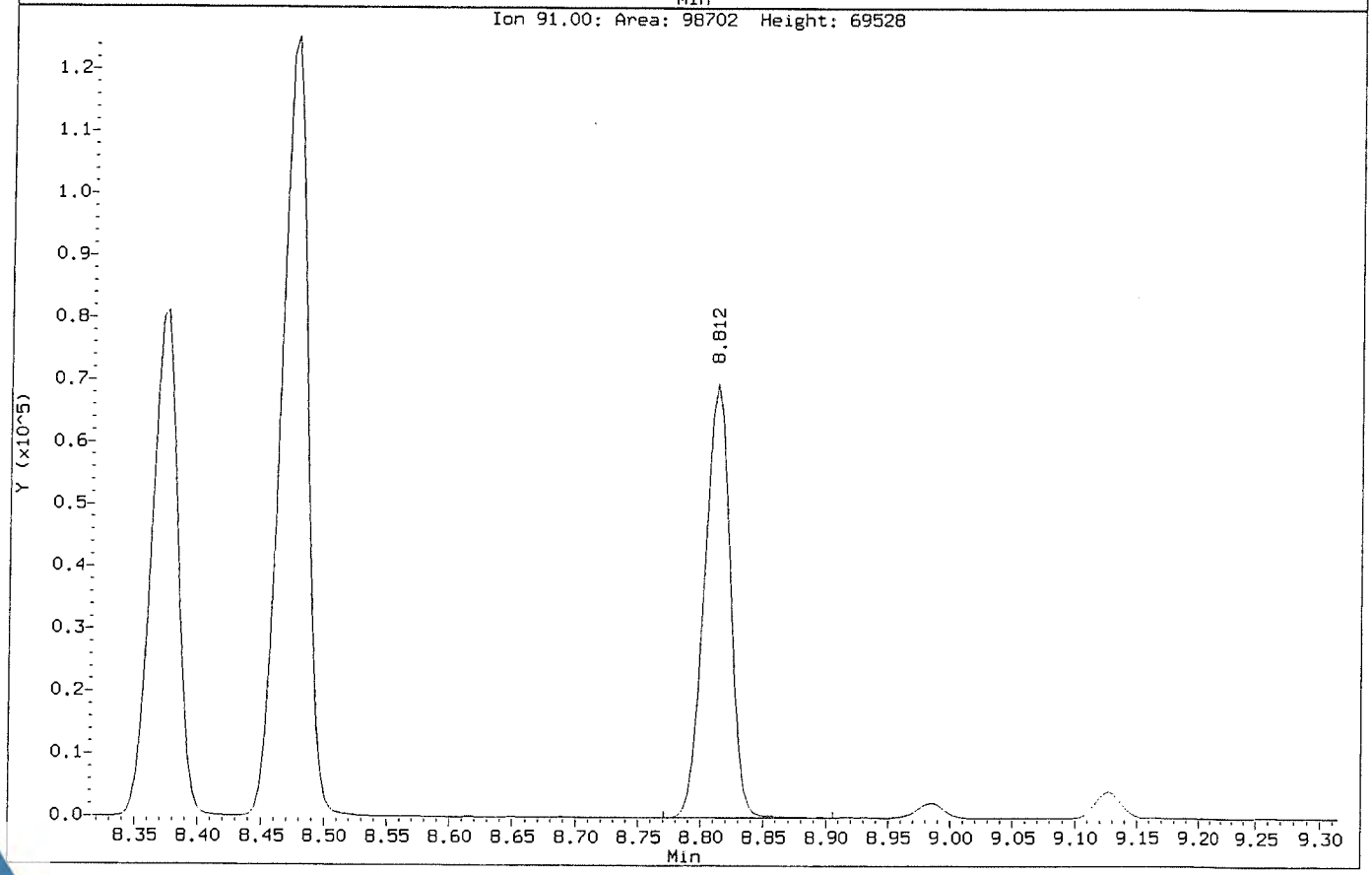
Injection Date: 13-NOV-2018 13:25
Instrument: VOA9.i
Client Sample ID: VSTD005

Compound: o-Xylene
CAS Number: 95-47-6





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Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111307.D
Lab Smp Id: VSTD020 Client Smp ID: VSTD020
Inj Date : 13-NOV-2018 13:50
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD020;VSTD020;1;6;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 13:25 Cal File: U111306.D
Als bottle: 8 Calibration Sample, Level: 6
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

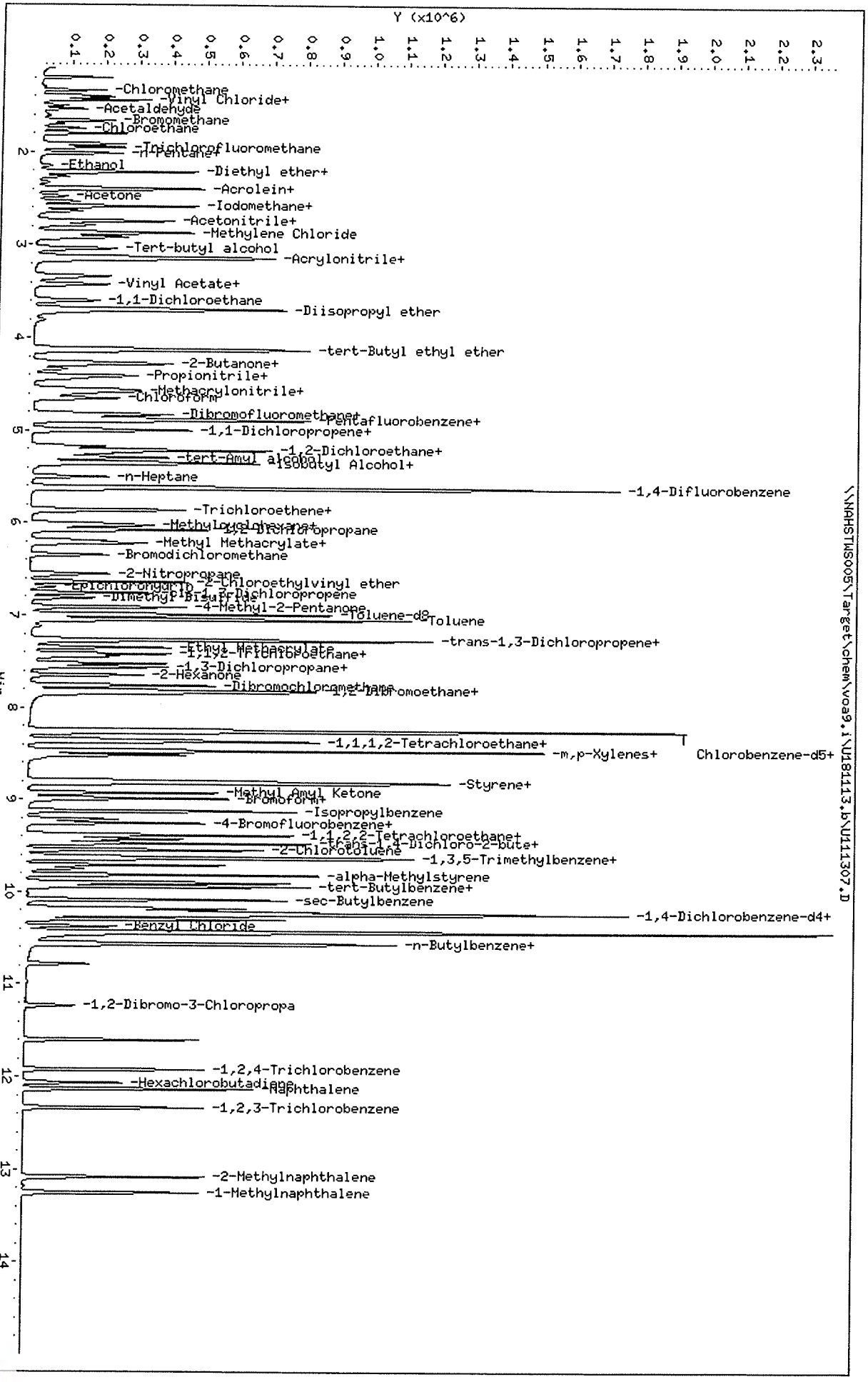
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	441430	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	825527	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	767763	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	370767	50.0000	
$ 30 Dibromofluoromethane	113	4.826	4.826	(0.986)	102630	20.0000	19.47
$ 35 1,2-Dichloroethane-d4	65	5.175	5.175	(1.057)	138453	20.0000	19.70
$ 48 Toluene-d8	98	6.989	6.989	(0.847)	412445	20.0000	20.02
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	154498	20.0000	19.71
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	94836	20.0000	19.58
31 1,1,1-Trichloroethane	97	4.826	4.826	(0.986)	144369	20.0000	18.61
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	170546	20.0000	19.41
138 Freon TF	101	2.397	2.397	(0.490)	81210	20.0000	18.36
53 1,1,2-Trichloroethane	83	7.420	7.420	(0.900)	94236	20.0000	19.30
22 1,1-Dichloroethane	63	3.601	3.601	(0.736)	188042	20.0000	18.58
11 1,1-Dichloroethene	96	2.397	2.397	(0.490)	92859	20.0000	18.63
32 1,1-Dichloropropene	75	5.003	5.003	(0.889)	142695	20.0000	18.71
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	136668	20.0000	19.52
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	178640	20.0000	19.49
90 1,2,4-Trichlorobenzene	180	11.926	11.926	(1.165)	137085	20.0000	18.80
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	410829	20.0000	19.94
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	24969	20.0000	19.13
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	112223	20.0000	19.85

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111307.D Page 2
Report Date: 24-Jan-2019 18:55

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	222900	20.0000	18.82
33	1,2-Dichloroethane	62	5.250	5.250	(0.933)	165626	20.0000	19.17
42	1,2-Dichloropropane	63	6.082	6.082	(1.081)	114197	20.0000	19.42
75	1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	396843	20.0000	19.92
83	1,3-Dichlorobenzene	146	10.179	10.179	(0.995)	220218	20.0000	18.86
54	1,3-Dichloropropane	76	7.563	7.563	(0.917)	202833	20.0000	19.35
84	1,4-Dichlorobenzene	146	10.254	10.254	(1.002)	228900	20.0000	20.02
26	2,2-Dichloropropane	77	4.272	4.272	(0.873)	113941	20.0000	18.18
24	2-Butanone	43	4.335	4.335	(0.886)	118404	40.0000	38.15
76	2-Chlorotoluene	91	9.546	9.546	(0.933)	350860	20.0000	19.32
52	2-Hexanone	43	7.649	7.649	(0.927)	181765	40.0000	40.72
77	4-Chlorotoluene	91	9.640	9.640	(0.942)	410588	20.0000	19.59
82	p-Isopropyltoluene	119	10.209	10.209	(0.997)	404381	20.0000	19.91
45	4-Methyl-2-Pentanone	43	6.914	6.914	(0.838)	257102	40.0000	40.14
10	Acetone	43	2.476	2.476	(0.506)	87797	40.0000	40.81
37	Benzene	78	5.216	5.216	(0.927)	436595	20.0000	19.13
74	Bromobenzene	156	9.381	9.381	(0.917)	115775	20.0000	19.03
29	Bromochloromethane	128	4.553	4.553	(0.930)	53724	20.0000	20.64
39	Bromodichloromethane	83	6.348	6.348	(1.129)	132026	20.0000	19.24
66	Bromoform	173	8.984	8.984	(1.089)	60993	20.0000	18.33(T)
6	Bromomethane	94	1.666	1.666	(0.341)	65394	20.0000	19.07
19	Carbon Disulfide	76	2.585	2.585	(0.528)	579343	40.0000	37.64
34	Carbon Tetrachloride	117	4.995	4.995	(0.888)	113726	20.0000	19.09
59	Chlorobenzene	112	8.275	8.275	(1.003)	302097	20.0000	19.06
7	Chloroethane	64	1.749	1.749	(0.357)	85496	20.0000	18.56(M)
28	Chloroform	83	4.654	4.654	(0.951)	190532	20.0000	18.74
3	Chloromethane	50	1.336	1.336	(0.273)	114171	20.0000	19.51
27	cis-1,2-Dichloroethene	96	4.283	4.283	(0.875)	119044	20.0000	19.03
46	cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	172818	20.0000	20.00
55	Dibromochloromethane	129	7.758	7.758	(0.940)	96570	20.0000	19.87
44	Dibromomethane	93	6.191	6.191	(1.101)	71419	20.0000	19.38
2	Dichlorodifluoromethane	85	1.201	1.201	(0.246)	119108	20.0000	18.89
61	Ethylbenzene	106	8.369	8.369	(1.015)	154131	20.0000	19.23
91	Hexachlorobutadiene	225	12.065	12.065	(1.179)	45235	20.0000	20.48
67	Isopropylbenzene	105	9.126	9.126	(1.106)	456275	20.0000	19.55
62	m,p-Xylenes	106	8.474	8.474	(1.027)	389423	40.0000	39.44
17	Methylene Chloride	84	2.866	2.866	(0.586)	113894	20.0000	19.80
87	n-Butylbenzene	91	10.558	10.558	(1.031)	381141	20.0000	20.10
73	n-Propylbenzene	91	9.475	9.475	(0.926)	574080	20.0000	19.62
92	Naphthalene	128	12.133	12.133	(1.185)	458615	20.0000	20.88
63	o-Xylene	106	8.811	8.811	(1.068)	197393	20.0000	19.97(H)
81	sec-Butylbenzene	105	10.086	10.086	(0.985)	477299	20.0000	19.59
64	Styrene	104	8.826	8.826	(1.070)	337037	20.0000	20.20
78	tert-Butylbenzene	119	9.902	9.902	(0.967)	334318	20.0000	19.69
56	Tetrachloroethene	164	7.525	7.525	(0.912)	75404	20.0000	18.74
50	Toluene	91	7.046	7.046	(0.854)	470397	20.0000	19.29
20	trans-1,2-Dichloroethene	96	3.139	3.139	(0.642)	101477	20.0000	18.58
51	trans-1,3-Dichloropropene	75	7.259	7.259	(1.291)	147063	20.0000	18.17
38	Trichloroethene	130	5.861	5.861	(1.042)	107204	20.0000	19.05
8	Trichlorofluoromethane	101	1.951	1.951	(0.399)	161290	20.0000	18.27
5	Vinyl Chloride	62	1.415	1.415	(0.289)	136290	20.0000	19.25

QC Flag Legend

T - Target compound detected outside RT window.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



Data File: \\NAHSTWS005\Target\chem\voa9,i\U181113,b\U111307.D
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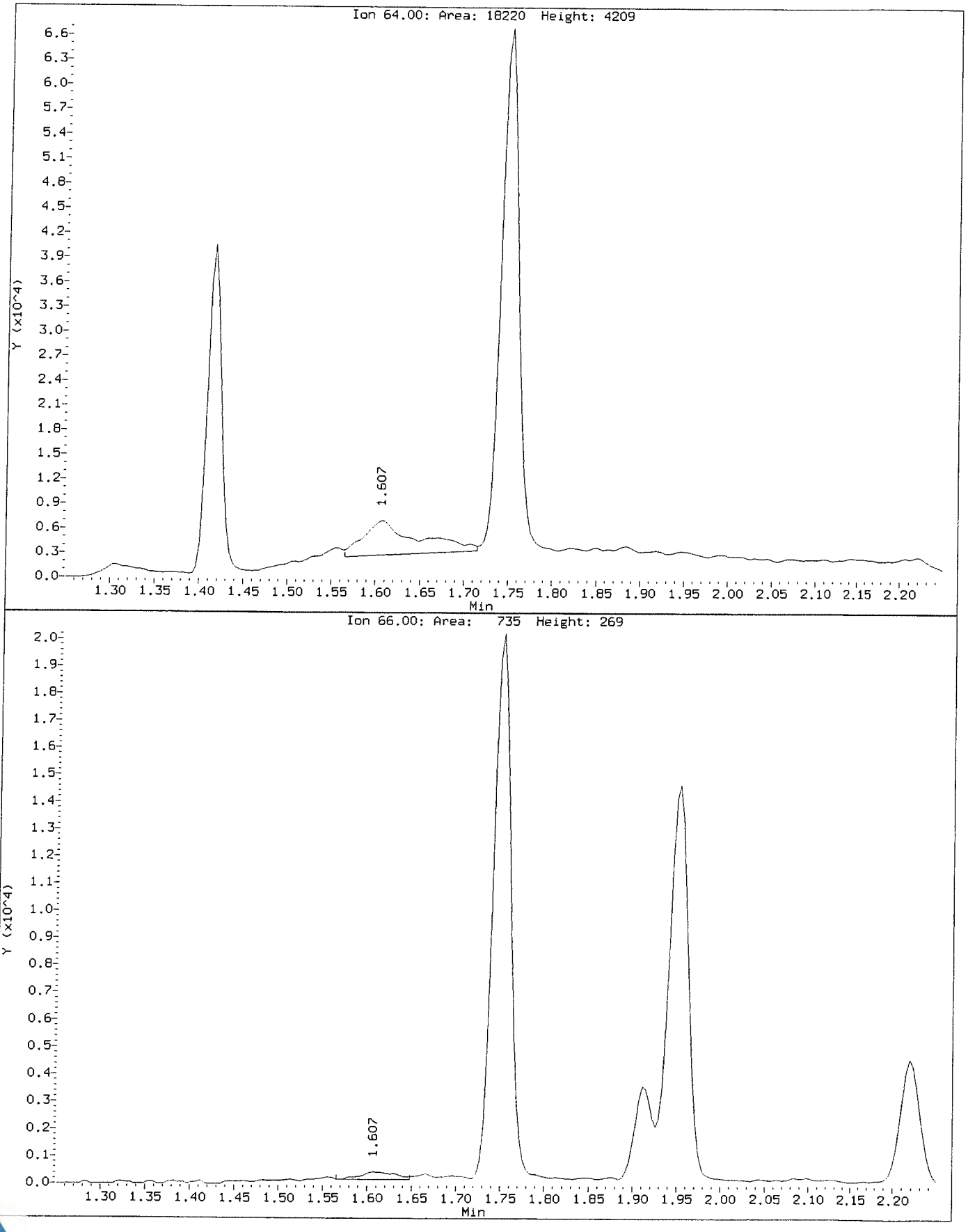
Client ID: VSTD020
Sample Info: VSTD020;VSTD020;1;6;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111307.D
Injection Date: 13-NOV-2018 13:50
Instrument: VOA9.i
Client Sample ID: VSTD020

Compound: Chloroethane
CAS Number: 75-00-3



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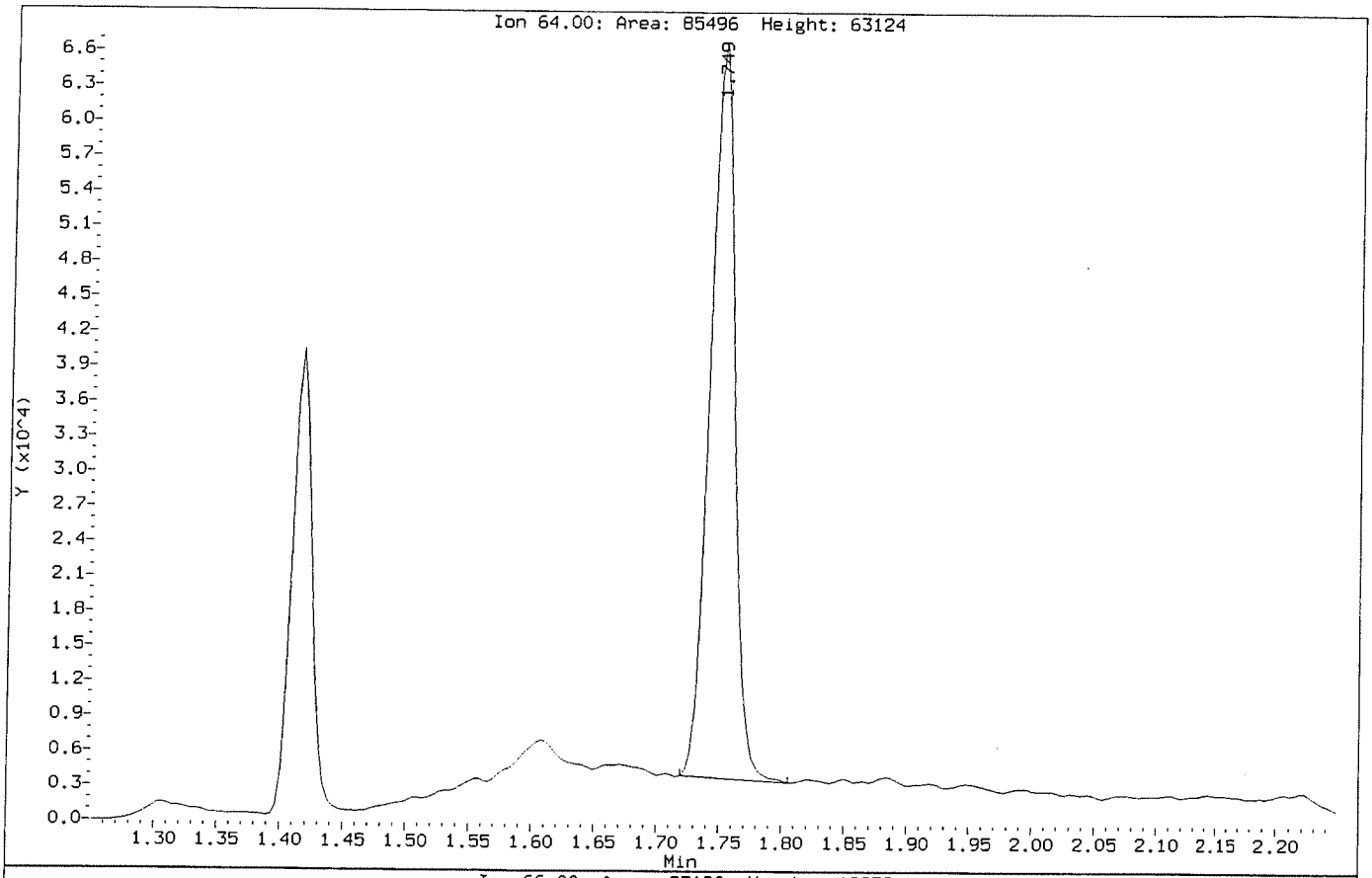
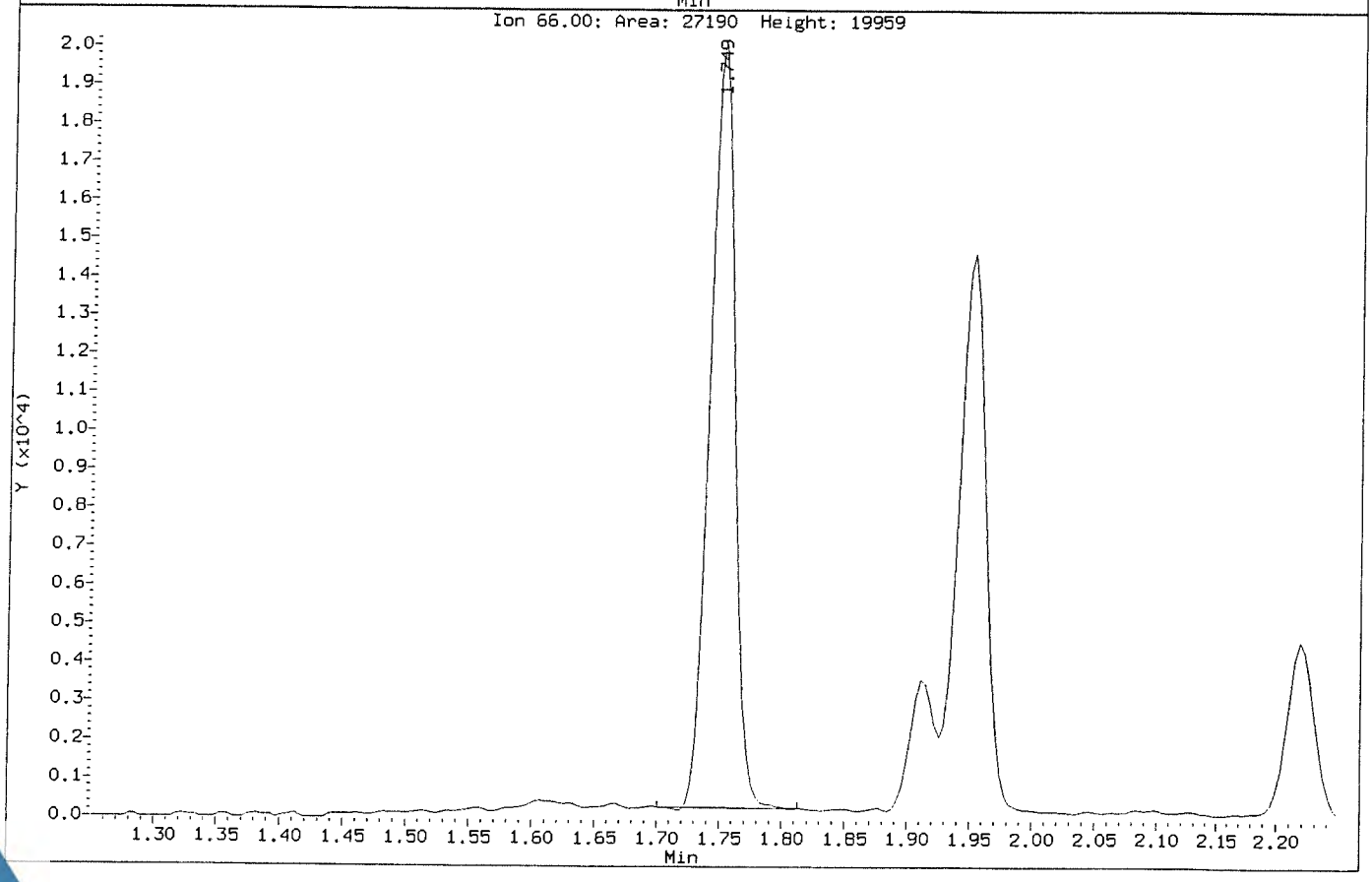
Injection Date: 13-NOV-2018 13:50
Instrument: VOA9.i
Client Sample ID: VSTD020

Compound: Chloroethane
CAS Number: 75-00-3





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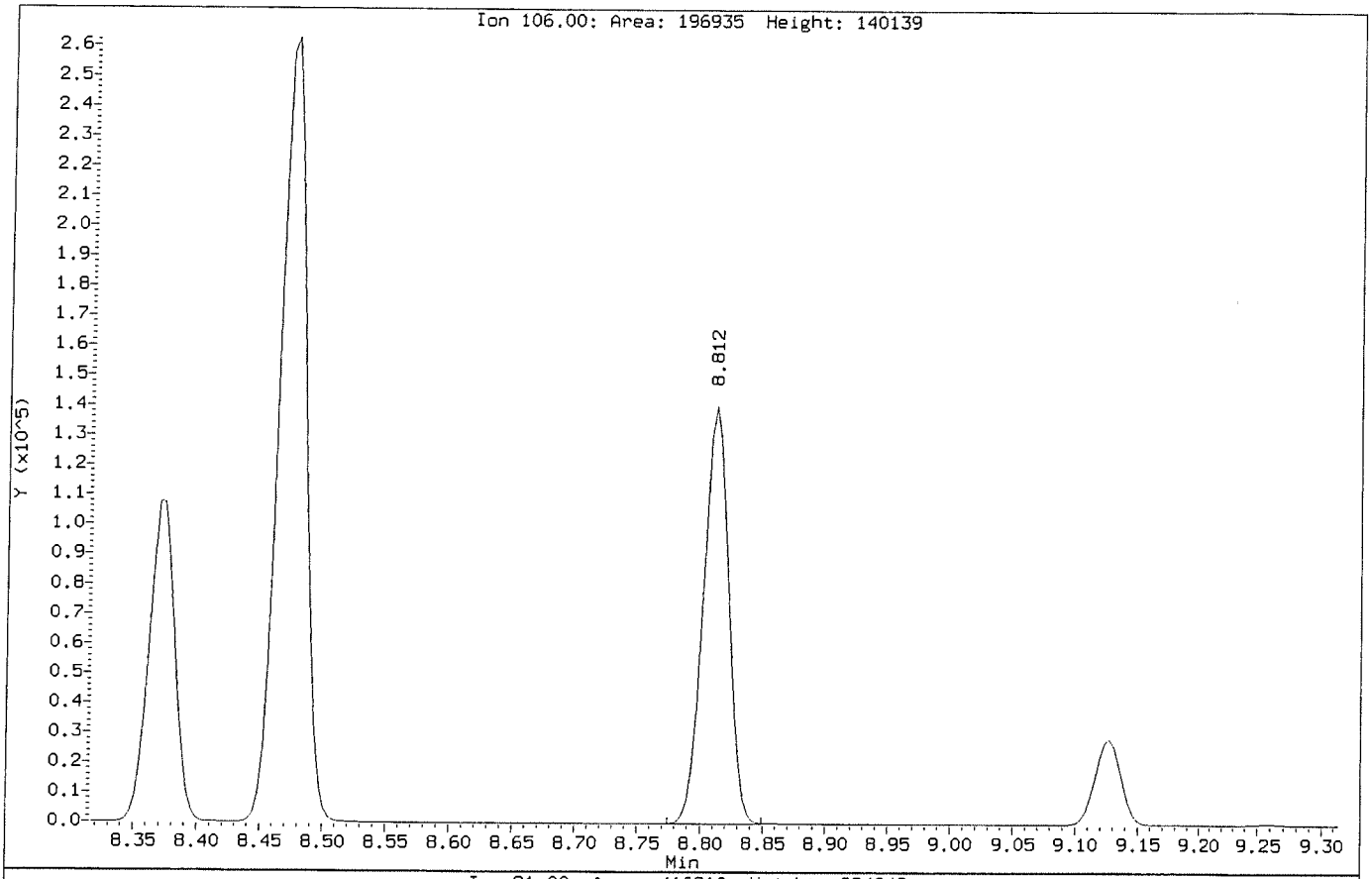
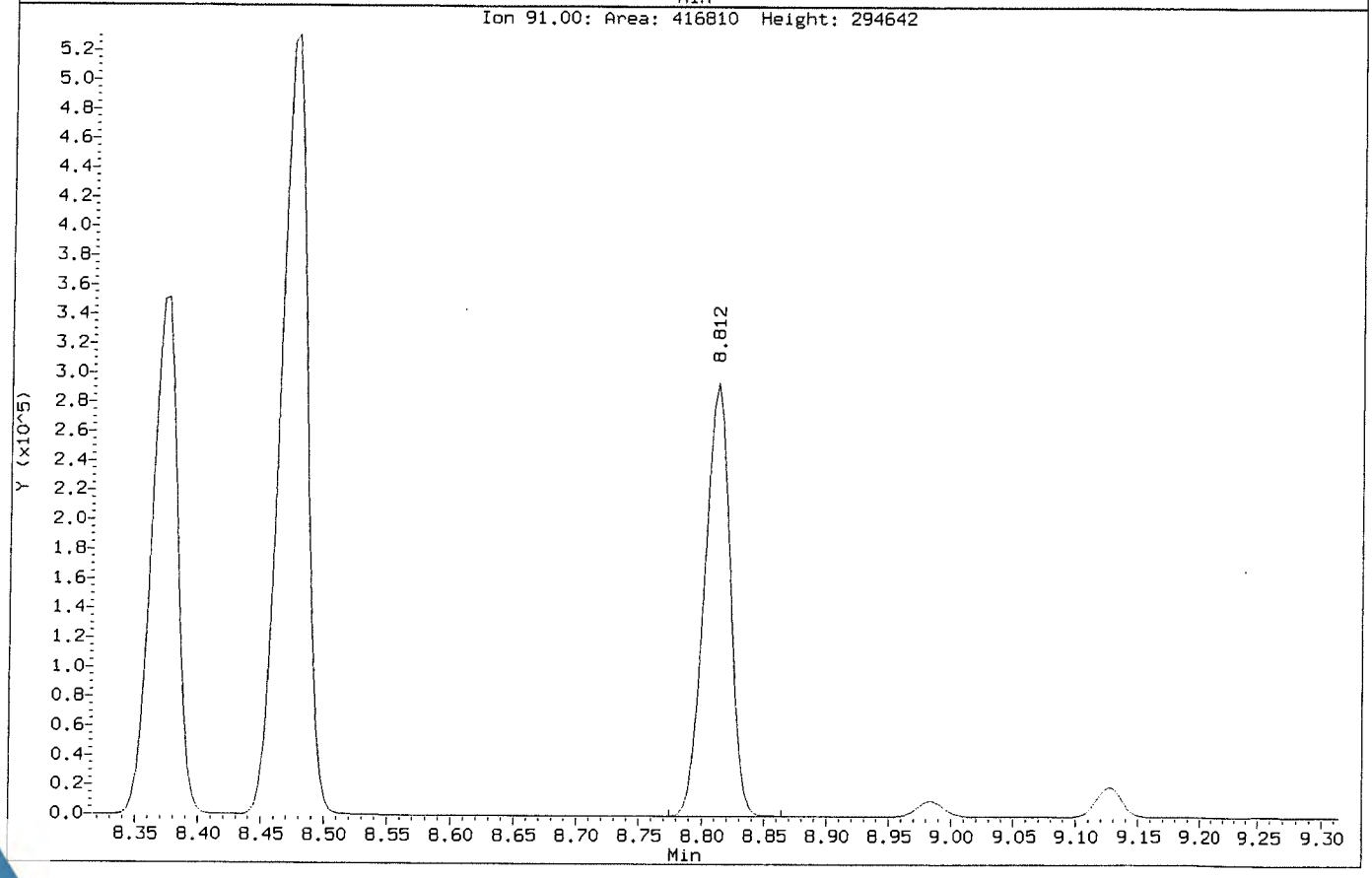
Injection Date: 13-NOV-2018 13:50
Instrument: VOA9.i
Client Sample ID: VSTD020

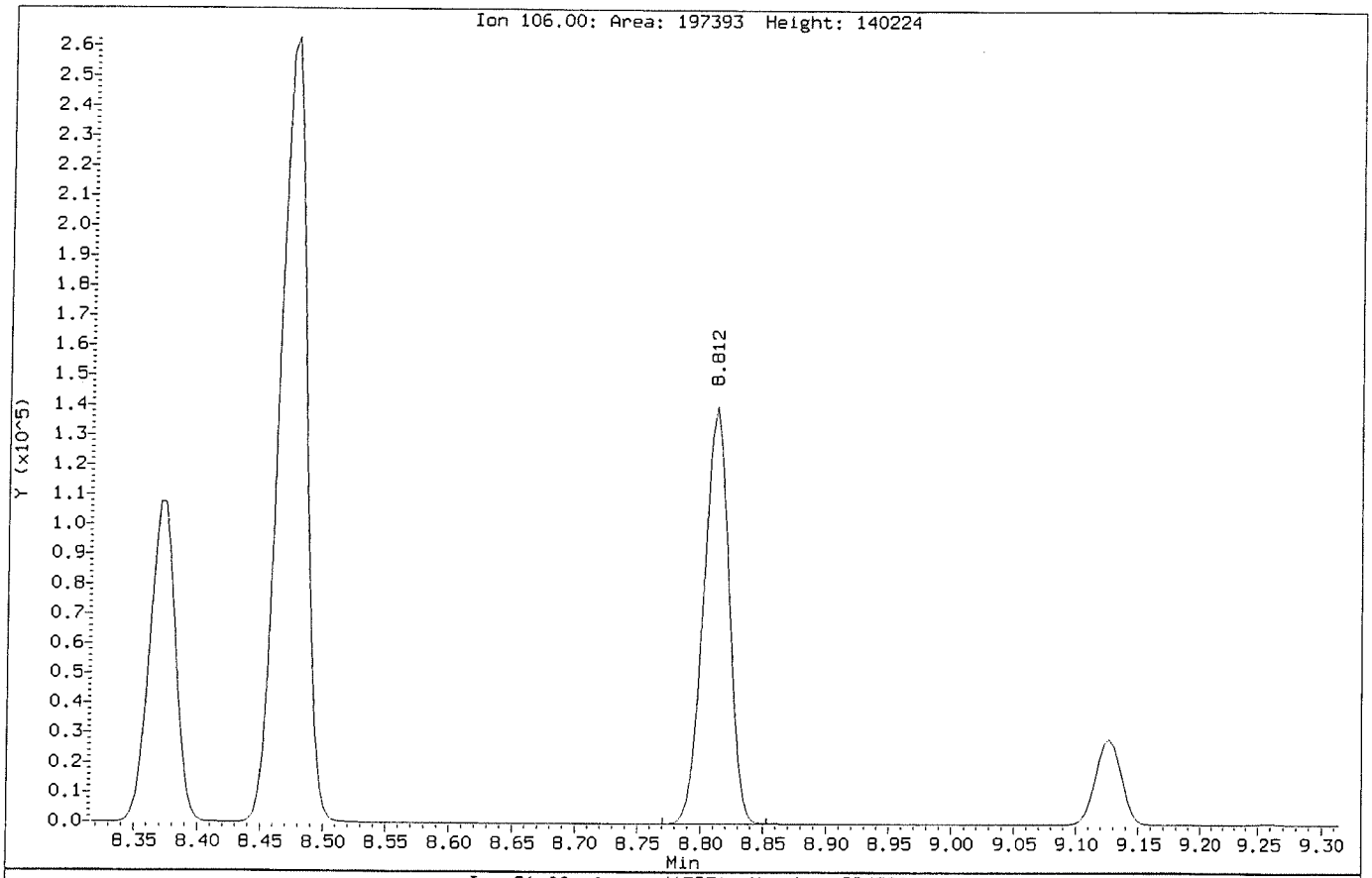
Compound: o-Xylene
CAS Number: 95-47-6

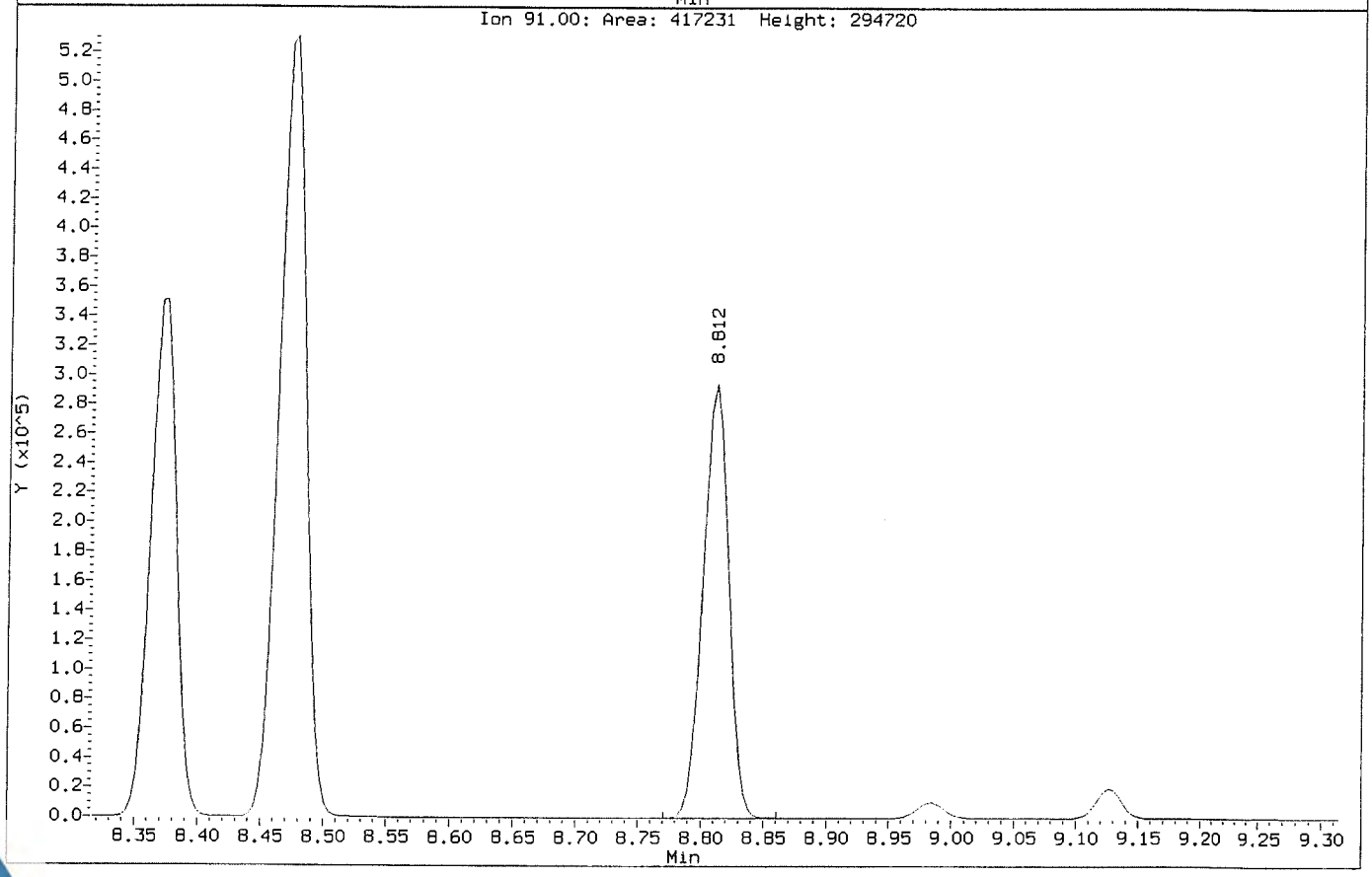




Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111307.D
Injection Date: 13-NOV-2018 13:50
Instrument: VOA9.i
Client Sample ID: VSTD020

Compound: o-Xylene
CAS Number: 95-47-6





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Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111308.D
Lab Smp Id: VSTD050 Client Smp ID: VSTD050
Inj Date : 13-NOV-2018 14:15
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD050;VSTD050;1;7;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 13:50 Cal File: U111307.D
Als bottle: 9 Calibration Sample, Level: 7
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

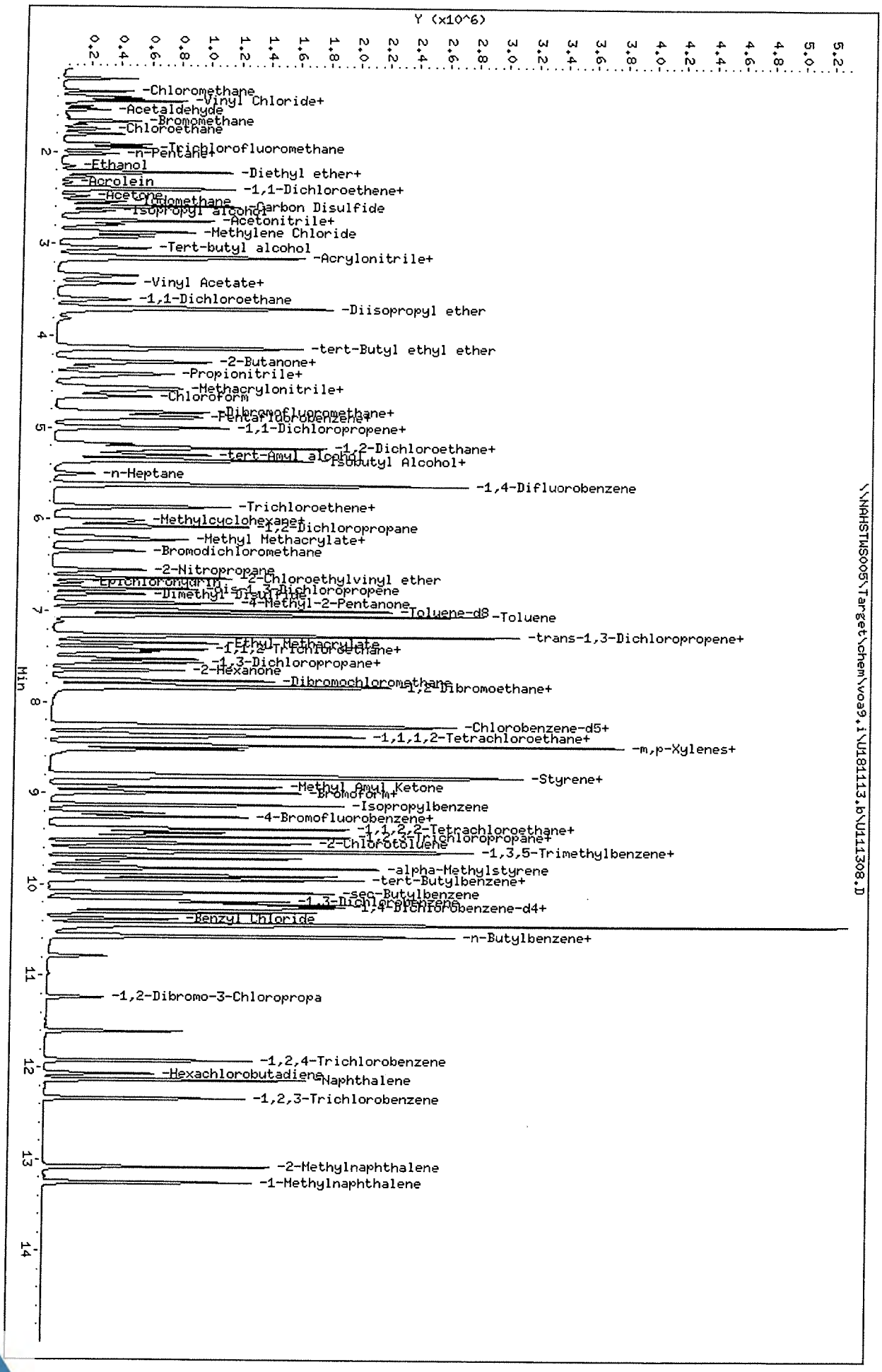
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	442076	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	849587	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	790877	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	387587	50.0000	
$ 30 Dibromofluoromethane	113	4.830	4.830	(0.987)	255826	50.0000	50.35
$ 35 1,2-Dichloroethane-d4	65	5.175	5.175	(1.057)	335901	50.0000	50.27
$ 48 Toluene-d8	98	6.989	6.989	(0.847)	1045096	50.0000	51.75
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	396604	50.0000	50.72
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	253286	50.0000	50.77
31 1,1,1-Trichloroethane	97	4.826	4.826	(0.986)	369959	50.0000	47.64
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	434682	50.0000	47.34
138 Freon TF	101	2.401	2.401	(0.491)	191531	50.0000	43.24
53 1,1,2-Trichloroethane	83	7.420	7.420	(0.900)	234031	50.0000	46.54
22 1,1-Dichloroethane	63	3.604	3.604	(0.737)	476032	50.0000	46.99
11 1,1-Dichloroethene	96	2.397	2.397	(0.490)	224107	50.0000	44.91
32 1,1-Dichloropropene	75	5.003	5.003	(0.889)	351415	50.0000	44.78
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	346843	50.0000	47.39
71 1,2,3-Trichloropropane	75	9.430	9.430	(0.921)	480640	50.0000	50.17
90 1,2,4-Trichlorobenzene	180	11.926	11.926	(1.165)	355891	50.0000	46.69
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	1025451	50.0000	47.63
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	66581	50.0000	47.02
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	287318	50.0000	49.34

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111308.D Page 2
Report Date: 24-Jan-2019 18:55

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	569575	50.0000	46.01
33 1,2-Dichloroethane	62	5.254	5.254	(0.934)	409387	50.0000	46.04
42 1,2-Dichloropropane	63	6.082	6.082	(1.081)	288083	50.0000	47.62
75 1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	989153	50.0000	47.49
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	558678	50.0000	45.78
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	507685	50.0000	47.02
84 1,4-Dichlorobenzene	146	10.258	10.258	(1.002)	576011	50.0000	48.25
26 2,2-Dichloropropane	77	4.275	4.275	(0.874)	295338	50.0000	47.07
24 2-Butanone	43	4.339	4.339	(0.887)	300842	100.000	96.81
76 2-Chlorotoluene	91	9.550	9.550	(0.933)	883069	50.0000	46.52
52 2-Hexanone	43	7.649	7.649	(0.927)	469848	100.000	102.19
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	1023060	50.0000	46.71
82 p-Isopropyltoluene	119	10.210	10.210	(0.997)	1018309	50.0000	47.97
45 4-Methyl-2-Pentanone	43	6.914	6.914	(0.838)	657858	100.000	99.71
10 Acetone	43	2.480	2.480	(0.507)	201617	100.000	99.32
37 Benzene	78	5.216	5.216	(0.927)	1096105	50.0000	46.67
74 Bromobenzene	156	9.385	9.385	(0.917)	293372	50.0000	46.14
29 Bromochloromethane	128	4.553	4.553	(0.930)	136269	50.0000	52.28
39 Bromodichloromethane	83	6.348	6.348	(1.129)	344674	50.0000	48.82
66 Bromoform	173	8.984	8.984	(1.089)	170886	50.0000	47.61(T)
6 Bromomethane	94	1.666	1.666	(0.341)	154362	50.0000	42.38
19 Carbon Disulfide	76	2.588	2.588	(0.529)	1468777	100.000	95.31
34 Carbon Tetrachloride	117	4.995	4.995	(0.888)	286167	50.0000	46.68
59 Chlorobenzene	112	8.275	8.275	(1.003)	750956	50.0000	46.00
7 Chloroethane	64	1.749	1.749	(0.357)	213028	50.0000	46.18(M)
28 Chloroform	83	4.658	4.658	(0.952)	478555	50.0000	47.01
3 Chloromethane	50	1.340	1.340	(0.274)	285521	50.0000	48.38
27 cis-1,2-Dichloroethene	96	4.287	4.287	(0.876)	293496	50.0000	46.85
46 cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	464679	50.0000	52.27
55 Dibromochloromethane	129	7.758	7.758	(0.940)	263139	50.0000	52.58
44 Dibromomethane	93	6.191	6.191	(1.101)	181664	50.0000	47.92
2 Dichlorodifluoromethane	85	1.205	1.205	(0.246)	293949	50.0000	45.08
61 Ethylbenzene	106	8.373	8.373	(1.015)	388724	50.0000	47.09
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	110558	50.0000	46.37
67 Isopropylbenzene	105	9.126	9.126	(1.106)	1128288	50.0000	46.94
62 m,p-Xylenes	106	8.474	8.474	(1.027)	962791	100.000	94.66
17 Methylene Chloride	84	2.870	2.870	(0.586)	276248	50.0000	48.96
87 n-Butylbenzene	91	10.558	10.558	(1.031)	954951	50.0000	47.12
73 n-Propylbenzene	91	9.475	9.475	(0.926)	1421540	50.0000	46.47
92 Naphthalene	128	12.133	12.133	(1.185)	1186850	50.0000	51.71
63 o-Xylene	106	8.811	8.811	(1.068)	497517	50.0000	48.87(H)
81 sec-Butylbenzene	105	10.086	10.086	(0.985)	1186653	50.0000	46.59
64 Styrene	104	8.826	8.826	(1.070)	870320	50.0000	50.64
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	827990	50.0000	46.65
56 Tetrachloroethene	164	7.525	7.525	(0.912)	182495	50.0000	44.04
50 Toluene	91	7.049	7.049	(0.855)	1170933	50.0000	46.63
20 trans-1,2-Dichloroethene	96	3.139	3.139	(0.642)	255498	50.0000	46.71
51 trans-1,3-Dichloropropene	75	7.263	7.263	(1.291)	407060	50.0000	46.38
38 Trichloroethene	130	5.861	5.861	(1.042)	263822	50.0000	45.57
8 Trichlorofluoromethane	101	1.951	1.951	(0.399)	392628	50.0000	44.42
5 Vinyl Chloride	62	1.419	1.419	(0.290)	335638	50.0000	46.60

QC Flag Legend

T - Target compound detected outside RT window.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



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Column phase: DB624

\\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111308.D

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

Page 4

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111308.D
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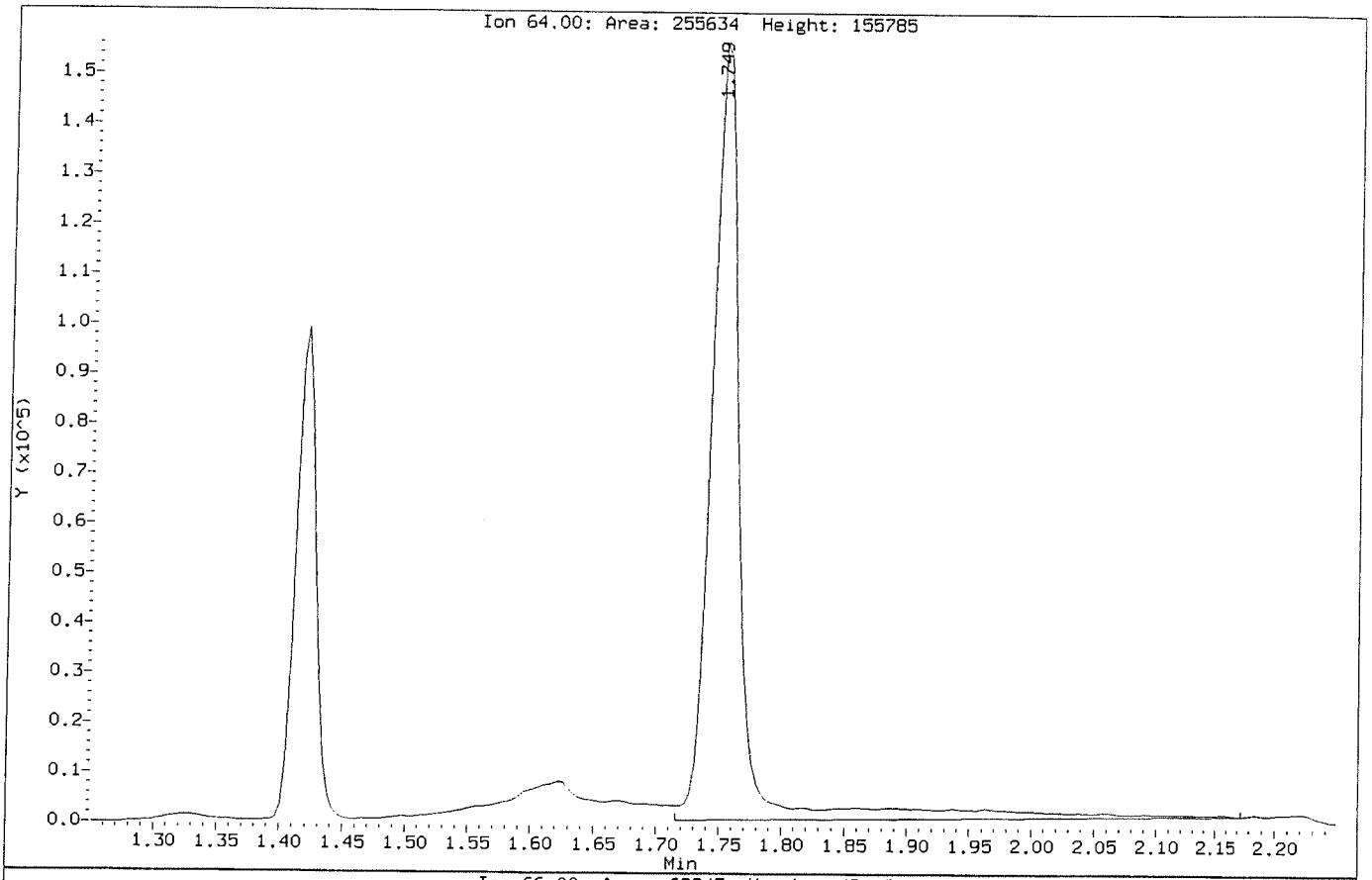
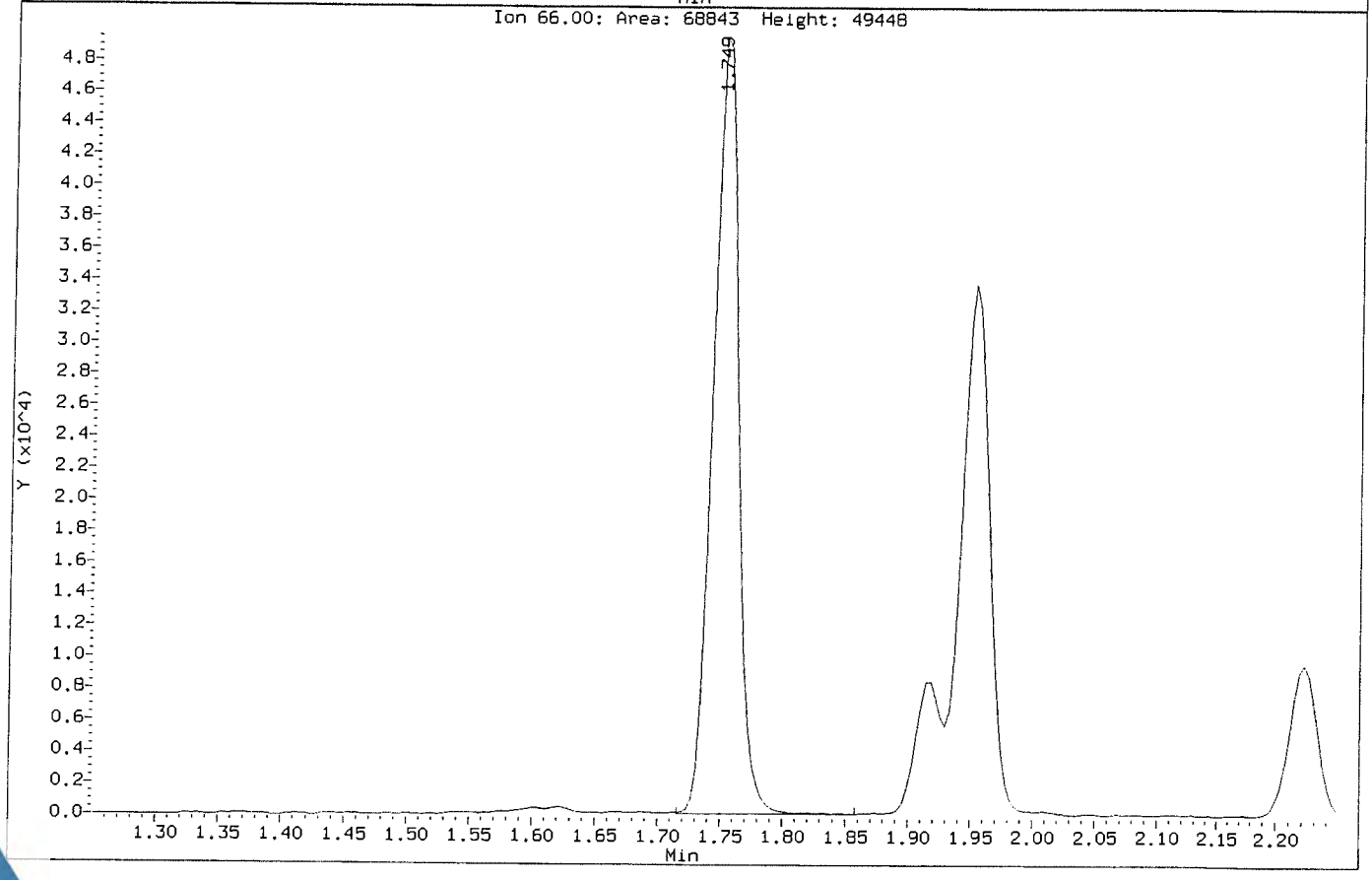
Instrument: VOA9.i
Client Sample ID: VSTD050

Compound: Chloroethane
CAS Number: 75-00-3





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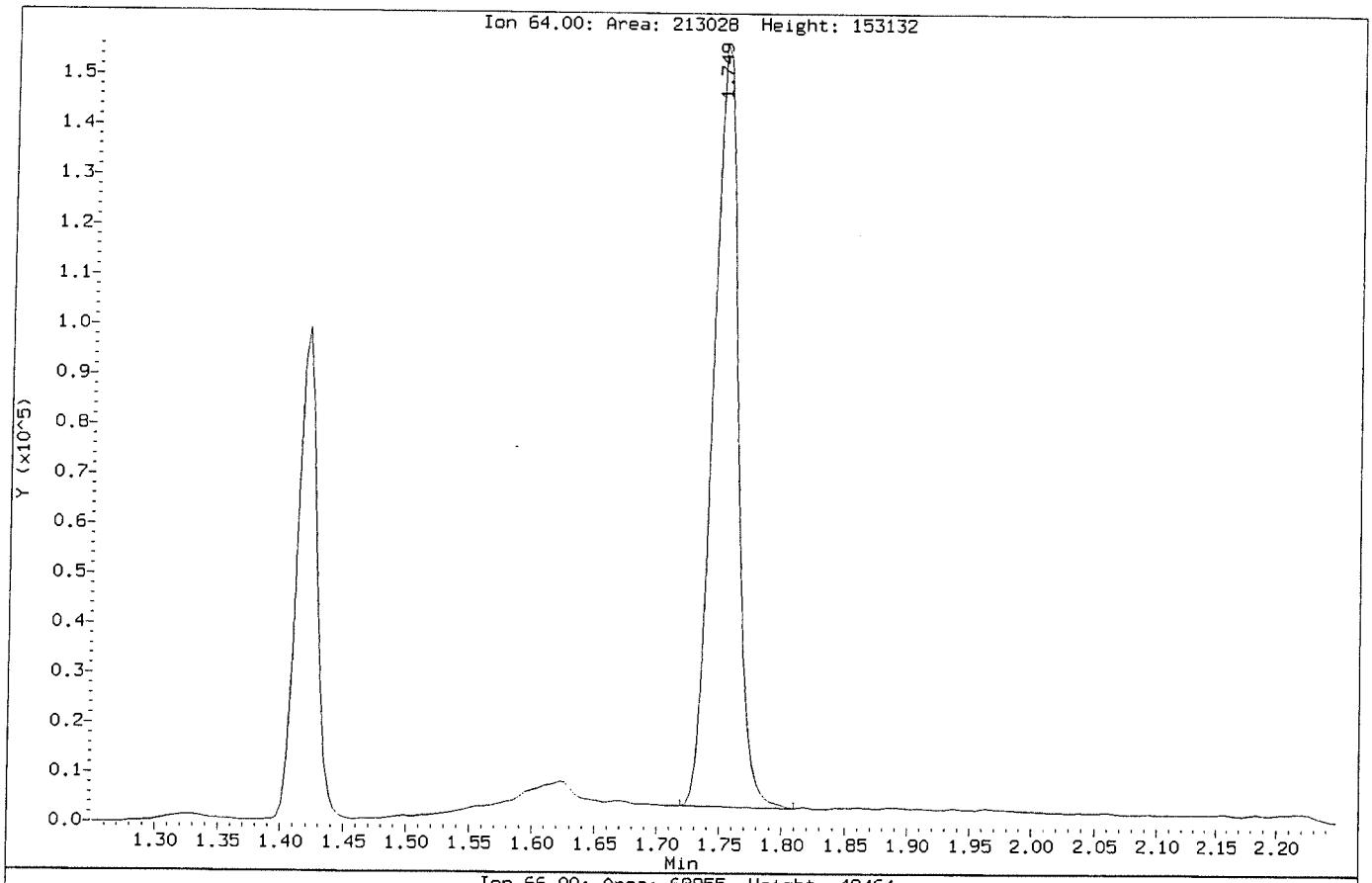
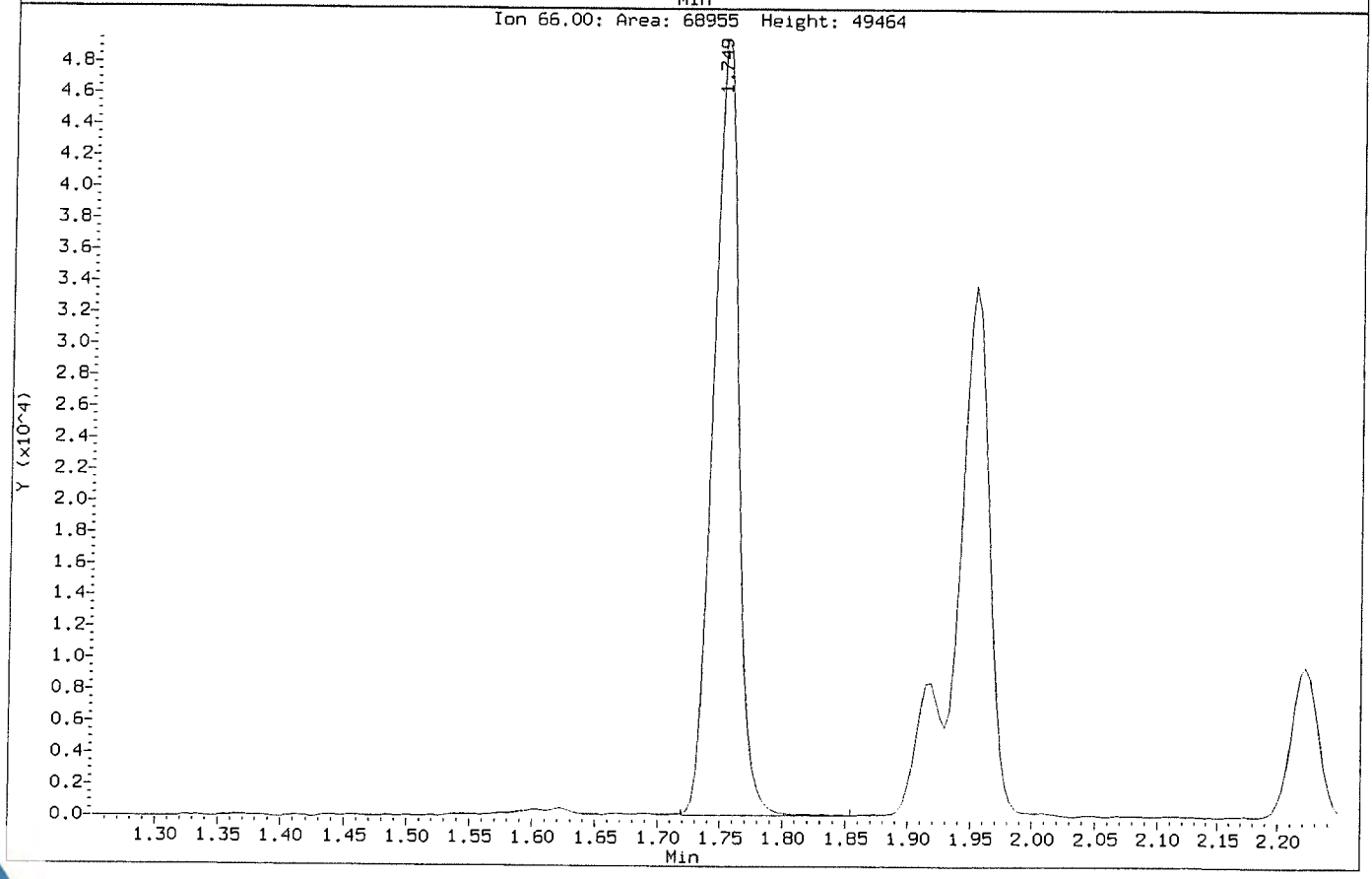
Compound: Chloroethane
CAS Number: 75-00-3





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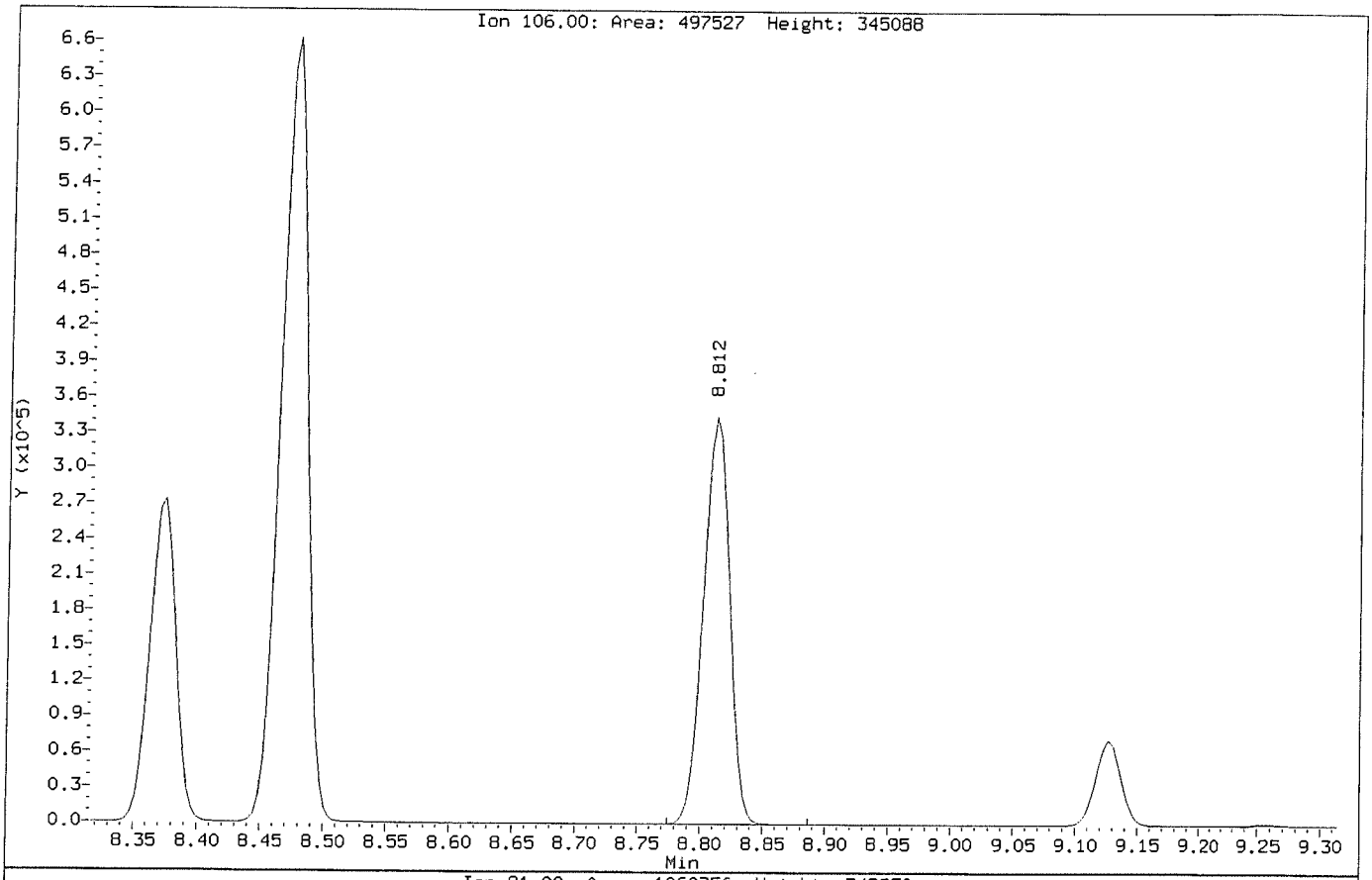
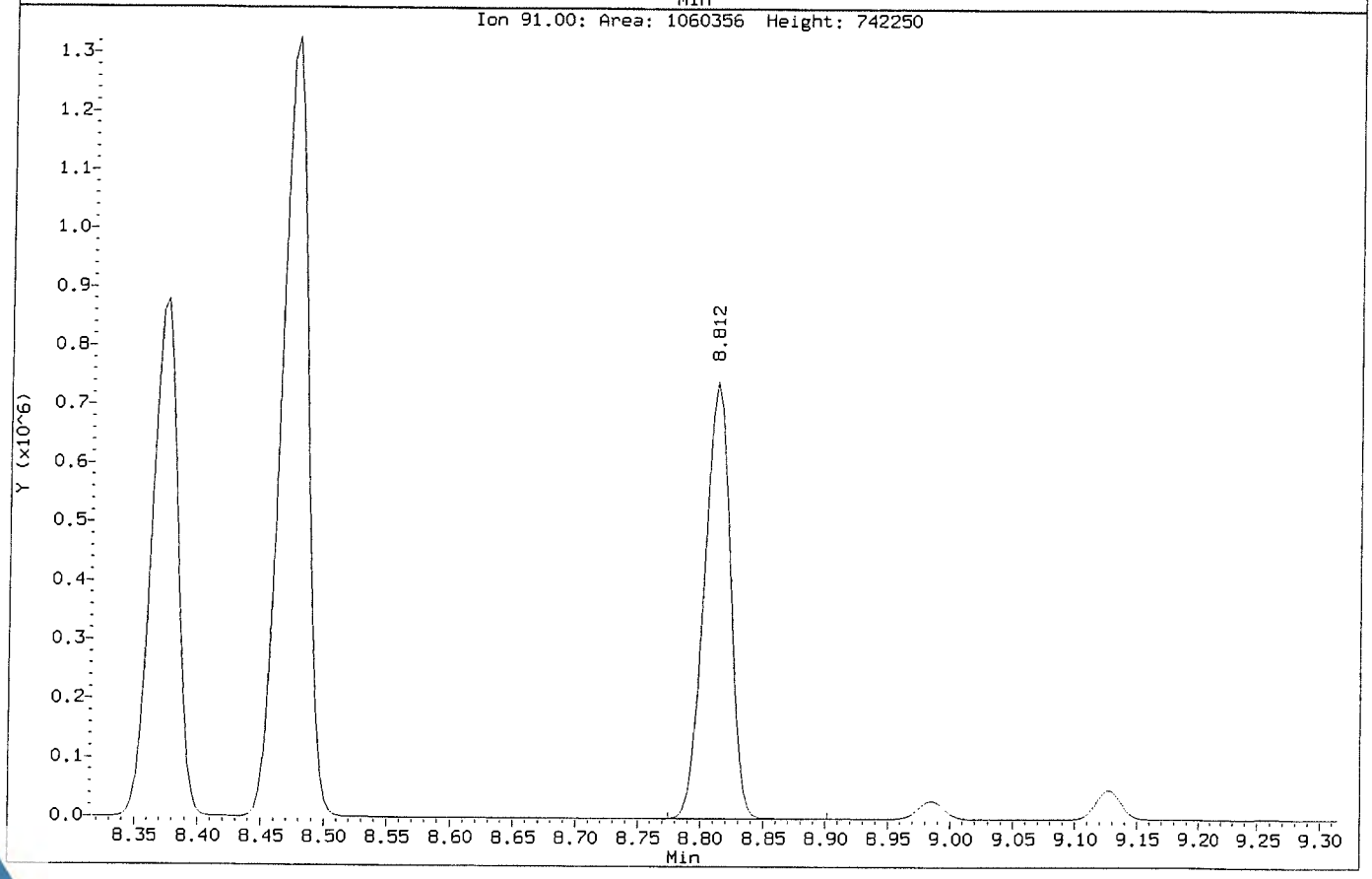
Injection Date: 13-NOV-2018 14:15
Instrument: VOA9.i
Client Sample ID: VSTD050

Compound: o-Xylene
CAS Number: 95-47-6





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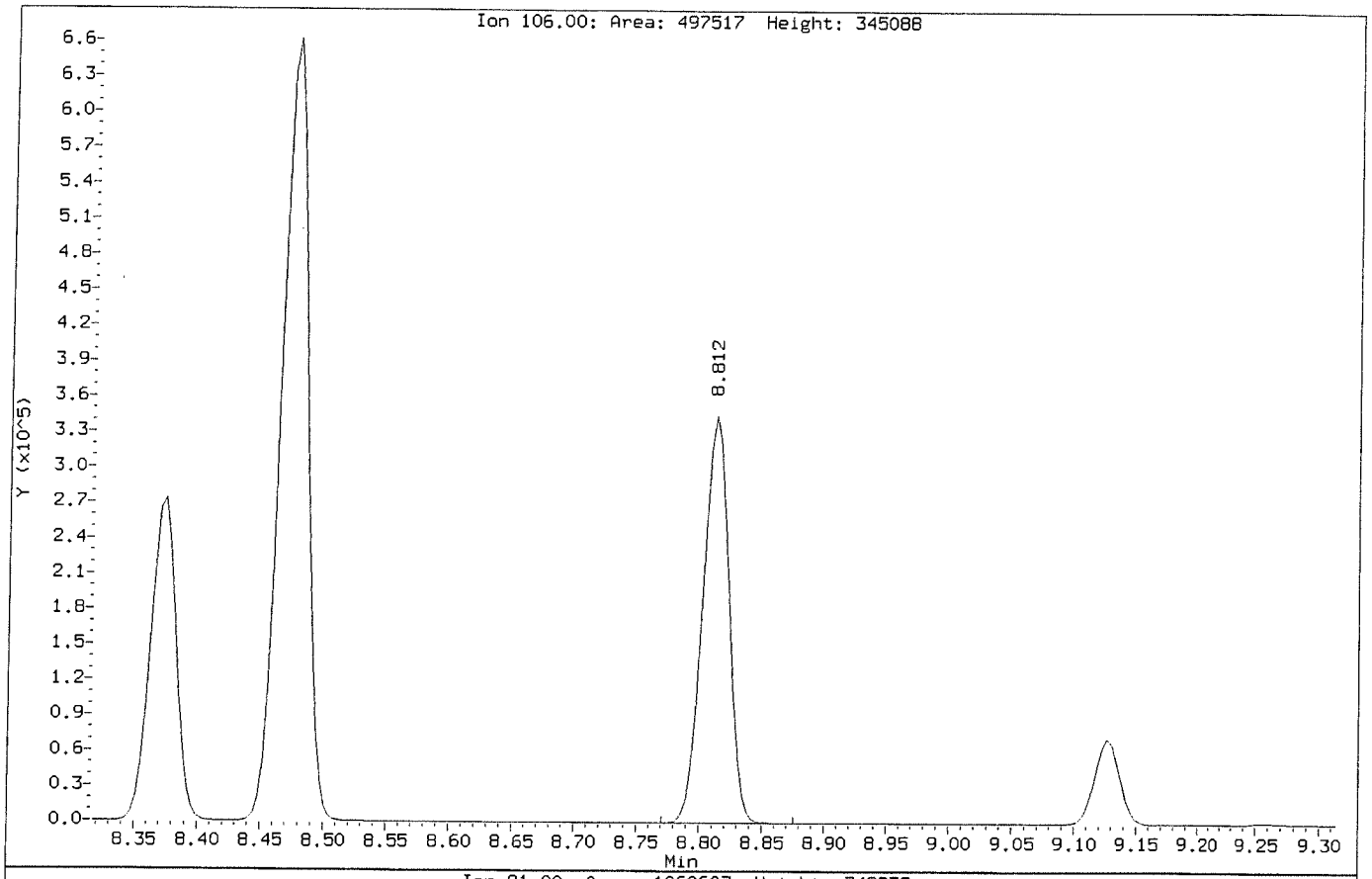
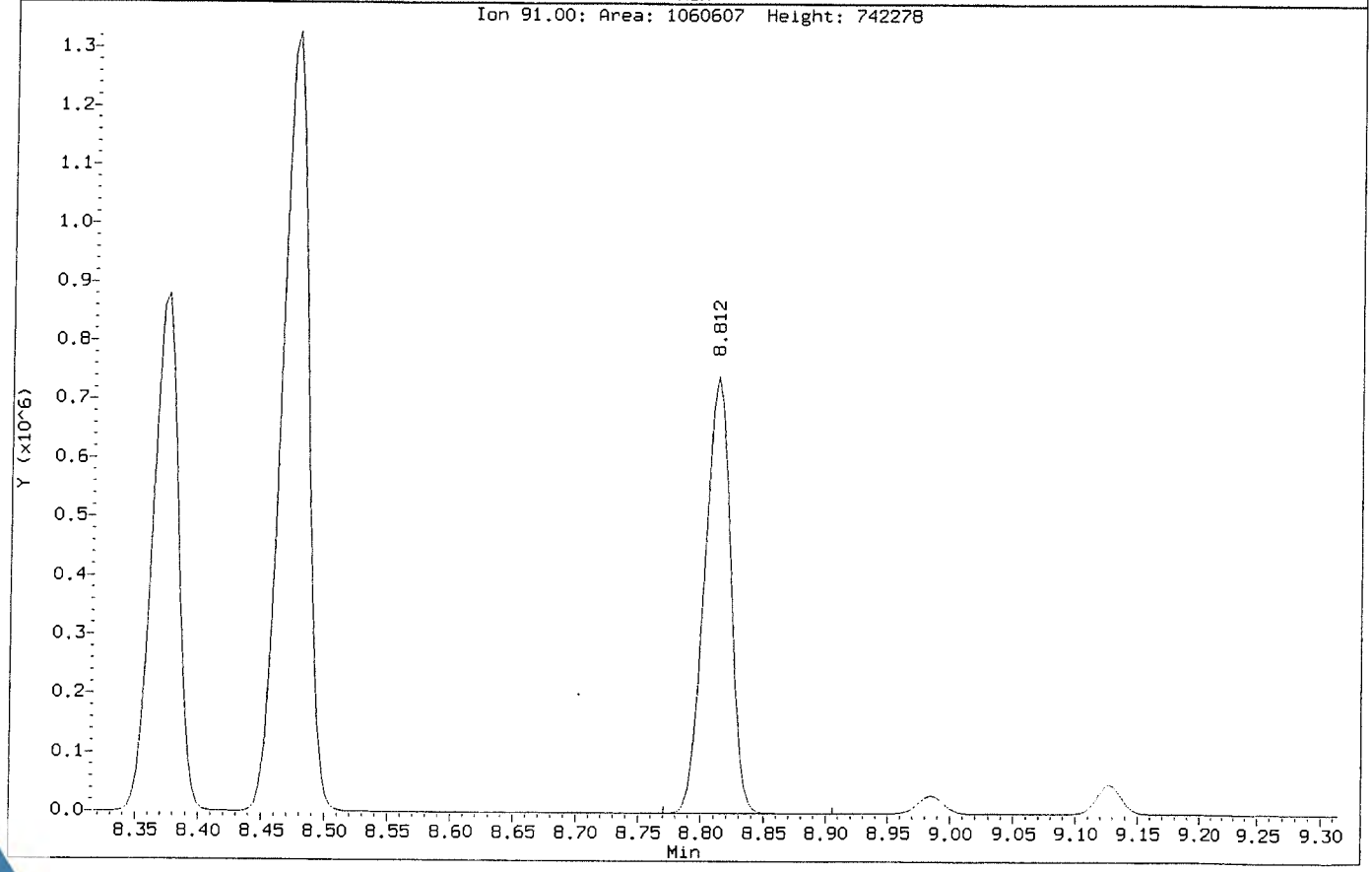
Instrument: VOA9.i
Client Sample ID: VSTD050

Compound: o-Xylene
CAS Number: 95-47-6





ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111309.D
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Inj Date : 13-NOV-2018 14:39
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD100;VSTD100;1;8;
Misc Info : 180315V9;WATER;0;1;
Comment :
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Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 10 Calibration Sample, Level: 8
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

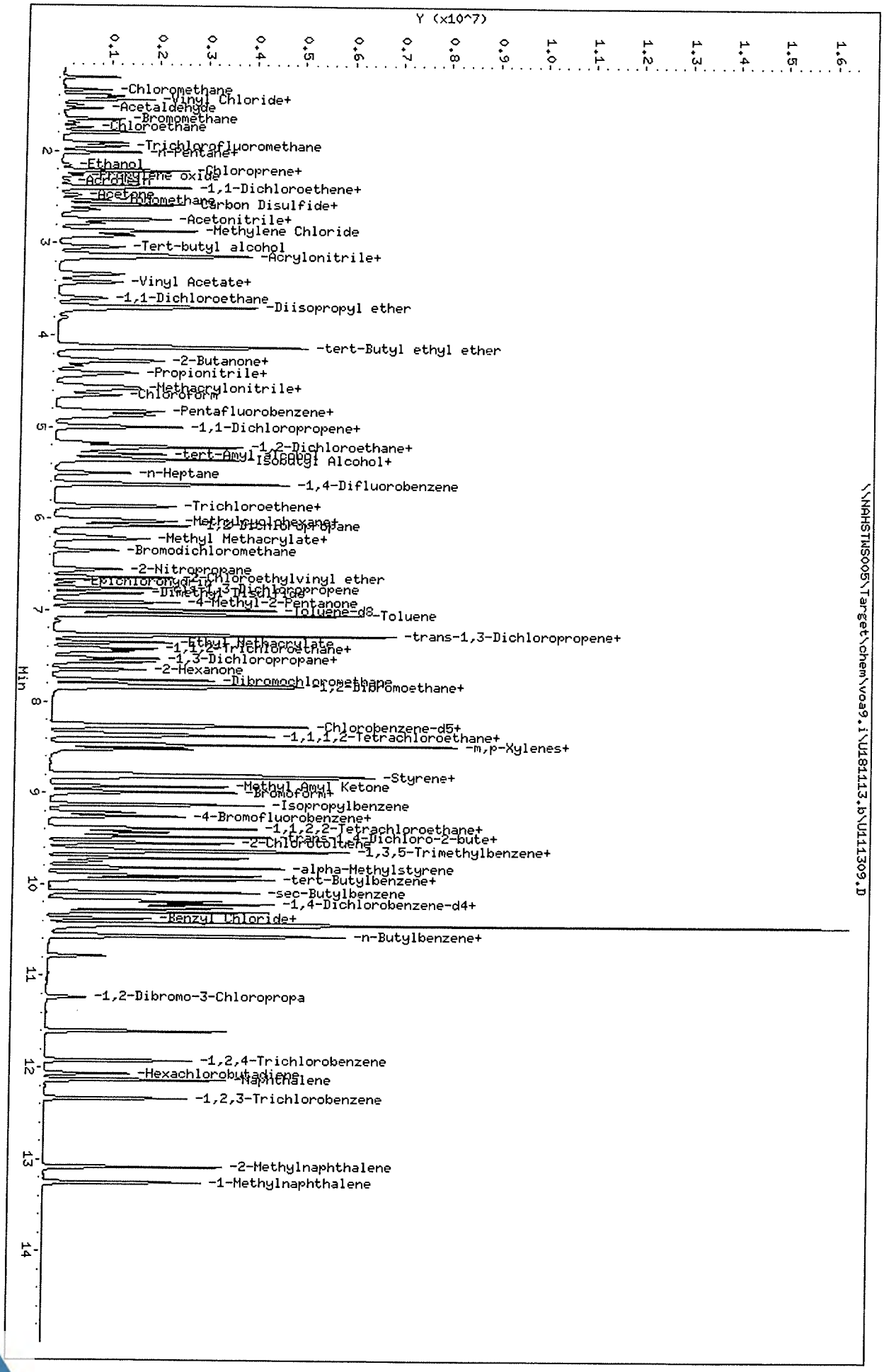
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.890	4.890	(1.000)	450542	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	856582	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	821336	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	399019	50.0000	
$ 30 Dibromofluoromethane	113	4.827	4.827	(0.987)	526814	100.000	103.01
$ 35 1,2-Dichloroethane-d4	65	5.171	5.171	(1.057)	696595	100.000	104.13
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	2142731	100.000	103.85
$ 69 4-Bromofluorobenzene	95	9.258	9.258	(1.122)	823996	100.000	102.55
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	547424	100.000	105.66
31 1,1,1-Trichloroethane	97	4.823	4.823	(0.986)	826811	100.000	104.47
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	905540	100.000	95.80
138 Freon TF	101	2.394	2.394	(0.490)	456374	100.000	101.11
53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	496464	100.000	95.07
22 1,1-Dichloroethane	63	3.597	3.597	(0.736)	991209	100.000	96.00
11 1,1-Dichloroethene	96	2.394	2.394	(0.490)	489401	100.000	96.23
32 1,1-Dichloropropene	75	4.999	4.999	(0.889)	782616	100.000	98.92
93 1,2,3-Trichlorobenzene	180	12.339	12.339	(1.205)	769767	100.000	102.18
71 1,2,3-Trichloropropane	75	9.430	9.430	(0.921)	1033869	100.000	104.82
90 1,2,4-Trichlorobenzene	180	11.927	11.927	(1.165)	795857	100.000	101.42
79 1,2,4-Trimethylbenzene	105	9.944	9.944	(0.971)	2240667	100.000	101.09
89 1,2-Dibromo-3-Chloropropane	155	11.237	11.237	(1.098)	149236	100.000	100.38
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	601967	100.000	99.55

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111309.D Page 2
Report Date: 24-Jan-2019 18:55

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	1221135	100.000	95.83
33 1,2-Dichloroethane	62	5.250	5.250	(0.933)	845716	100.000	94.35
42 1,2-Dichloropropane	63	6.079	6.079	(1.081)	607568	100.000	99.62
75 1,3,5-Trimethylbenzene	105	9.629	9.629	(0.941)	2179527	100.000	101.66
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	1206946	100.000	96.07
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	1063077	100.000	94.81
84 1,4-Dichlorobenzene	146	10.258	10.258	(1.002)	1240019	100.000	100.95
26 2,2-Dichloropropane	77	4.268	4.268	(0.873)	666488	100.000	104.24
24 2-Butanone	43	4.332	4.332	(0.886)	626648	200.000	197.86
76 2-Chlorotoluene	91	9.550	9.550	(0.933)	1897282	100.000	97.10
52 2-Hexanone	43	7.649	7.649	(0.927)	1009723	200.000	211.48(A)
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	2209785	100.000	98.01
82 p-Isopropyltoluene	119	10.213	10.213	(0.998)	2303162	100.000	105.40
45 4-Methyl-2-Pentanone	43	6.915	6.915	(0.838)	1416197	200.000	206.69(A)
10 Acetone	43	2.476	2.476	(0.506)	430350	200.000	212.87(A)
37 Benzene	78	5.216	5.216	(0.927)	2279526	100.000	96.27
74 Bromobenzene	156	9.385	9.385	(0.917)	640019	100.000	97.78
29 Bromochloromethane	128	4.549	4.549	(0.930)	269321	100.000	101.39
39 Bromodichloromethane	83	6.345	6.345	(1.128)	740758	100.000	104.07
66 Bromoform	173	8.984	8.984	(1.089)	383125	100.000	100.58
6 Bromomethane	94	1.655	1.655	(0.339)	367005	100.000	96.33
19 Carbon Disulfide	76	2.581	2.581	(0.528)	3169516	200.000	201.81(A)
34 Carbon Tetrachloride	117	4.991	4.991	(0.887)	664499	100.000	107.51
59 Chlorobenzene	112	8.275	8.275	(1.003)	1606902	100.000	94.79
7 Chloroethane	64	1.741	1.741	(0.356)	444513	100.000	94.55(M)
28 Chloroform	83	4.654	4.654	(0.952)	994934	100.000	95.91
3 Chloromethane	50	1.333	1.333	(0.273)	595590	100.000	98.79
27 cis-1,2-Dichloroethene	96	4.283	4.283	(0.876)	613605	100.000	96.11
46 cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	1019257	100.000	113.72
55 Dibromochloromethane	129	7.758	7.758	(0.940)	576245	100.000	110.87
44 Dibromomethane	93	6.187	6.187	(1.100)	378115	100.000	98.92
2 Dichlorodifluoromethane	85	1.198	1.198	(0.245)	680233	100.000	101.10
61 Ethylbenzene	106	8.373	8.373	(1.015)	844002	100.000	98.46
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	270039	100.000	102.92
67 Isopropylbenzene	105	9.126	9.126	(1.106)	2535018	100.000	101.55
62 m,p-Xylenes	106	8.474	8.474	(1.027)	2096282	200.000	198.47
17 Methylene Chloride	84	2.866	2.866	(0.586)	577262	100.000	101.12
87 n-Butylbenzene	91	10.558	10.558	(1.031)	2203969	100.000	102.68
73 n-Propylbenzene	91	9.479	9.479	(0.926)	3164922	100.000	100.51
92 Naphthalene	128	12.133	12.133	(1.185)	2576616	100.000	109.04
63 o-Xylene	106	8.811	8.811	(1.068)	1070218	100.000	101.23(H)
81 sec-Butylbenzene	105	10.090	10.090	(0.986)	2704732	100.000	103.16
64 Styrene	104	8.826	8.826	(1.070)	1856392	100.000	104.02
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	1862977	100.000	101.96
56 Tetrachloroethene	164	7.526	7.526	(0.912)	415217	100.000	96.50
50 Toluene	91	7.046	7.046	(0.854)	2482746	100.000	95.21
20 trans-1,2-Dichloroethene	96	3.136	3.136	(0.641)	538852	100.000	96.67
51 trans-1,3-Dichloropropene	75	7.259	7.259	(1.291)	912116	100.000	101.29
38 Trichloroethene	130	5.861	5.861	(1.042)	566649	100.000	97.08
8 Trichlorofluoromethane	101	1.944	1.944	(0.398)	897271	100.000	99.61
5 Vinyl Chloride	62	1.411	1.411	(0.289)	744825	100.000	100.88

QC Flag Legend

A - Target compound detected but, quantitated amount exceeded maximum amount.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.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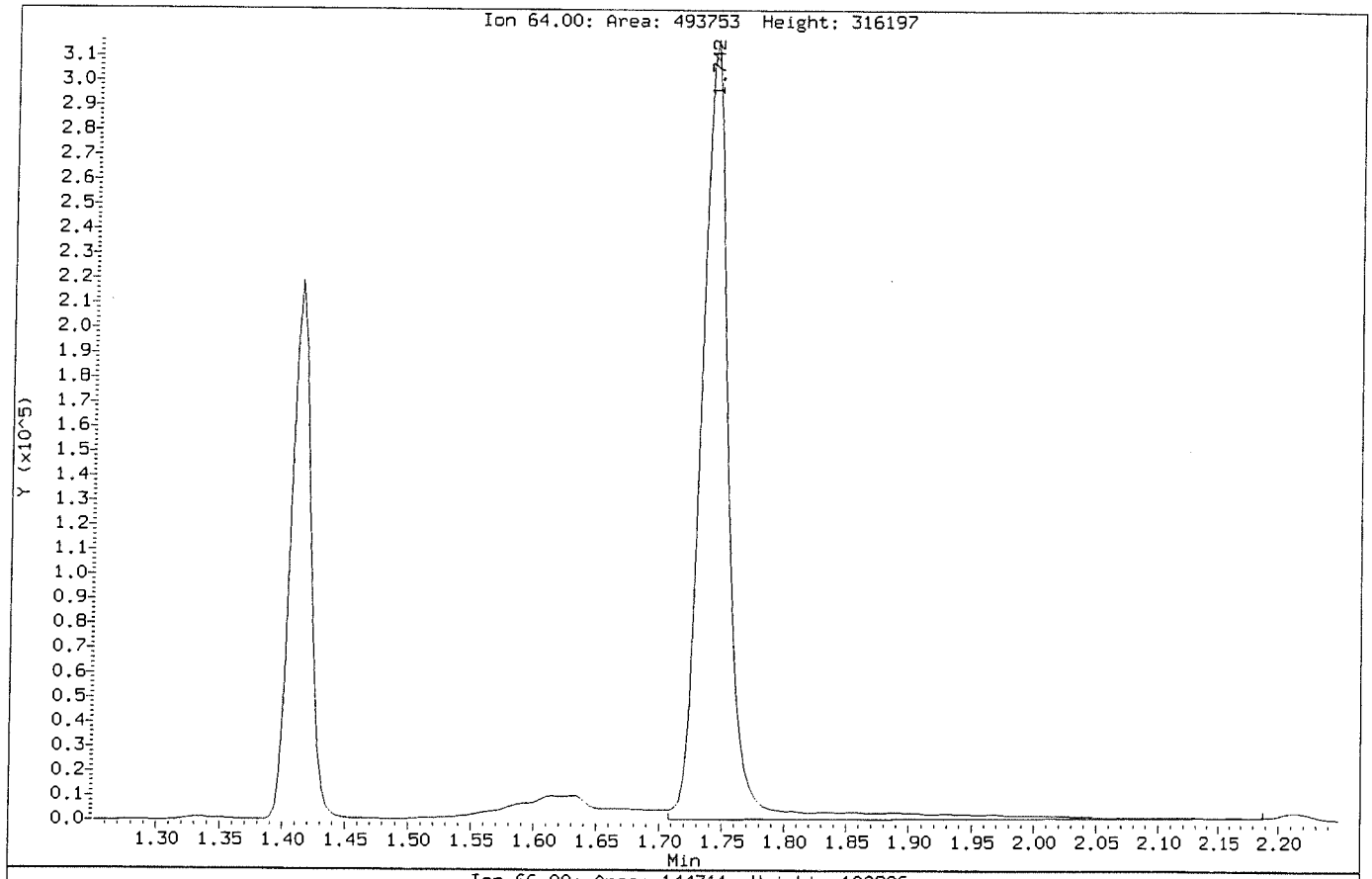
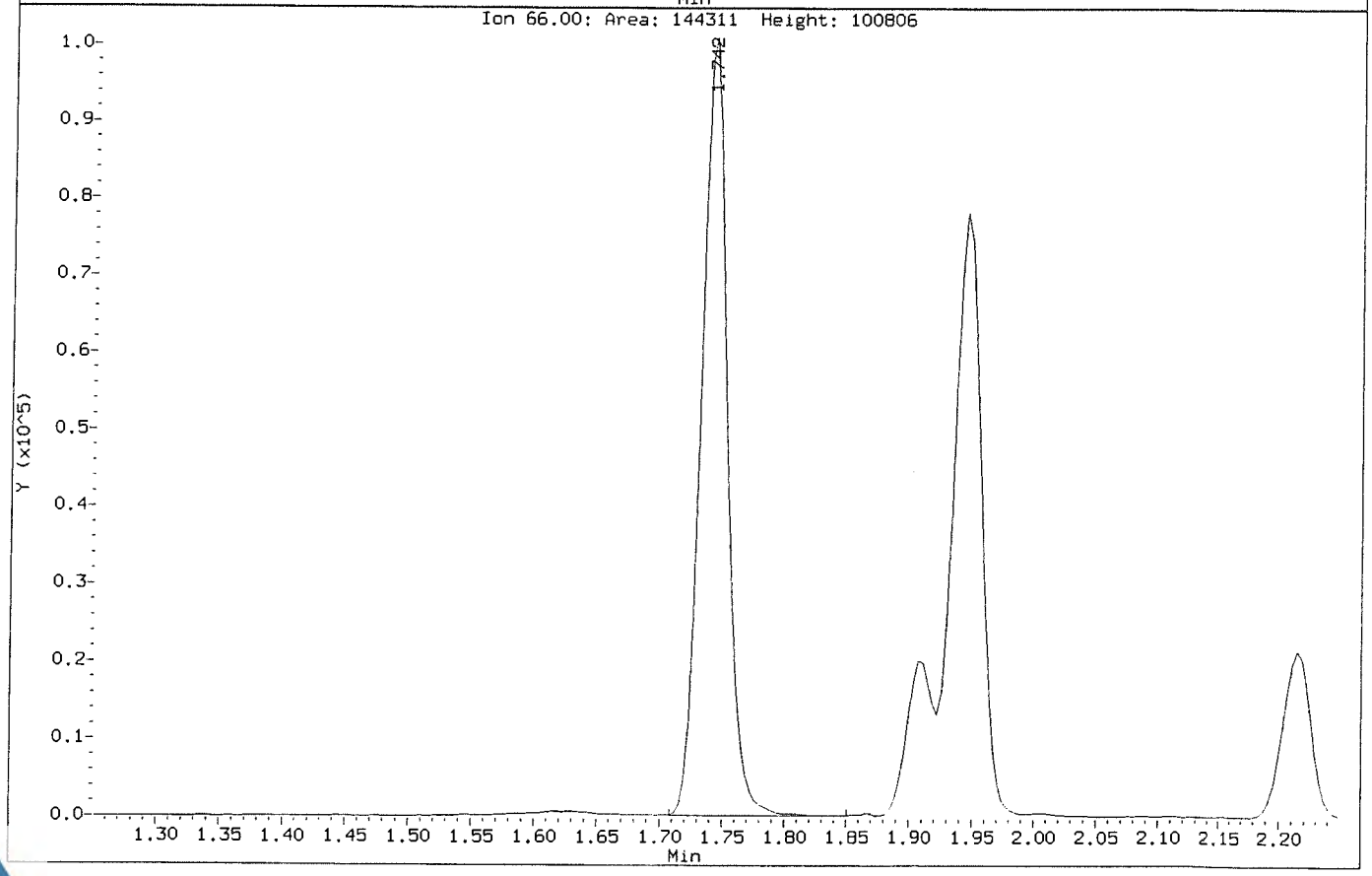
Operator: PC
Column diameter: 0.18
\\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111309.D
Y (x10^7)
Min
-Chloromethane
-Vinyl Chloride+
-Acetaldehyde
-Bromomethane
-Chloroethane
-Trichlorofluoromethane
-n-Pentane+
-Ethanol
-Chloroprene+
-Acrolein
-1,1-Dichloroethene+
-Acetone
-Carbon Disulfide+
-Acetonitrile+
-Methylene Chloride
-Tert-butyl alcohol
-Acrylonitrile+
-Vinyl Acetate+
-1,1-Dichloroethane
-Diisopropyl ether
-tert-Butyl ethyl ether
-2-Butanone+
-Propionitrile+
-Methacrylonitrile+
-Chloroform
-Pentafluorobenzene+
-1,1-Dichloropropene+
-1,2-Dichloroethane+
-Isobutyl Alcohol+
-n-Heptane
-1,4-Difluorobenzene
-Trichloroethene+
-Methylcyclohexane+
-Methyl Methacrylate+
-Bromodichloromethane
-2-Nitropropane
-Dimethyl Disulfide
-4-Methyl-2-Pentanone
-Toluene-d8
-Toluene
-trans-1,3-Dichloropropene+
-Ethyl Methacrylate
-1,1,2-Trichloroethane+
-1,3-Dichloropropane+
-2-Hexanone
-Dibromochloromethane
-1,2-Dibromoethane+
-Chlorobenzene-d5+
-1,1,1,2-Tetrachloroethane+
-m,p-Xylenes+
-Styrene+
-Methyl Amyl Ketone
-Bromoform+
-Isopropylbenzene
-4-Bromofluorobenzene+
-1,1,2,2-Tetrachloroethane+
-2-Chlorotoluene
-1,3,5-Trimethylbenzene+
-alpha-Methylstyrene
-tert-Butylbenzene+
-sec-Butylbenzene
-1,4-Dichlorobenzene-d4+
-Benzyl Chloride+
-n-Butylbenzene+
-1,2-Dibromo-3-Chloropropa
-1,2,4-Trichlorobenzene
-Hexachlorobutadiene
-Naphthalene
-1,2,3-Trichlorobenzene
-2-Methylnaphthalene
-1-Methylnaphthalene

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111309.D
Injection Date: 13-NOV-2018 14:39
Instrument: VOA9.i
Client Sample ID: VSTD100

Compound: Chloroethane
CAS Number: 75-00-3





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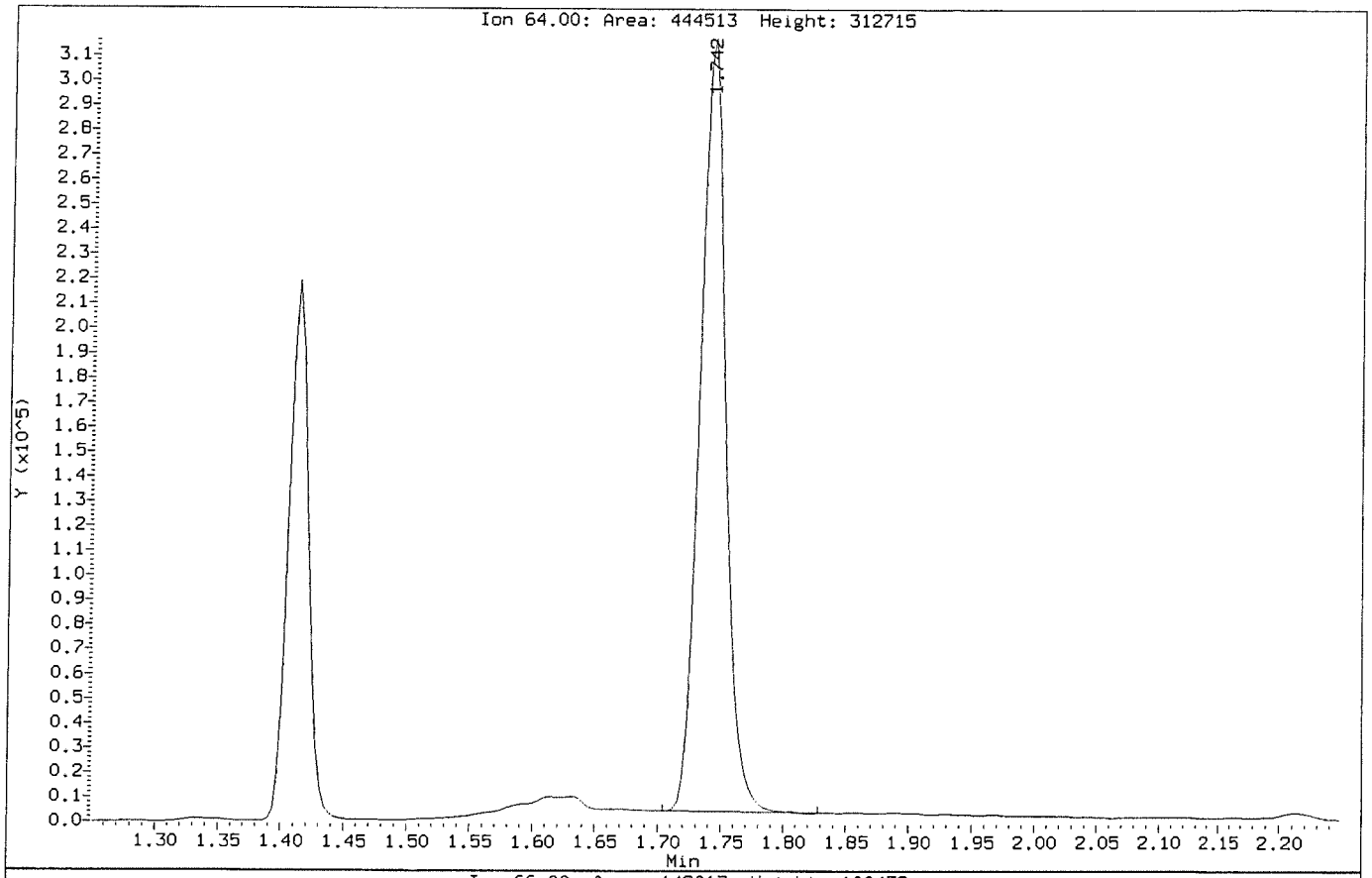
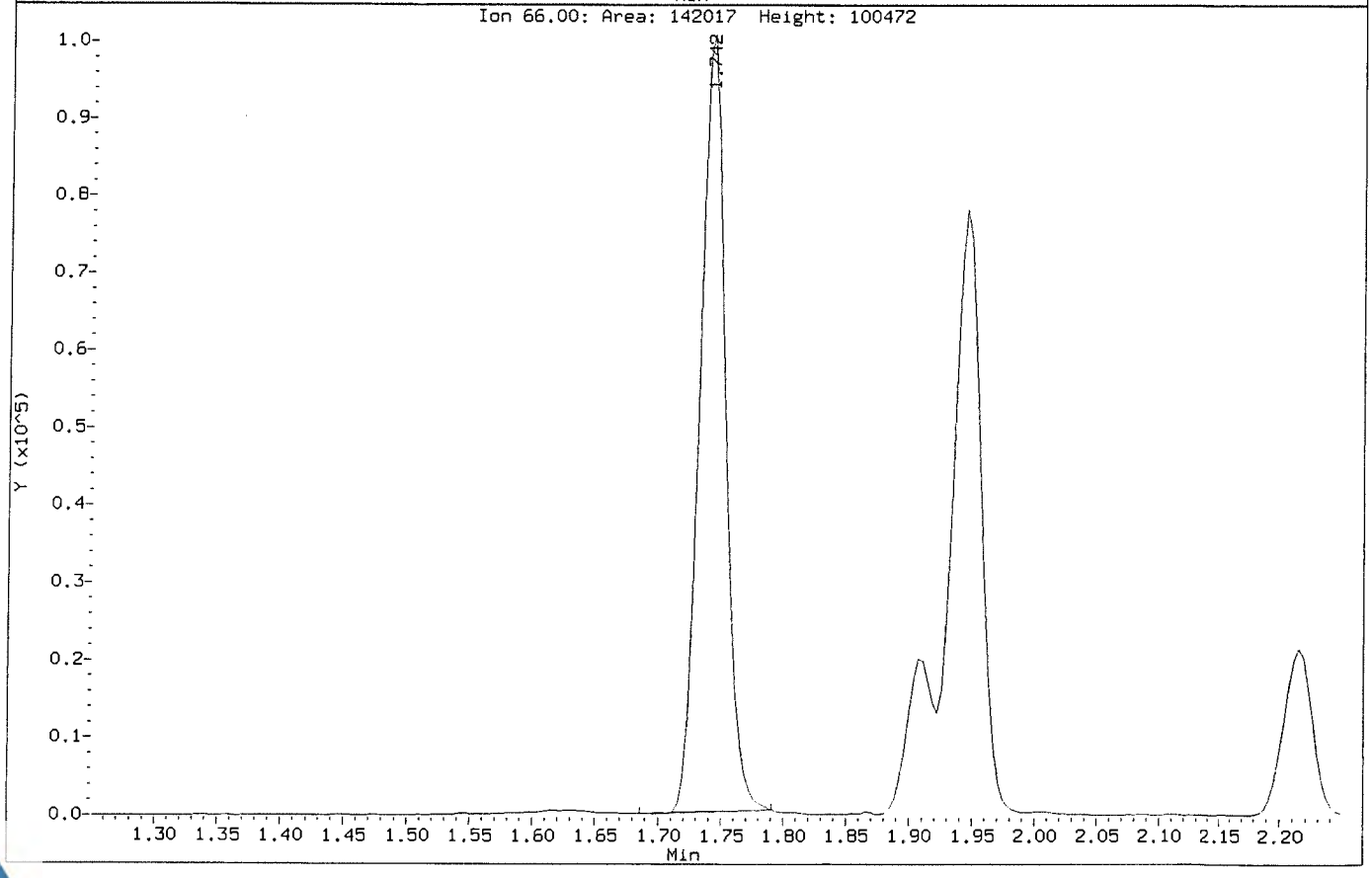
Client Sample ID: VSTD100

Compound: Chloroethane
CAS Number: 75-00-3





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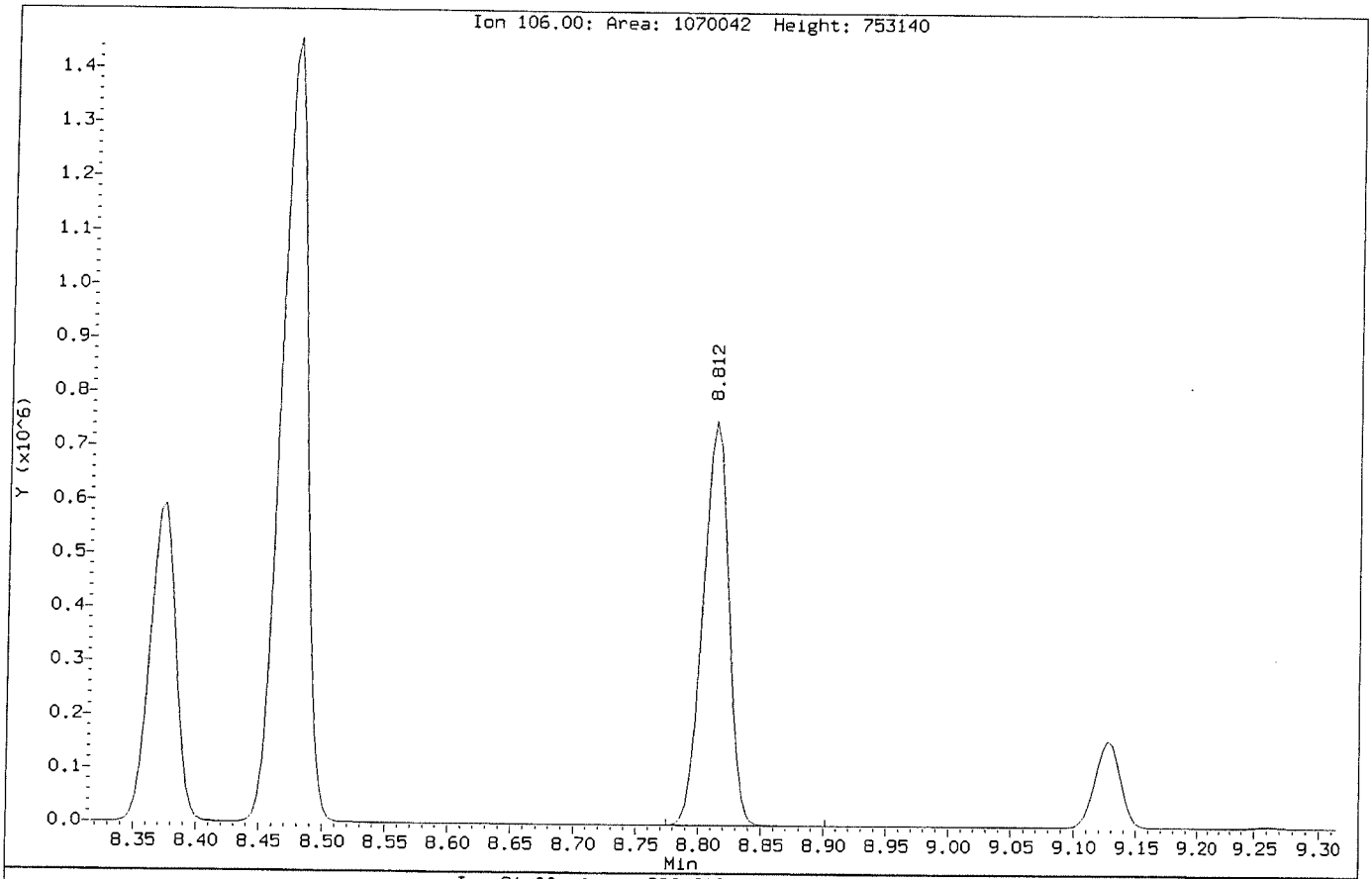
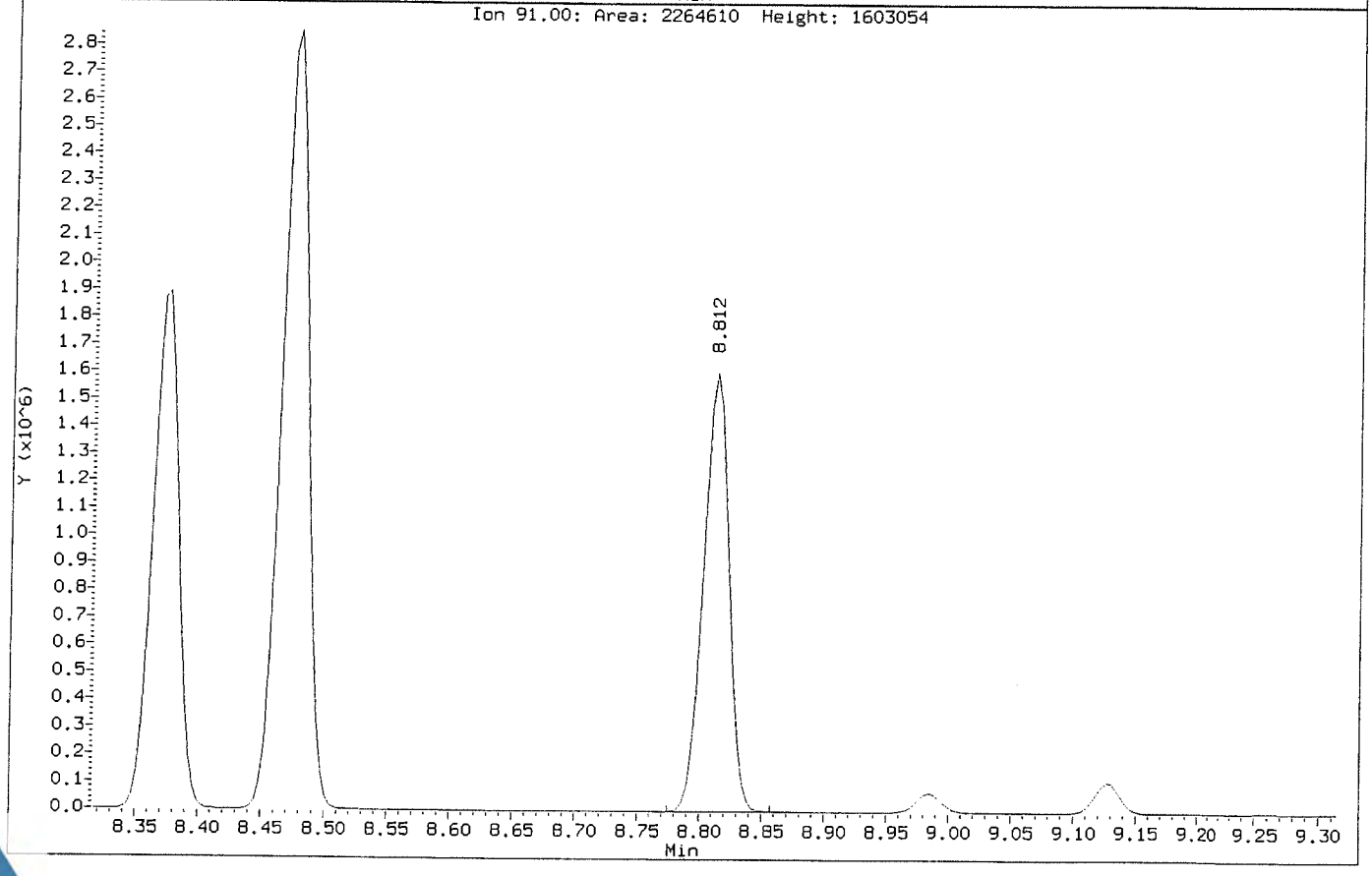
Injection Date: 13-NOV-2018 14:39
Instrument: VOA9.i
Client Sample ID: VSTD100

Compound: o-Xylene
CAS Number: 95-47-6





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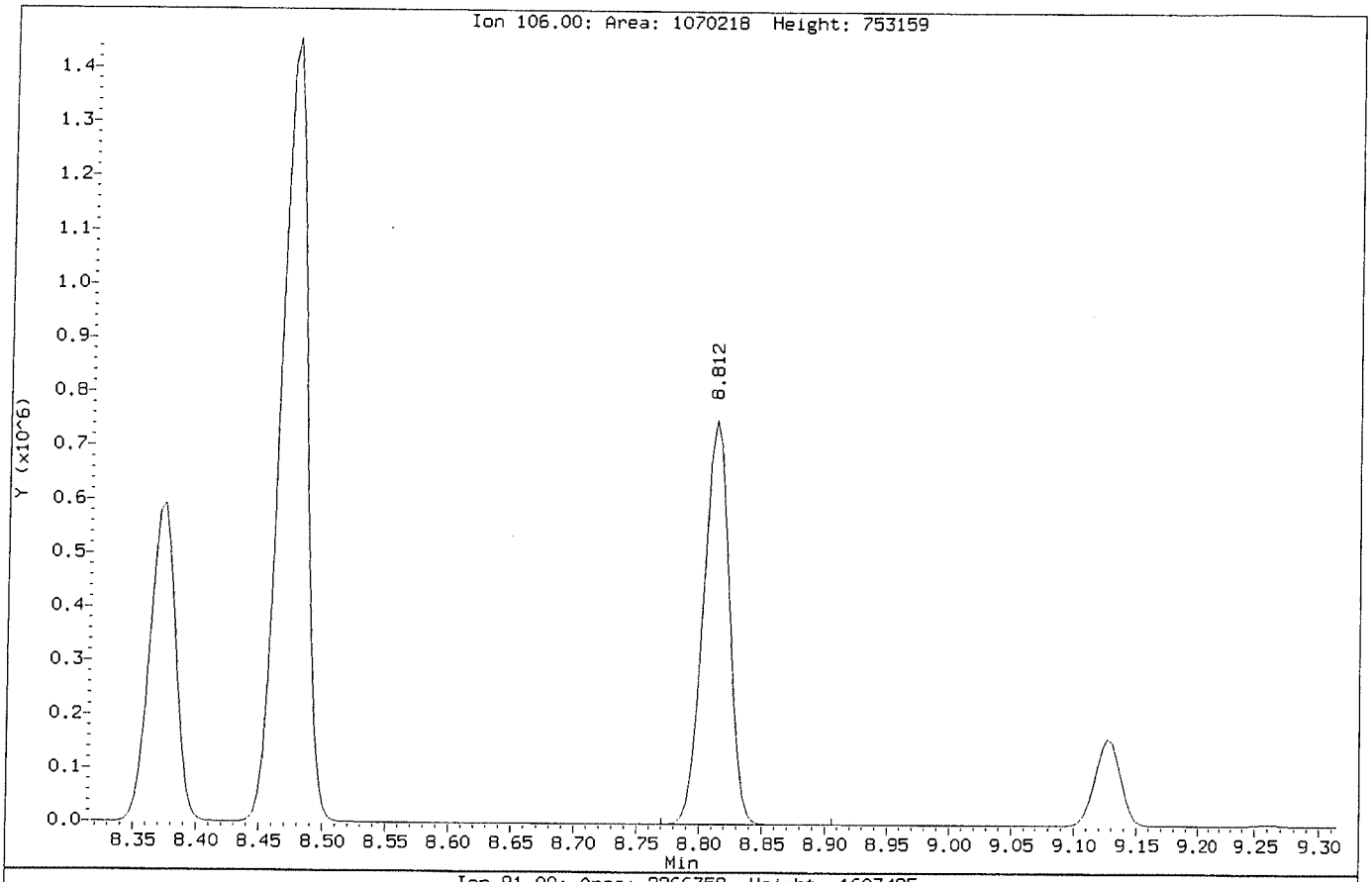
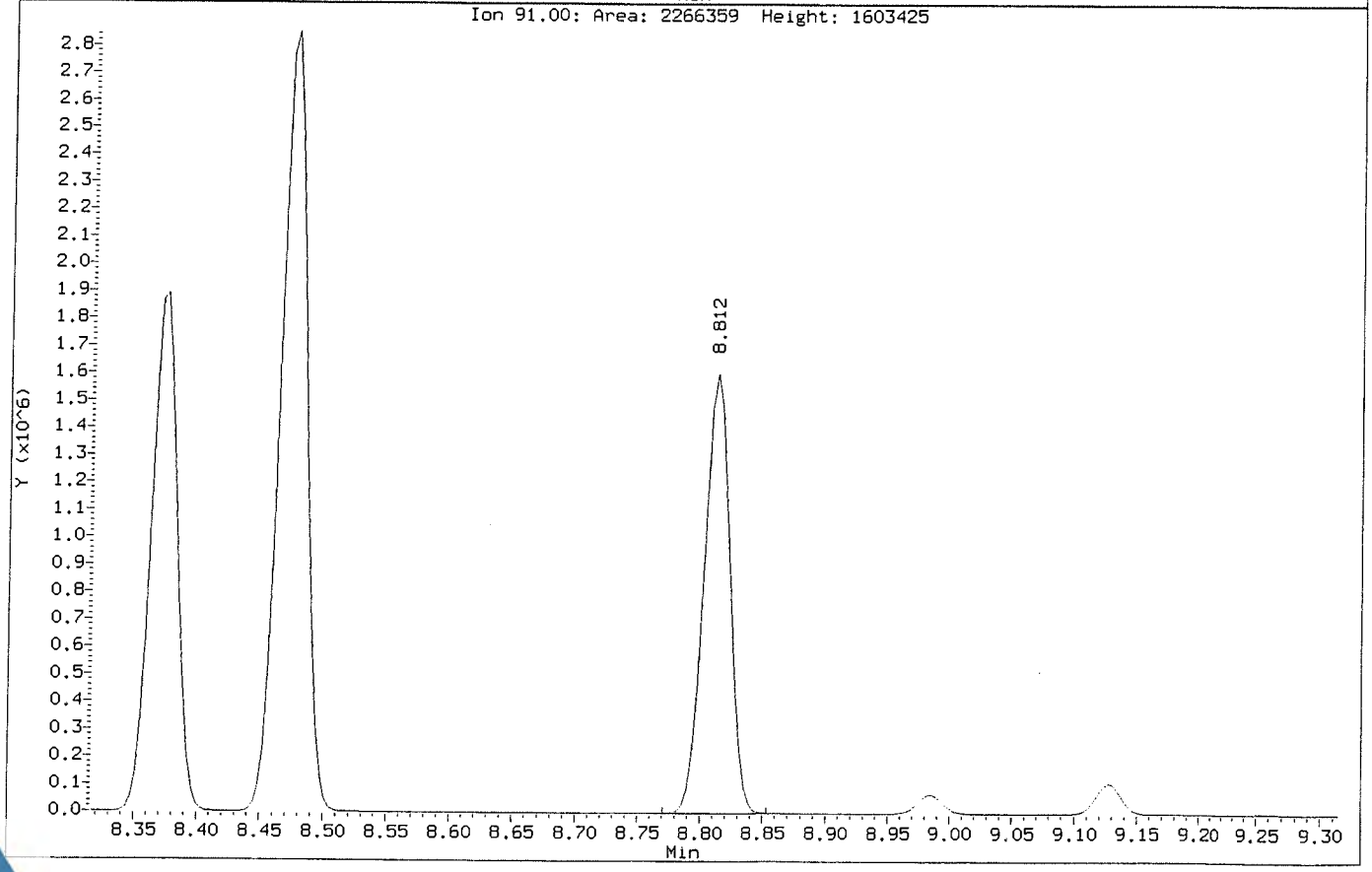
Compound: o-Xylene
CAS Number: 95-47-6





ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111310.D
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Inj Date : 13-NOV-2018 15:04
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD150;VSTD150;1;9;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:39 Cal File: U111309.D
Als bottle: 11 Calibration Sample, Level: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

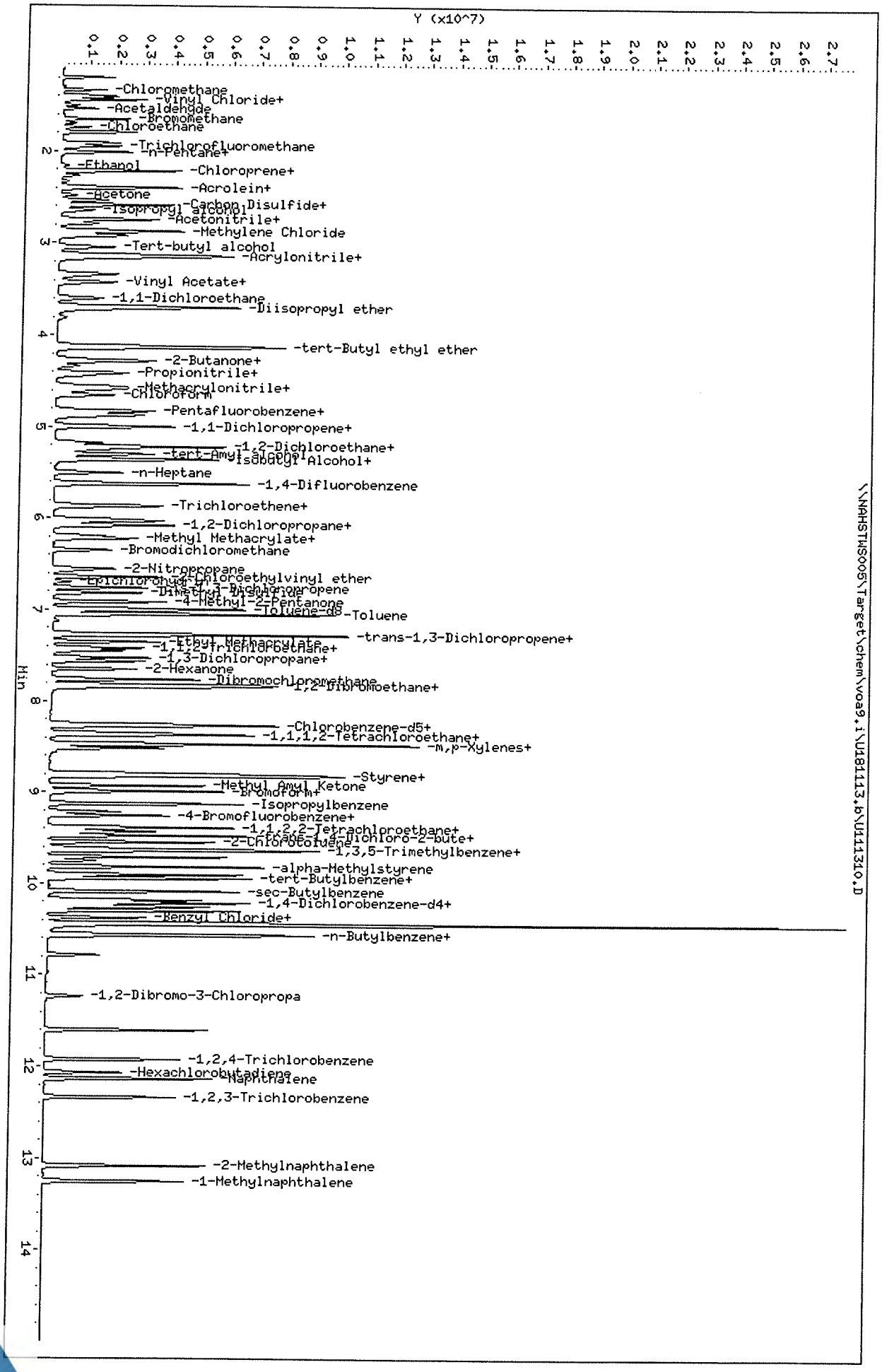
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	463456	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	890799	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	854800	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	408174	50.0000	
$ 30 Dibromofluoromethane	113	4.827	4.827	(0.986)	809097	150.000	154.42
$ 35 1,2-Dichloroethane-d4	65	5.175	5.175	(1.057)	1062364	150.000	155.24
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	3238162	150.000	151.57
$ 69 4-Bromofluorobenzene	95	9.258	9.258	(1.122)	1261578	150.000	151.36
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	858465	150.000	159.21
31 1,1,1-Trichloroethane	97	4.827	4.827	(0.986)	1329534	150.000	163.31
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	1394090	150.000	144.19
138 Freon TF	101	2.397	2.397	(0.490)	735007	150.000	158.31
53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	767365	150.000	141.20
22 1,1-Dichloroethane	63	3.601	3.601	(0.736)	1566973	150.000	147.54
11 1,1-Dichloroethene	96	2.394	2.394	(0.489)	789917	150.000	150.99
32 1,1-Dichloropropene	75	5.003	5.003	(0.889)	1250083	150.000	151.94
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	1201294	150.000	155.88
71 1,2,3-Trichloropropane	75	9.430	9.430	(0.921)	1603390	150.000	158.92
90 1,2,4-Trichlorobenzene	180	11.927	11.927	(1.165)	1246599	150.000	155.30
79 1,2,4-Trimethylbenzene	105	9.944	9.944	(0.971)	3425922	150.000	151.11
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	234820	150.000	152.68
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	923726	150.000	146.78

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111310.D Page 2
Report Date: 24-Jan-2019 18:55

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	1872904	150.000	143.68
33 1,2-Dichloroethane	62	5.250	5.250	(0.933)	1302354	150.000	139.71
42 1,2-Dichloropropane	63	6.082	6.082	(1.081)	950163	150.000	149.81
75 1,3,5-Trimethylbenzene	105	9.629	9.629	(0.941)	3367895	150.000	153.56
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	1864119	150.000	145.05
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	1651259	150.000	141.50
84 1,4-Dichlorobenzene	146	10.258	10.258	(1.002)	1907496	150.000	151.83
26 2,2-Dichloropropane	77	4.272	4.272	(0.873)	1089497	150.000	165.65
24 2-Butanone	43	4.336	4.336	(0.886)	955107	300.000	293.17(A)
76 2-Chlorotoluene	91	9.550	9.550	(0.933)	2905161	150.000	145.35
52 2-Hexanone	43	7.653	7.653	(0.928)	1563288	300.000	314.60(A)
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	3405553	150.000	147.66
82 p-Isopropyltoluene	119	10.213	10.213	(0.998)	3559913	150.000	159.26
45 4-Methyl-2-Pentanone	43	6.915	6.915	(0.838)	2161270	300.000	303.08(A)
10 Acetone	43	2.480	2.480	(0.507)	636098	300.000	307.81(A)
37 Benzene	78	5.216	5.216	(0.927)	3563563	150.000	144.72
74 Bromobenzene	156	9.385	9.385	(0.917)	991935	150.000	148.14
29 Bromochloromethane	128	4.553	4.553	(0.930)	396590	150.000	145.15
39 Bromodichloromethane	83	6.349	6.349	(1.129)	1169536	150.000	158.01
66 Bromoform	173	8.984	8.984	(1.089)	610635	150.000	152.14
6 Bromomethane	94	1.655	1.655	(0.338)	609177	150.000	154.28
19 Carbon Disulfide	76	2.585	2.585	(0.528)	5076235	300.000	314.21(A)
34 Carbon Tetrachloride	117	4.995	4.995	(0.888)	1081499	150.000	168.27
59 Chlorobenzene	112	8.275	8.275	(1.003)	2477986	150.000	140.45
7 Chloroethane	64	1.741	1.741	(0.356)	708077	150.000	146.42(M)
28 Chloroform	83	4.654	4.654	(0.951)	1558200	150.000	146.02
3 Chloromethane	50	1.337	1.337	(0.273)	963160	150.000	155.17
27 cis-1,2-Dichloroethene	96	4.283	4.283	(0.875)	965405	150.000	147.00
46 cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	1623779	150.000	174.21
55 Dibromochloromethane	129	7.758	7.758	(0.940)	908238	150.000	167.91
44 Dibromomethane	93	6.191	6.191	(1.101)	587501	150.000	147.80
2 Dichlorodifluoromethane	85	1.202	1.202	(0.246)	1086406	150.000	156.42
61 Ethylbenzene	106	8.373	8.373	(1.015)	1325471	150.000	148.58
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	426795	150.000	149.03
67 Isopropylbenzene	105	9.126	9.126	(1.106)	3937489	150.000	151.57
62 m,p-Xylenes	106	8.474	8.474	(1.027)	3241074	300.000	294.85(A)
17 Methylene Chloride	84	2.866	2.866	(0.586)	911224	150.000	155.55
87 n-Butylbenzene	91	10.558	10.558	(1.031)	3347969	150.000	149.04
73 n-Propylbenzene	91	9.479	9.479	(0.926)	4851775	150.000	150.63
92 Naphthalene	128	12.133	12.133	(1.185)	3933835	150.000	162.75
63 o-Xylene	106	8.811	8.811	(1.068)	1663910	150.000	151.23(H)
81 sec-Butylbenzene	105	10.090	10.090	(0.986)	4188144	150.000	156.16
64 Styrene	104	8.826	8.826	(1.070)	2865534	150.000	154.28
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	2893337	150.000	154.80
56 Tetrachloroethene	164	7.526	7.526	(0.912)	658457	150.000	147.04
50 Toluene	91	7.050	7.050	(0.855)	3865080	150.000	142.41
20 trans-1,2-Dichloroethene	96	3.140	3.140	(0.642)	855722	150.000	149.25
51 trans-1,3-Dichloropropene	75	7.259	7.259	(1.291)	1439550	150.000	152.95
38 Trichloroethene	130	5.861	5.861	(1.042)	898620	150.000	148.04
8 Trichlorofluoromethane	101	1.948	1.948	(0.398)	1438631	150.000	155.26
5 Vinyl Chloride	62	1.415	1.415	(0.289)	1189386	150.000	156.33

QC Flag Legend

A - Target compound detected but, quantitated amount exceeded maximum amount.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.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Min
1 2 3 4 5 6 7 8 9 10 11 12 13 14
-Chloromethane
-Vinyl Chloride+
-Acetaldehyde
-Bromomethane
-Chloroethane
-Trichlorofluoromethane
-n-Pentane+
-Ethanol
-Chloroprene+
-Acrolein+
-Acetone
-Carbon Disulfide+
-Isopropyl alcohol
-Acetonitrile+
-Methylene Chloride
-Tert-butyl alcohol
-Acrylonitrile+
-Vinyl Acetate+
-1,1-Dichloroethane
-Diisopropyl ether
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-2-Butanone+
-Propionitrile+
-Methacrylonitrile+
-Chloroform
-Pentafluorobenzene+
-1,1-Dichloropropene+
-1,2-Dichloroethane+
-tert-Amyl alcohol
-Isobutyl Alcohol+
-n-Heptane
-1,4-Difluorobenzene
-Trichloroethene+
-1,2-Dichloropropane+
-Methyl Methacrylate+
-Bromodichloromethane
-2-Nitropropane
-2-Chloroethylvinyl ether
-Epichlorohydrin
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-Toluene
-Ethyl Methacrylate
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-1,3-Dichloropropane+
-2-Hexanone
-Dibromochloromethane
-1,2-Dibromoethane+
-Chlorobenzene-d5+
-1,1,1,2-Tetrachloroethane+
-m,p-Xylenes+
-Styrene+
-Methyl Amyl Ketone
-Bromoform+
-Isopropylbenzene
-4-Bromofluorobenzene+
-1,1,2,2-Tetrachloroethane+
-trans-1,4-Dichloro-2-bute+
-2-Chlorotoluene
-1,3,5-Trimethylbenzene+
-alpha-Methylstyrene
-tert-Butylbenzene+
-sec-Butylbenzene
-1,4-Dichlorobenzene-d4+
-Benzyl Chloride
-n-Butylbenzene+
-1,2-Dibromo-3-Chloropropa
-1,2,4-Trichlorobenzene
-Hexachlorobutadiene
-Naphthalene
-1,2,3-Trichlorobenzene
-2-Methylnaphthalene
-1-Methylnaphthalene
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Sample Info: VSTD150;VSTD150;1;9;
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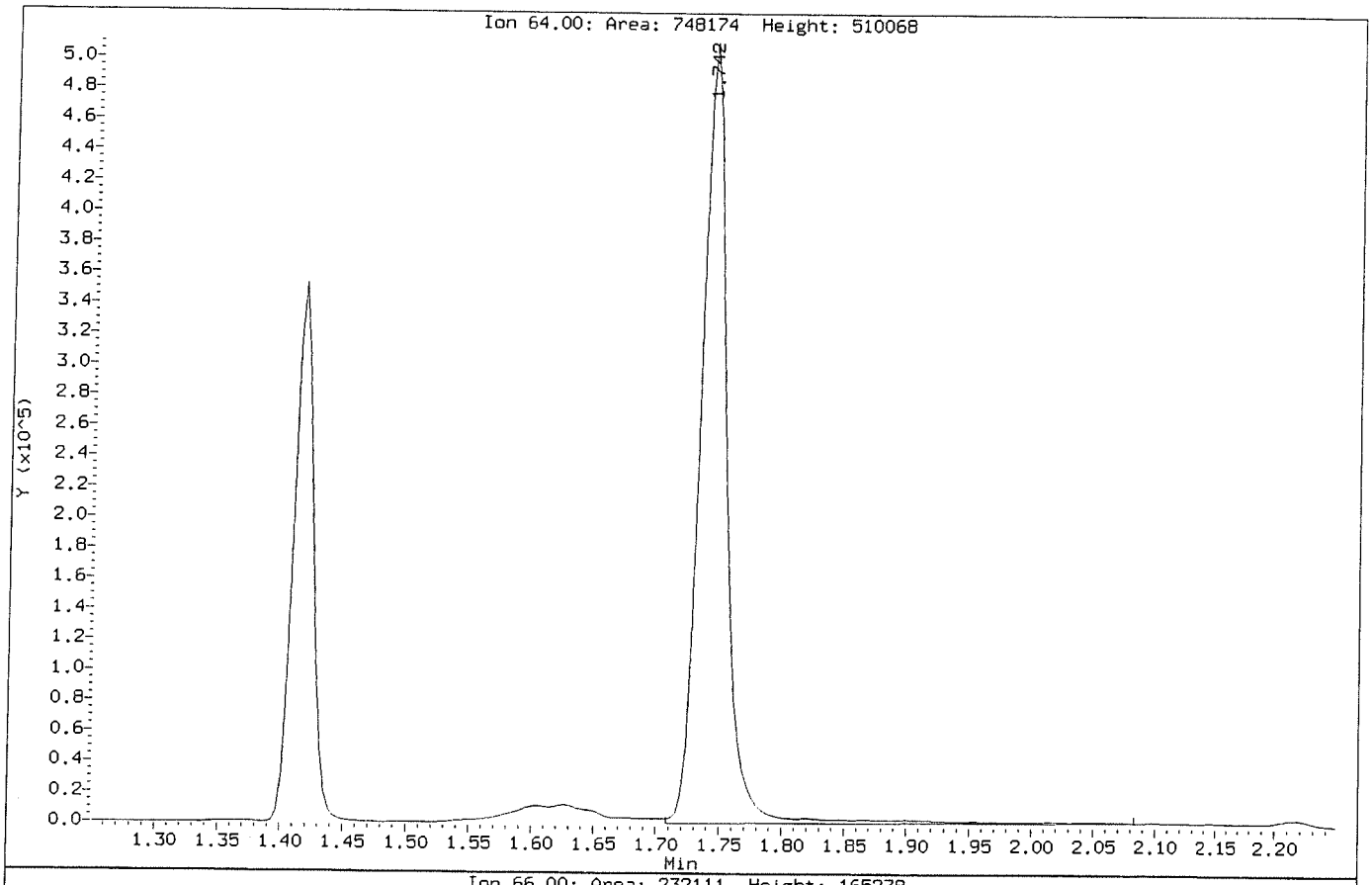
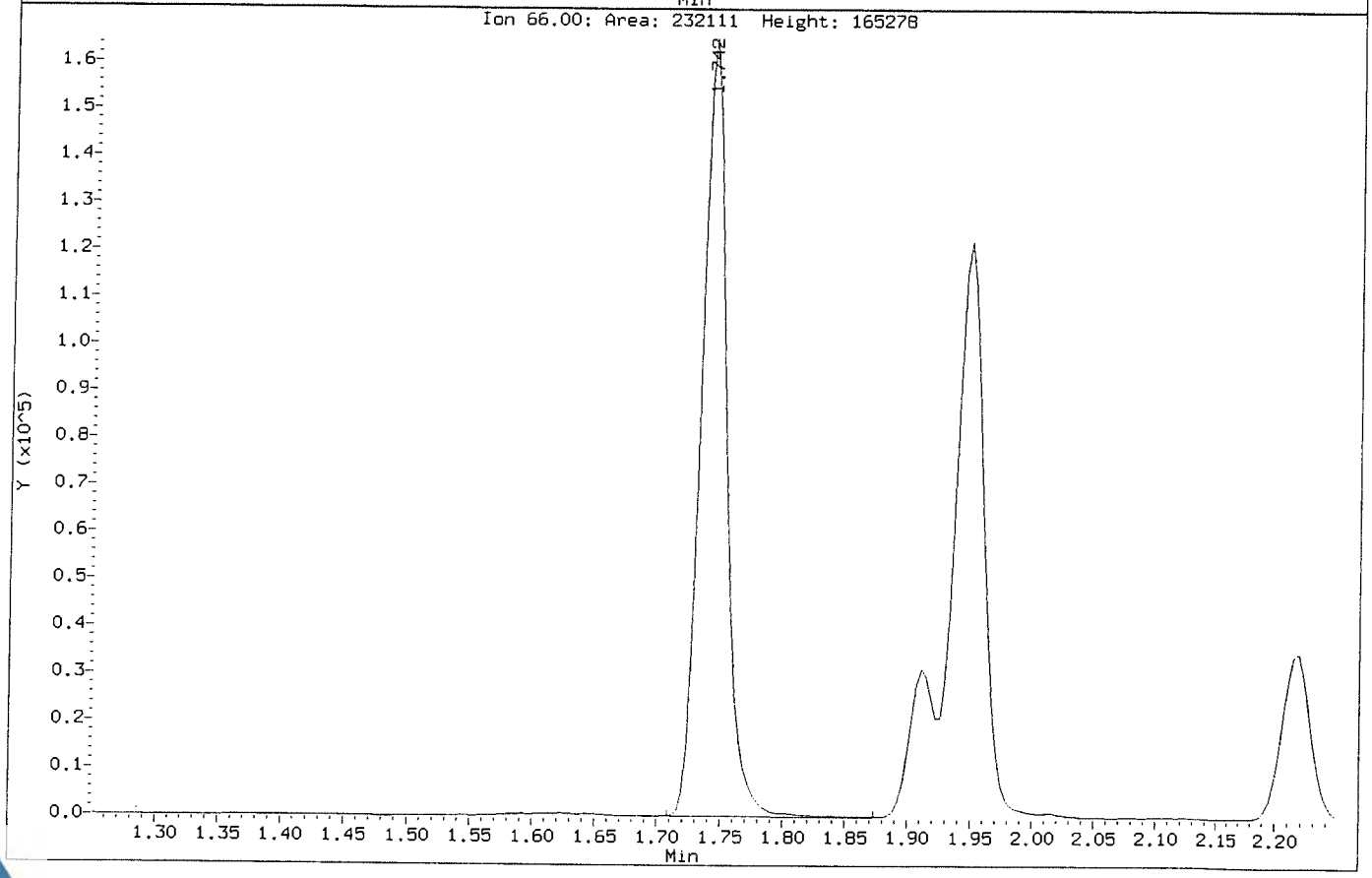
Column phase: DB624
Instrument: VOA9,i
Operator: PC
Column diameter: 0.18
Page 4

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111310.D
Injection Date: 13-NOV-2018 15:04
Instrument: VOA9.i
Client Sample ID: VSTD150

Compound: Chloroethane
CAS Number: 75-00-3





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Compound: Chloroethane
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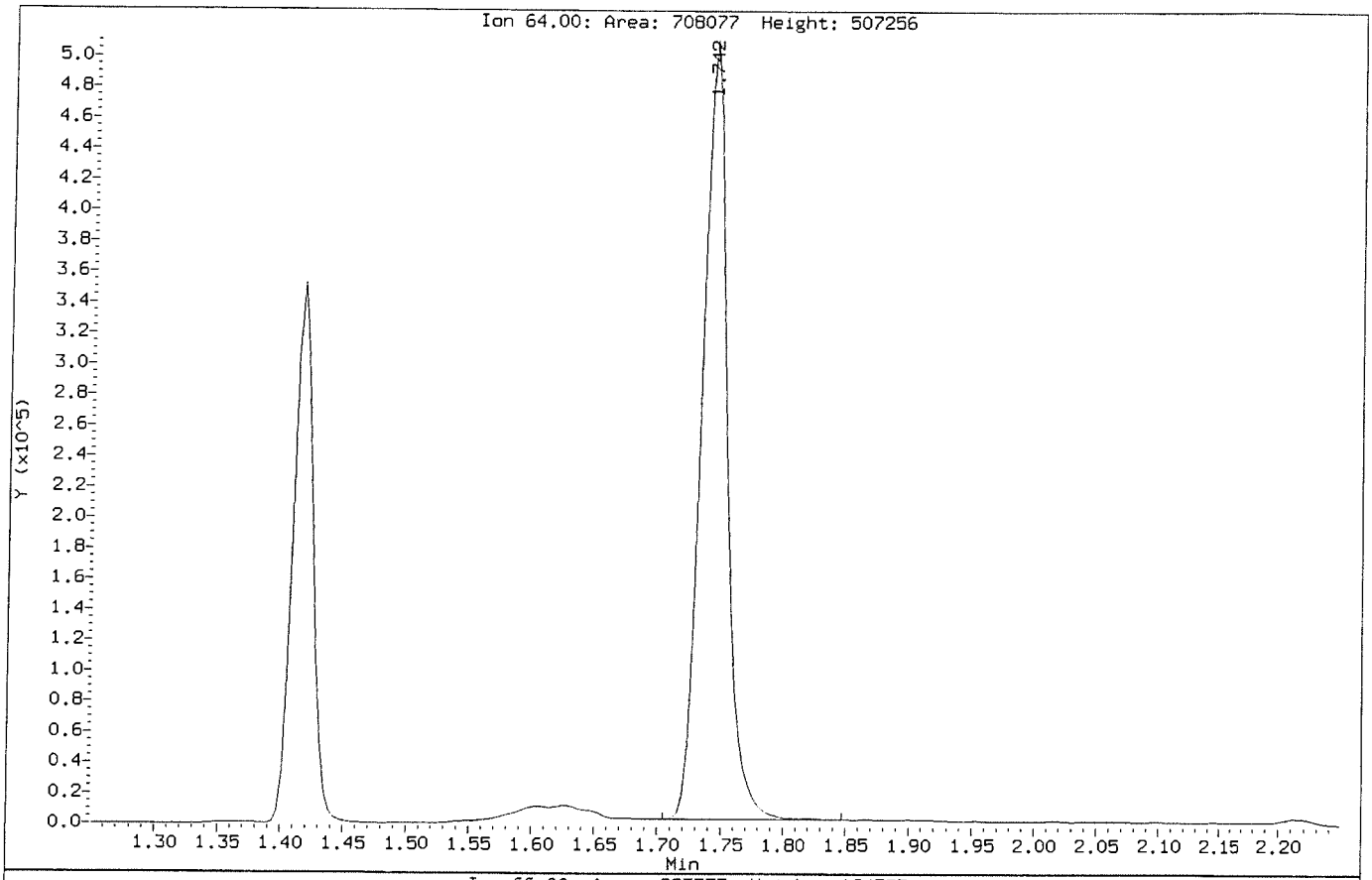

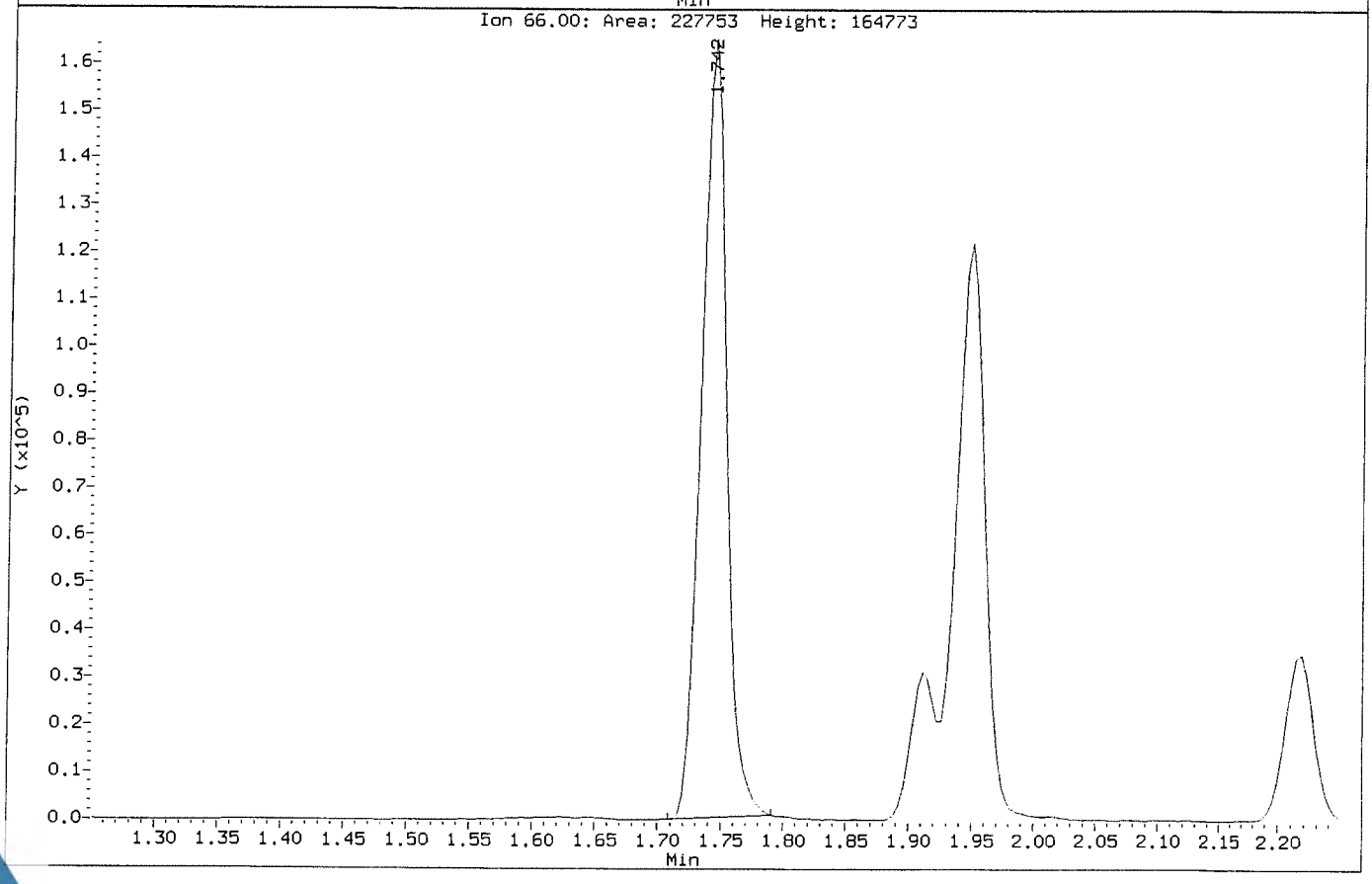

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Client Sample ID: VSTD150

Compound: o-Xylene
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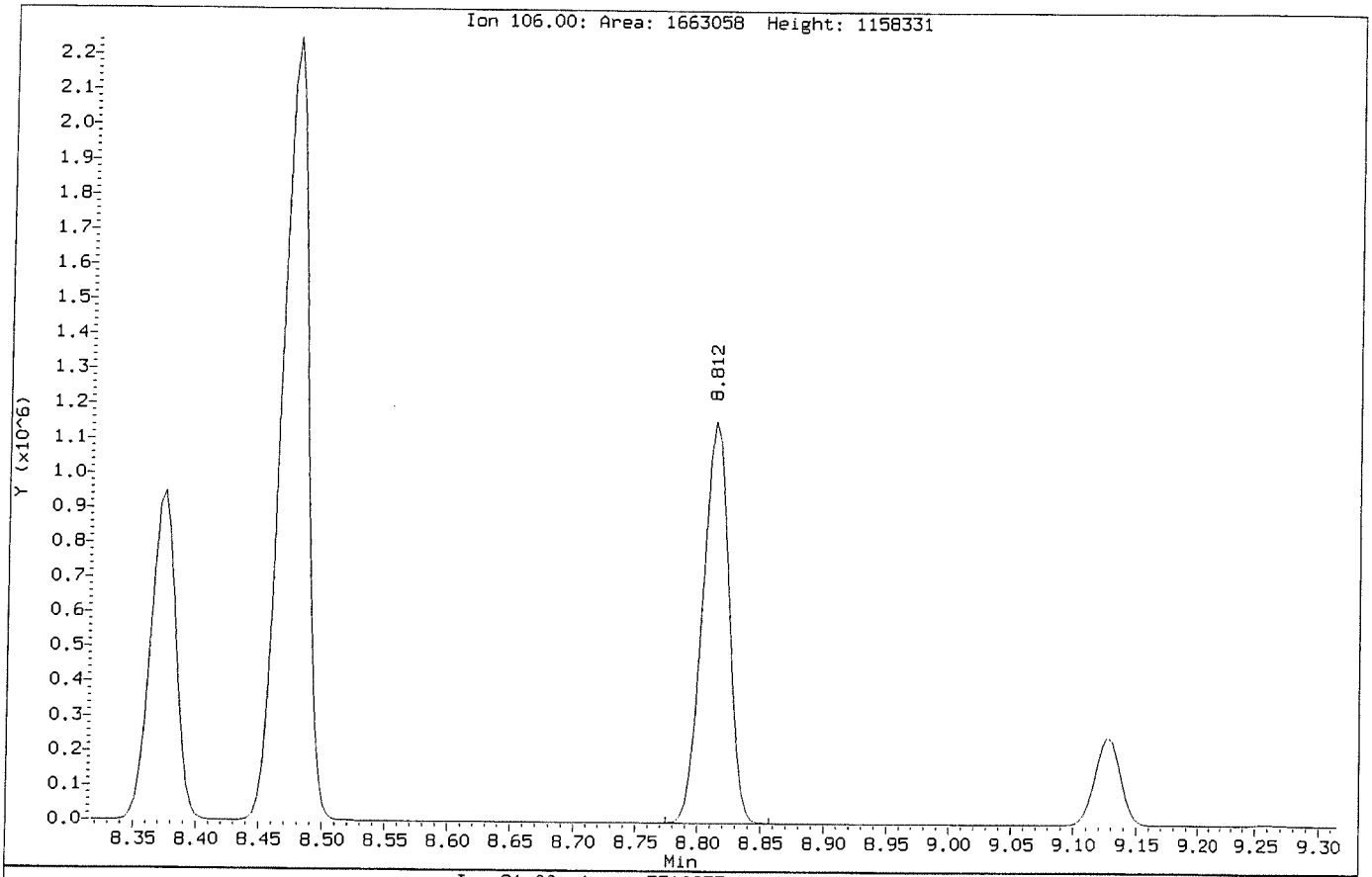

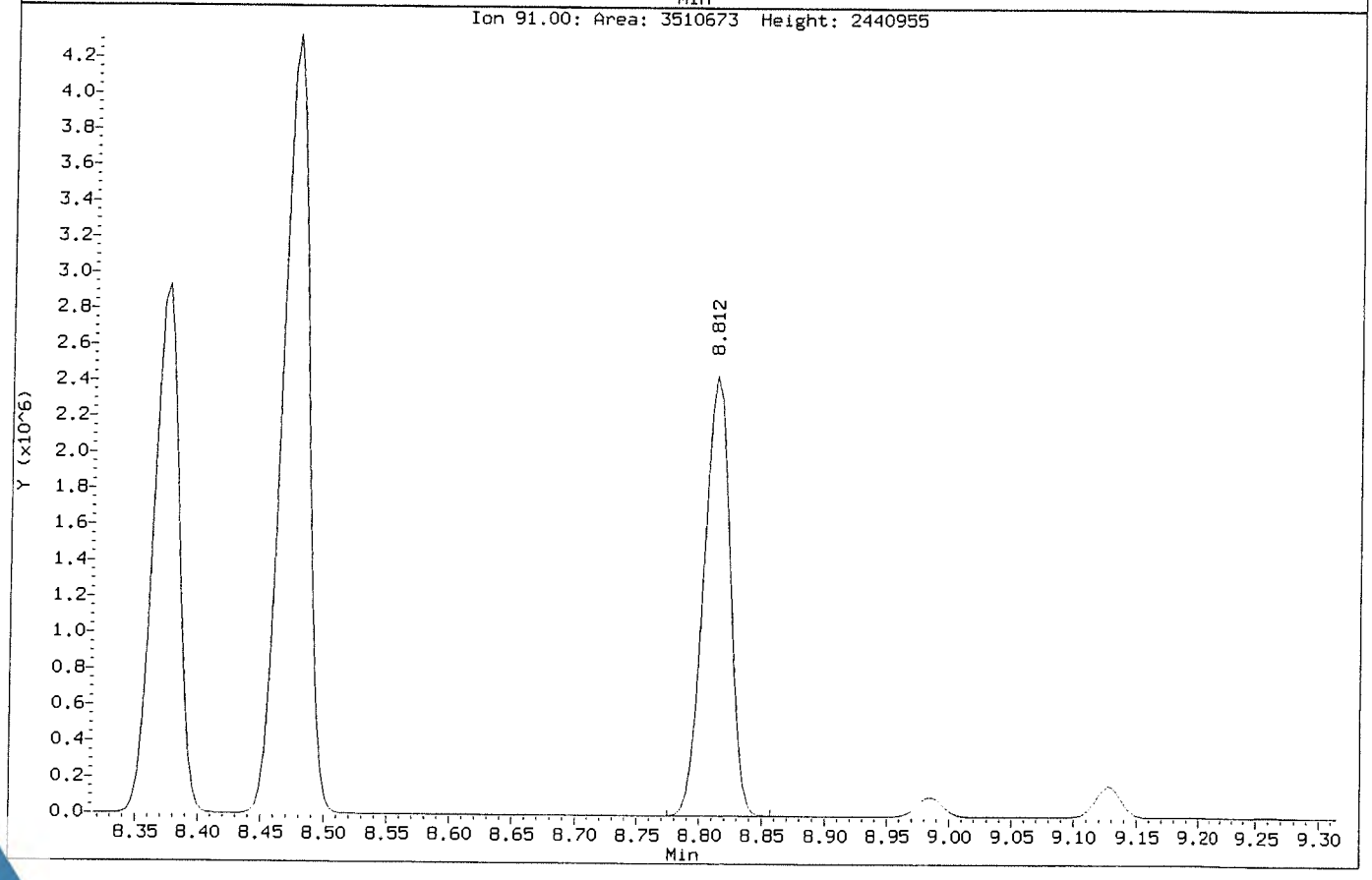

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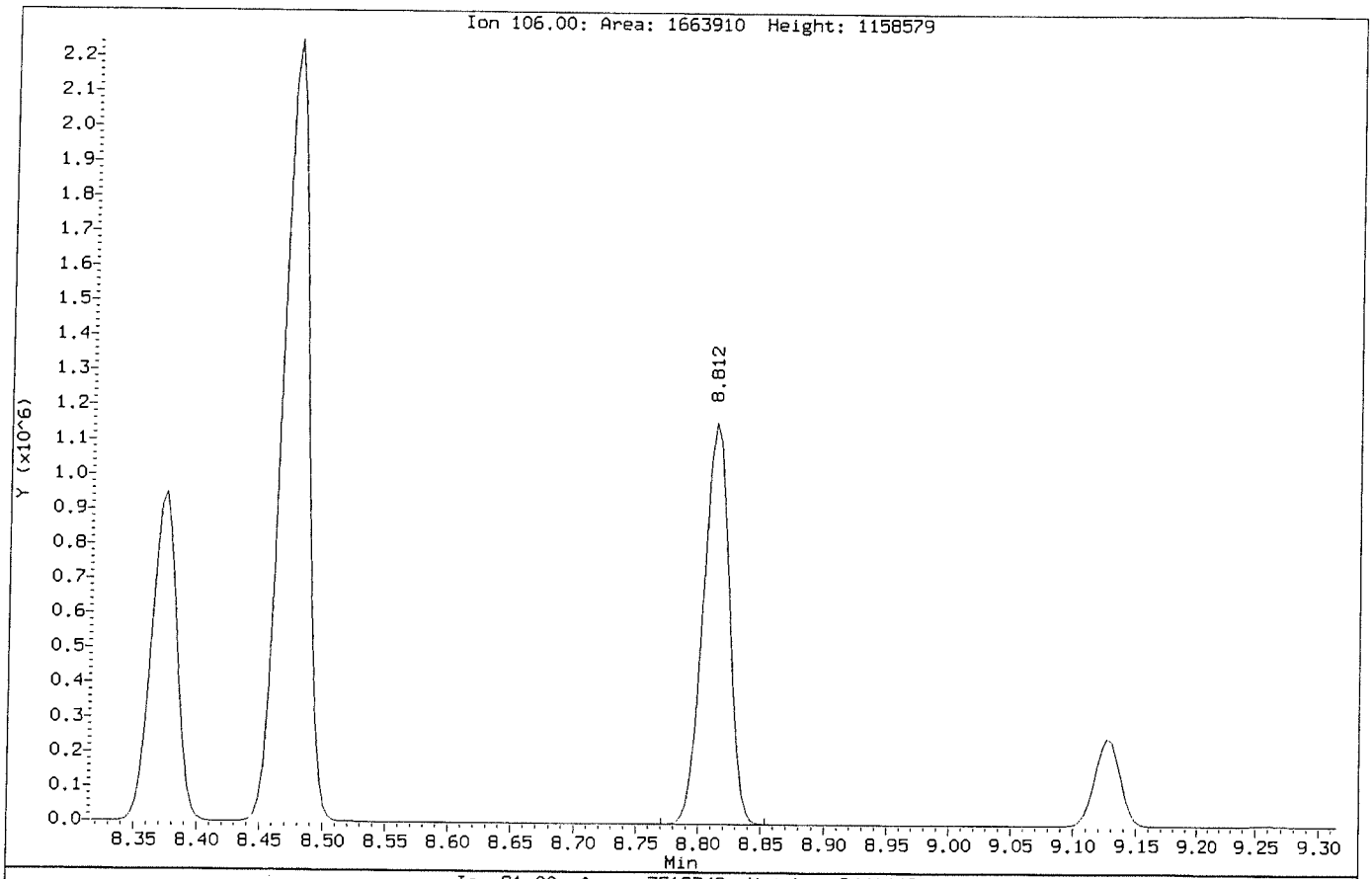
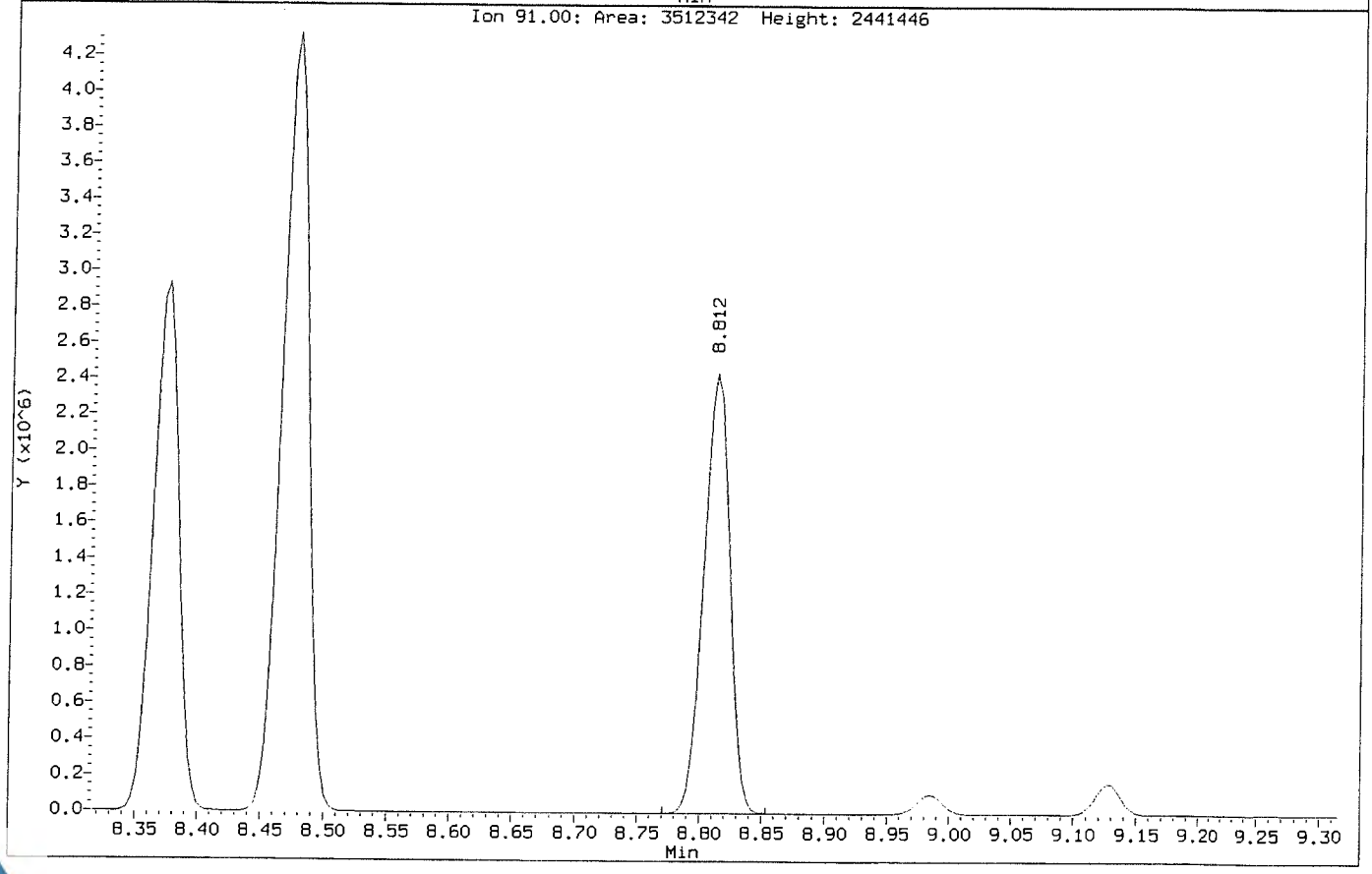
Client Sample ID: VSTD150

Compound: o-Xylene
CAS Number: 95-47-6





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Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111311.D
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Inj Date : 13-NOV-2018 15:28
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD200;VSTD200;1;10;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 15:04 Cal File: U111310.D
Als bottle: 12 Calibration Sample, Level: 10
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

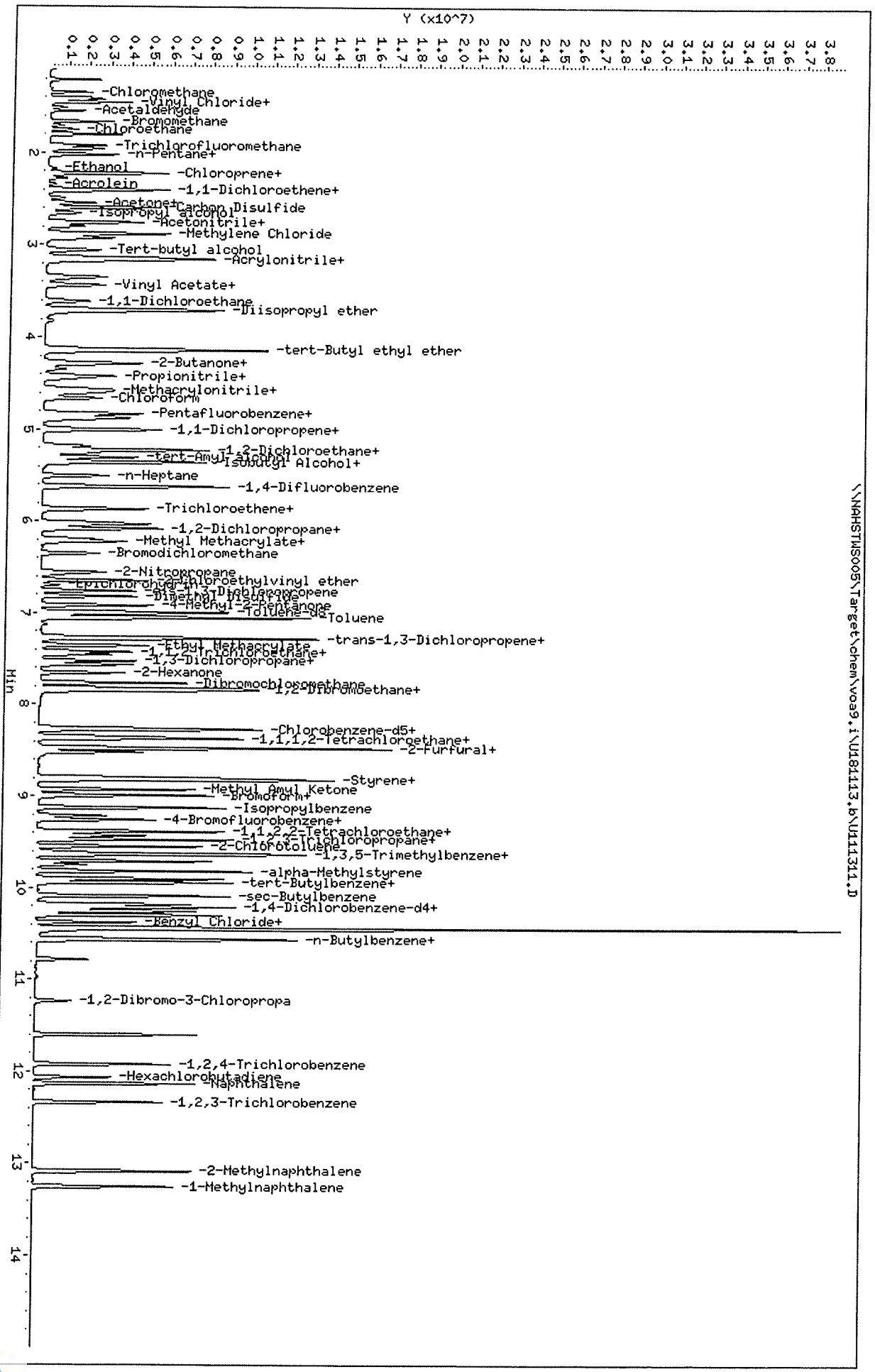
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.898	(1.000)	505644	50.0000	
* 36 1,4-Difluorobenzene	114	5.629	5.629	(1.000)	946062	50.0000	
* 47 Chlorobenzene-d5	117	8.253	8.253	(1.000)	896349	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.239	10.239	(1.000)	426550	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.834	(0.987)	1112100	200.000	194.87
$ 35 1,2-Dichloroethane-d4	65	5.179	5.179	(1.057)	1441844	200.000	193.54
$ 48 Toluene-d8	98	6.993	6.993	(0.847)	4386438	200.000	196.29
$ 69 4-Bromofluorobenzene	95	9.261	9.261	(1.122)	1723103	200.000	197.48
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	1191494	200.000	210.73(A)
31 1,1,1-Trichloroethane	97	4.830	4.830	(0.986)	1824622	200.000	205.42(A)
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.917)	1884161	200.000	186.48
138 Freon TF	101	2.405	2.405	(0.491)	1007022	200.000	198.80
53 1,1,2-Trichloroethane	83	7.424	7.424	(0.900)	1043779	200.000	183.16
22 1,1-Dichloroethane	63	3.608	3.608	(0.737)	2138732	200.000	184.57
11 1,1-Dichloroethene	96	2.405	2.405	(0.491)	1081090	200.000	189.41
32 1,1-Dichloropropene	75	5.010	5.010	(0.890)	1707700	200.000	195.44
93 1,2,3-Trichlorobenzene	180	12.339	12.339	(1.205)	1636643	200.000	203.23(A)
71 1,2,3-Trichloropropane	75	9.434	9.434	(0.921)	2176006	200.000	206.38(A)
90 1,2,4-Trichlorobenzene	180	11.926	11.926	(1.165)	1712716	200.000	204.18(A)
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	4631542	200.000	195.48
89 1,2-Dibromo-3-Chloropropane	155	11.237	11.237	(1.097)	321770	200.000	198.50
57 1,2-Dibromoethane	107	7.855	7.855	(0.952)	1265930	200.000	191.84

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111311.D Page 2
Report Date: 24-Jan-2019 18:55

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	2535364	200.000	186.12
33	1,2-Dichloroethane	62	5.257	5.257	(0.934)	1770998	200.000	178.89
42	1,2-Dichloropropane	63	6.086	6.086	(1.081)	1294674	200.000	192.20
75	1,3,5-Trimethylbenzene	105	9.628	9.628	(0.940)	4535917	200.000	197.91
83	1,3-Dichlorobenzene	146	10.183	10.183	(0.995)	2548608	200.000	189.77
54	1,3-Dichloropropane	76	7.567	7.567	(0.917)	2235193	200.000	182.67
84	1,4-Dichlorobenzene	146	10.258	10.258	(1.002)	2606334	200.000	198.53
26	2,2-Dichloropropane	77	4.279	4.279	(0.874)	1492829	200.000	208.03(A)
24	2-Butanone	43	4.343	4.343	(0.887)	1287268	400.000	362.16(A)
76	2-Chlorotoluene	91	9.550	9.550	(0.933)	3934986	200.000	188.39
52	2-Hexanone	43	7.653	7.653	(0.927)	2091584	400.000	401.41(A)
77	4-Chlorotoluene	91	9.643	9.643	(0.942)	4615489	200.000	191.50
82	p-Isopropyltoluene	119	10.213	10.213	(0.997)	4810748	200.000	205.94(A)
45	4-Methyl-2-Pentanone	43	6.918	6.918	(0.838)	2944165	400.000	393.73(A)
10	Acetone	43	2.491	2.491	(0.509)	869596	400.000	386.81(A)
37	Benzene	78	5.224	5.224	(0.928)	4810692	200.000	183.96(M)
74	Bromobenzene	156	9.385	9.385	(0.917)	1358088	200.000	194.09
29	Bromochloromethane	128	4.560	4.560	(0.931)	537789	200.000	180.41
39	Bromodichloromethane	83	6.352	6.352	(1.129)	1603888	200.000	204.03(A)
66	Bromoform	173	8.987	8.987	(1.089)	844522	200.000	198.75
6	Bromomethane	94	1.662	1.662	(0.340)	794649	200.000	184.09
19	Carbon Disulfide	76	2.596	2.596	(0.530)	6896612	400.000	391.27(A)
34	Carbon Tetrachloride	117	4.999	4.999	(0.888)	1483776	200.000	217.37(A)
59	Chlorobenzene	112	8.279	8.279	(1.003)	3391468	200.000	183.32
7	Chloroethane	64	1.749	1.749	(0.357)	955282	200.000	181.06(M)
28	Chloroform	83	4.661	4.661	(0.952)	2117243	200.000	181.86
3	Chloromethane	50	1.344	1.344	(0.274)	1334230	200.000	196.96
27	cis-1,2-Dichloroethene	96	4.290	4.290	(0.876)	1322041	200.000	184.51
46	cis-1,3-Dichloropropene	75	6.761	6.761	(1.201)	2224591	200.000	224.72(A)
55	Dibromochloromethane	129	7.762	7.762	(0.940)	1258930	200.000	221.96(A)
44	Dibromomethane	93	6.195	6.195	(1.101)	803081	200.000	190.24
2	Dichlorodifluoromethane	85	1.213	1.213	(0.248)	1483355	200.000	195.50
61	Ethylbenzene	106	8.373	8.373	(1.015)	1806514	200.000	193.12(M)
91	Hexachlorobutadiene	225	12.065	12.065	(1.178)	582613	200.000	183.44
67	Isopropylbenzene	105	9.130	9.130	(1.106)	5274717	200.000	193.63
62	m,p-Xylenes	106	8.474	8.474	(1.027)	4413064	400.000	382.86(AM)
17	Methylene Chloride	84	2.877	2.877	(0.587)	1246871	200.000	195.27
87	n-Butylbenzene	91	10.558	10.558	(1.031)	4531778	200.000	189.12
73	n-Propylbenzene	91	9.478	9.478	(0.926)	6433909	200.000	191.14
92	Naphthalene	128	12.136	12.136	(1.185)	5280797	200.000	209.07(A)
63	o-Xylene	106	8.815	8.815	(1.068)	2277275	200.000	197.39(MH)
81	sec-Butylbenzene	105	10.090	10.090	(0.985)	5603961	200.000	199.95
64	Styrene	104	8.826	8.826	(1.069)	3881020	200.000	199.27
78	tert-Butylbenzene	119	9.906	9.906	(0.967)	3887715	200.000	199.04
56	Tetrachloroethene	164	7.525	7.525	(0.912)	907758	200.000	193.32
50	Toluene	91	7.049	7.049	(0.854)	5182031	200.000	182.09
20	trans-1,2-Dichloroethene	96	3.147	3.147	(0.643)	1173691	200.000	187.63
51	trans-1,3-Dichloropropene	75	7.263	7.263	(1.290)	1983766	200.000	198.03
38	Trichloroethene	130	5.865	5.865	(1.042)	1238549	200.000	192.12
8	Trichlorofluoromethane	101	1.955	1.955	(0.399)	1950000	200.000	192.89
5	Vinyl Chloride	62	1.426	1.426	(0.291)	1622522	200.000	195.34

QC Flag Legend

A - Target compound detected but, quantitated amount exceeded maximum amount.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



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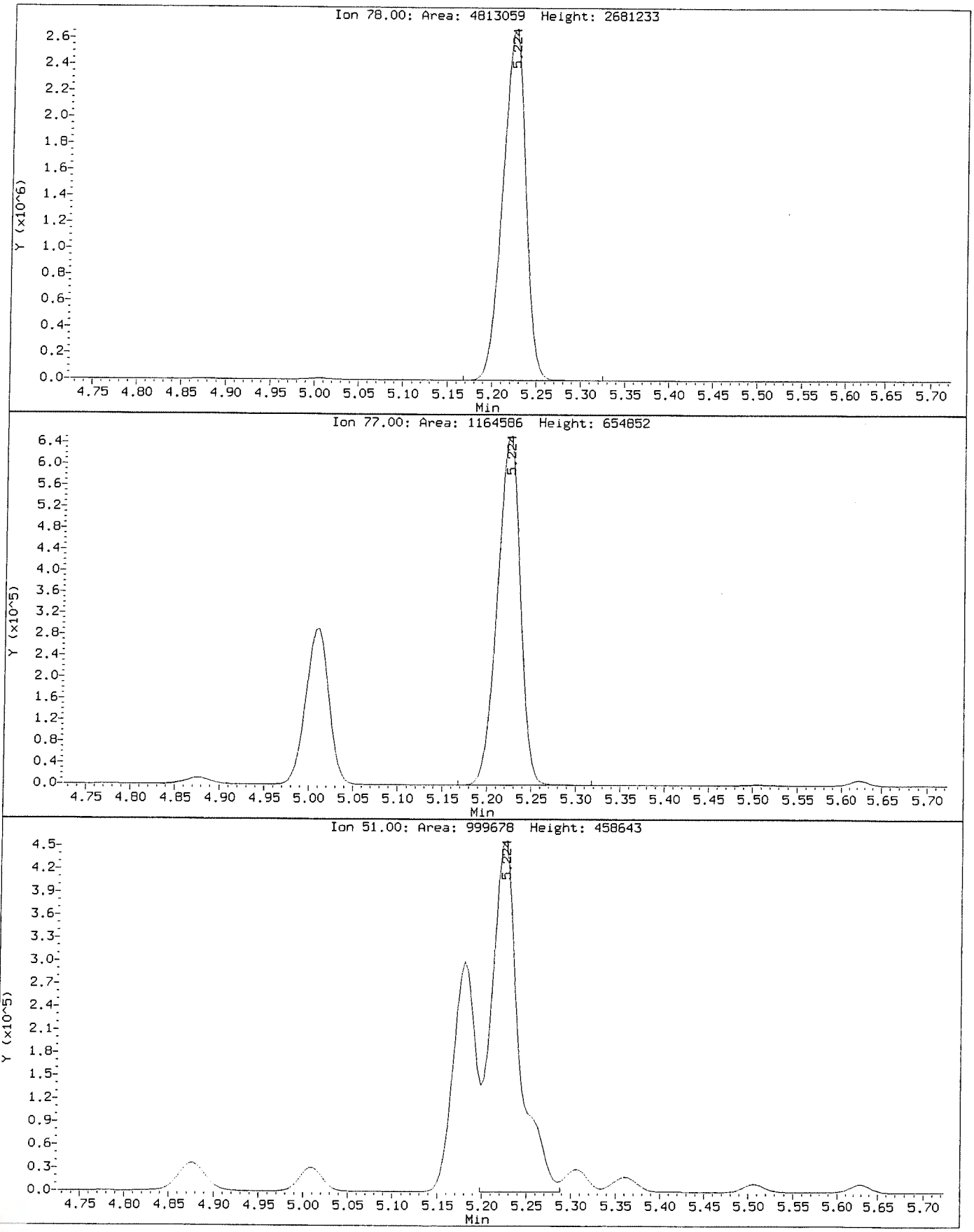
Sample Info: VSTD200;VSTD200;1;10;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111311.D
Injection Date: 13-NOV-2018 15:28
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: Benzene
CAS Number: 71-43-2



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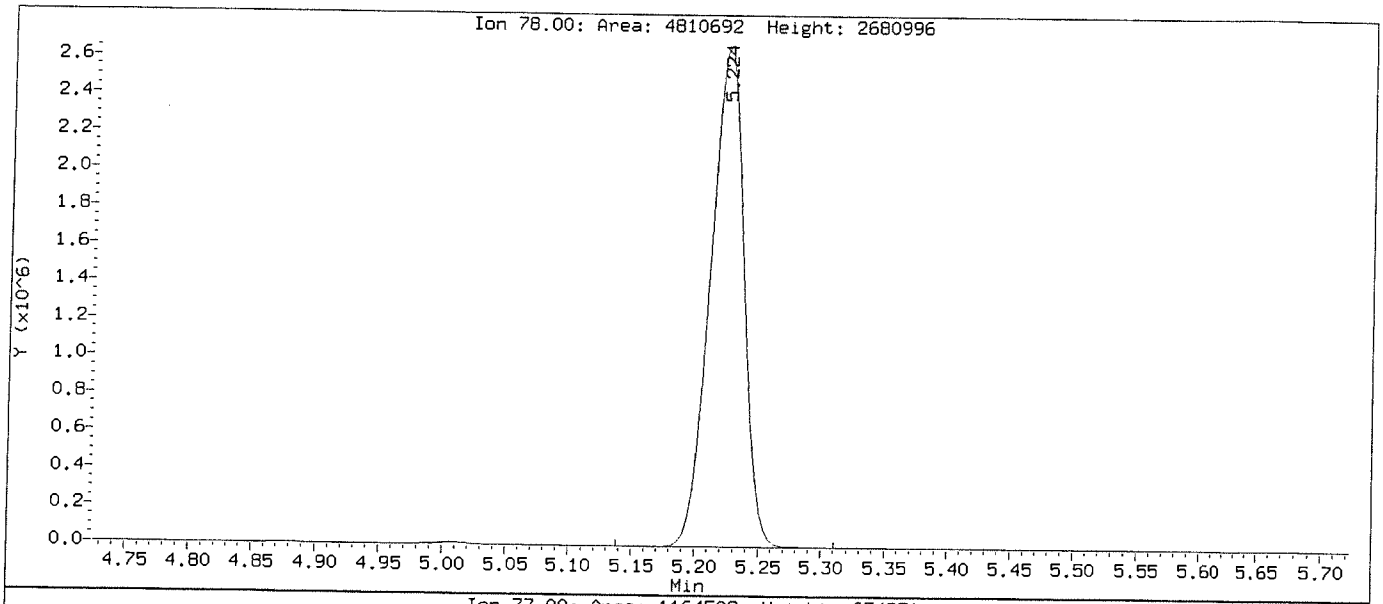
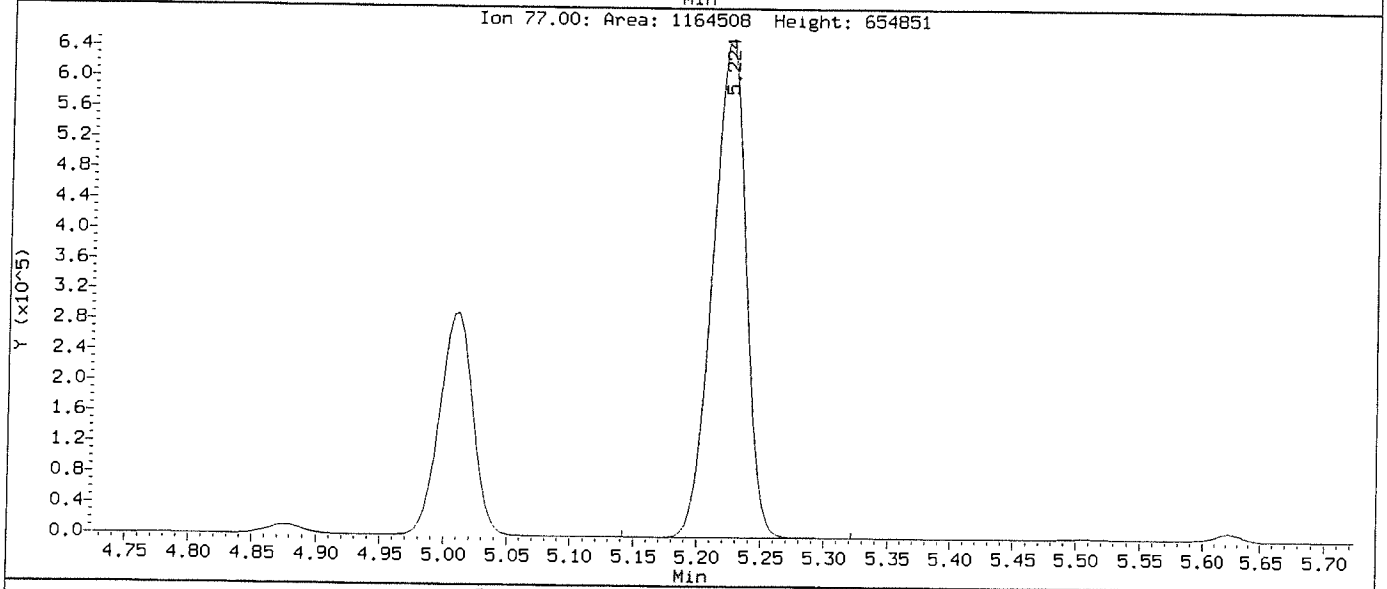
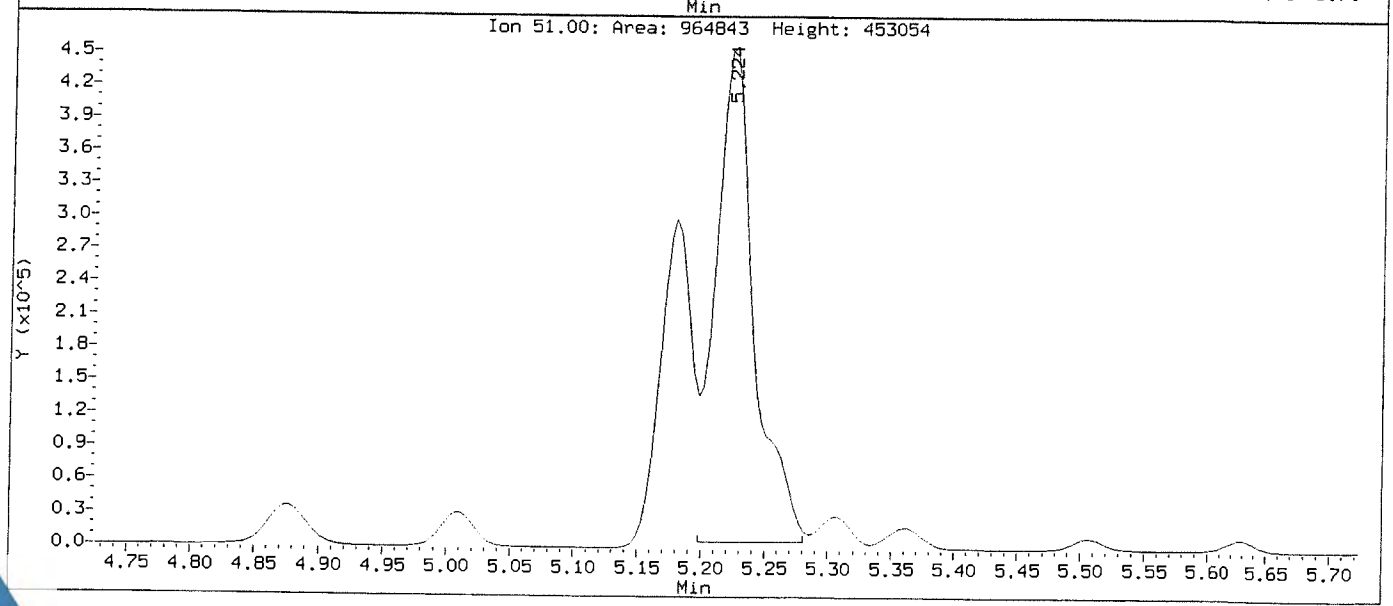
Client Sample ID: VSTD200

Compound: Benzene
CAS Number: 71-43-2







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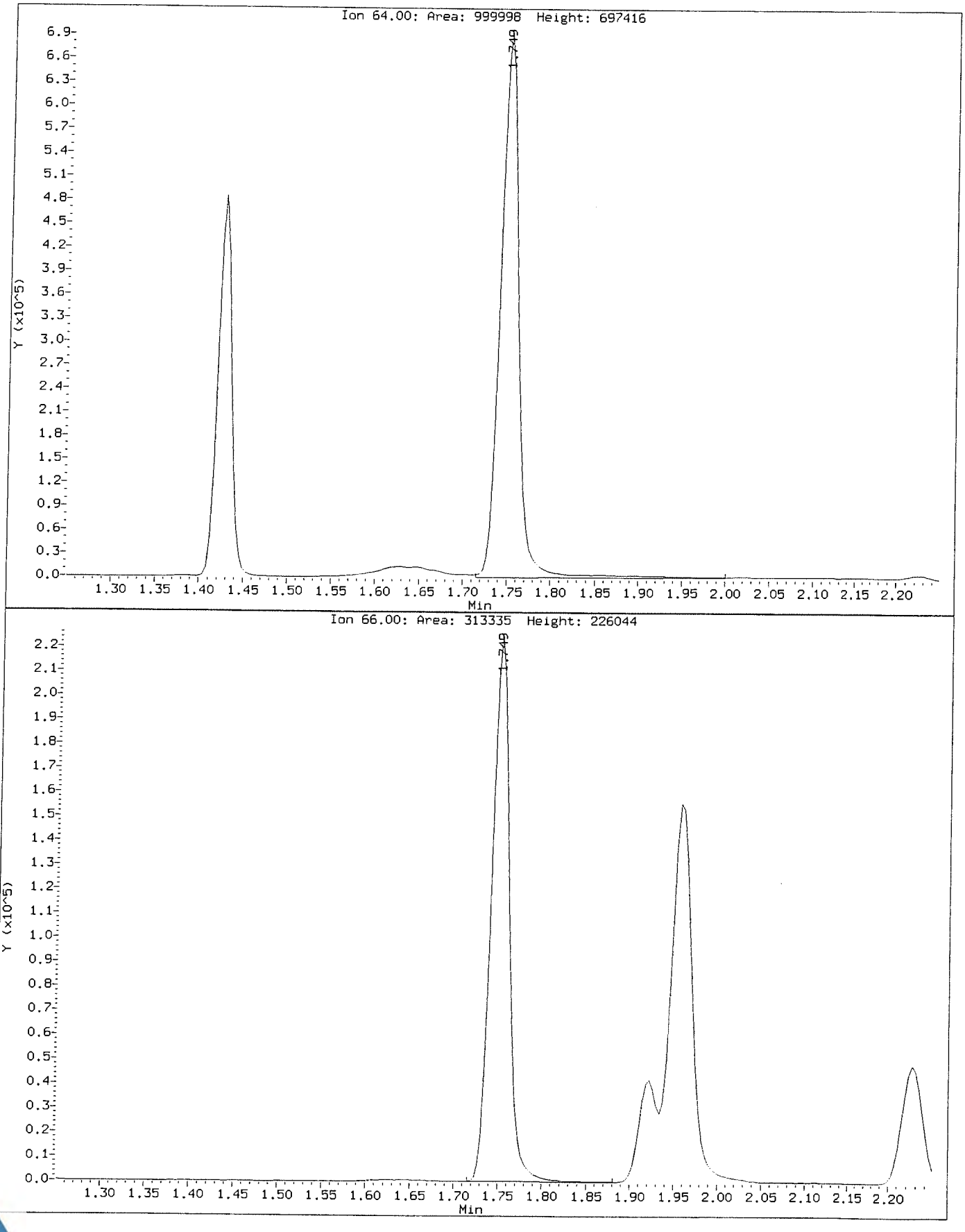
Injection Date: 13-NOV-2018 15:28
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: Chloroethane
CAS Number: 75-00-3



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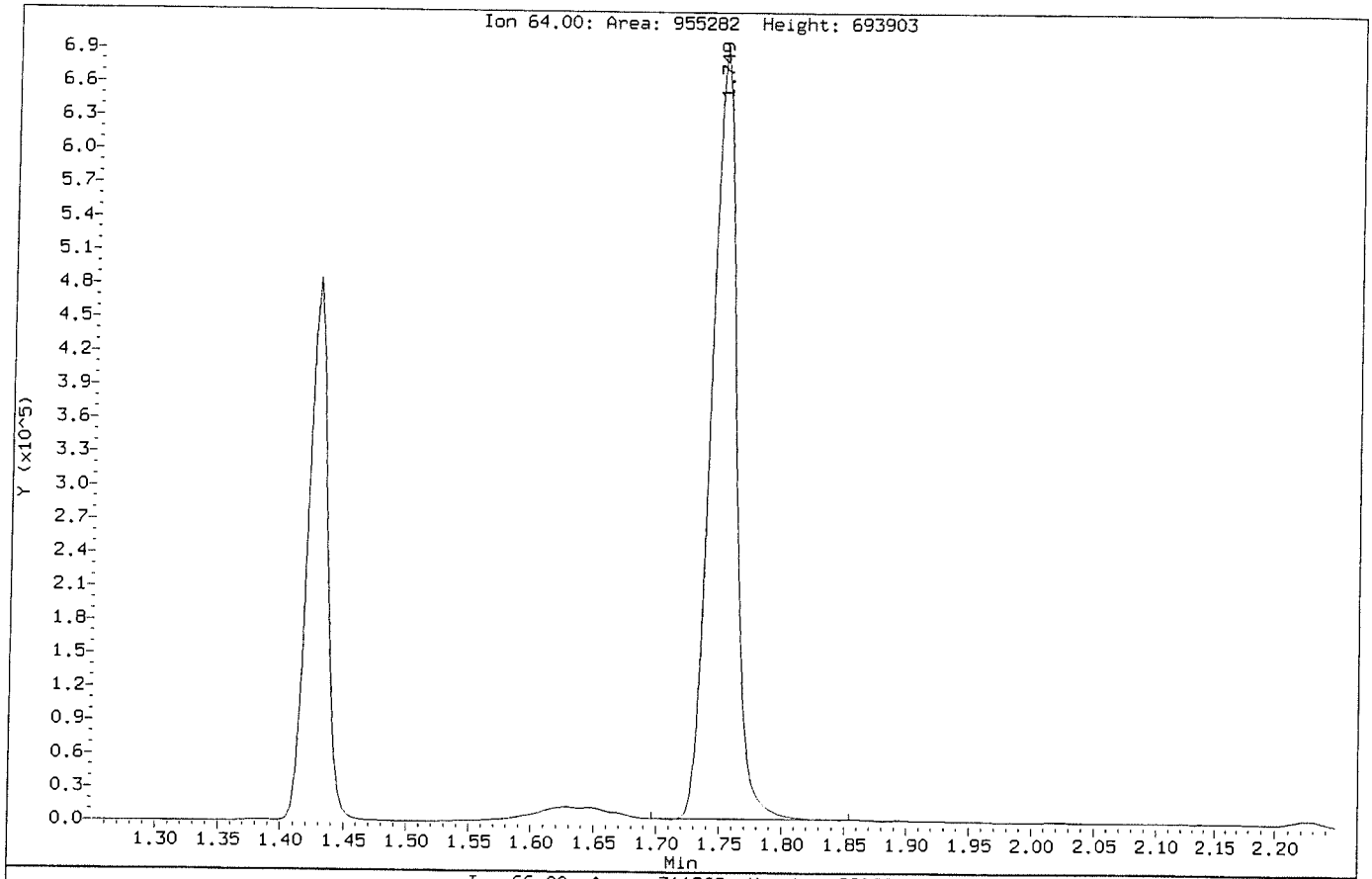
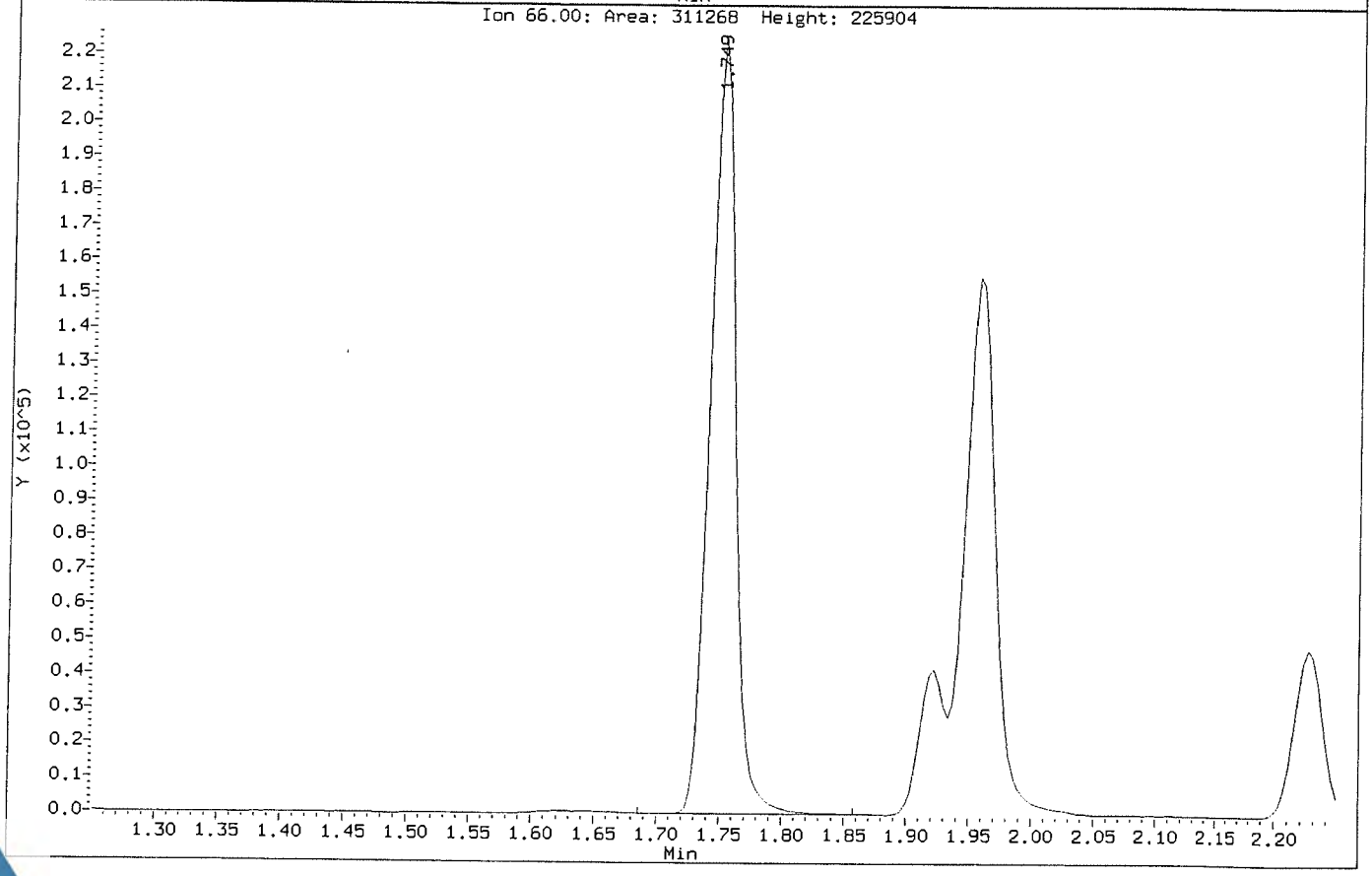
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: Chloroethane
CAS Number: 75-00-3





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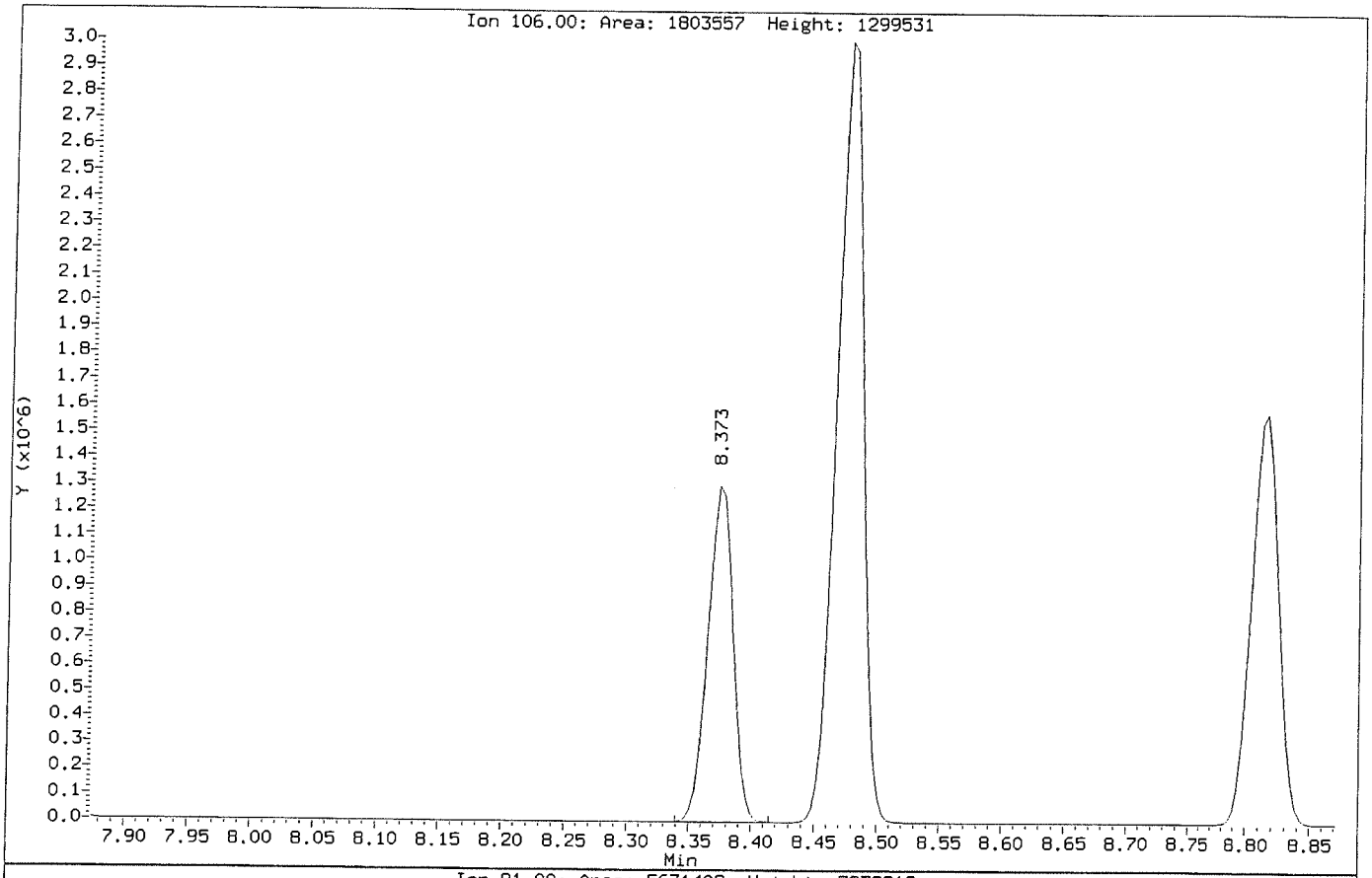
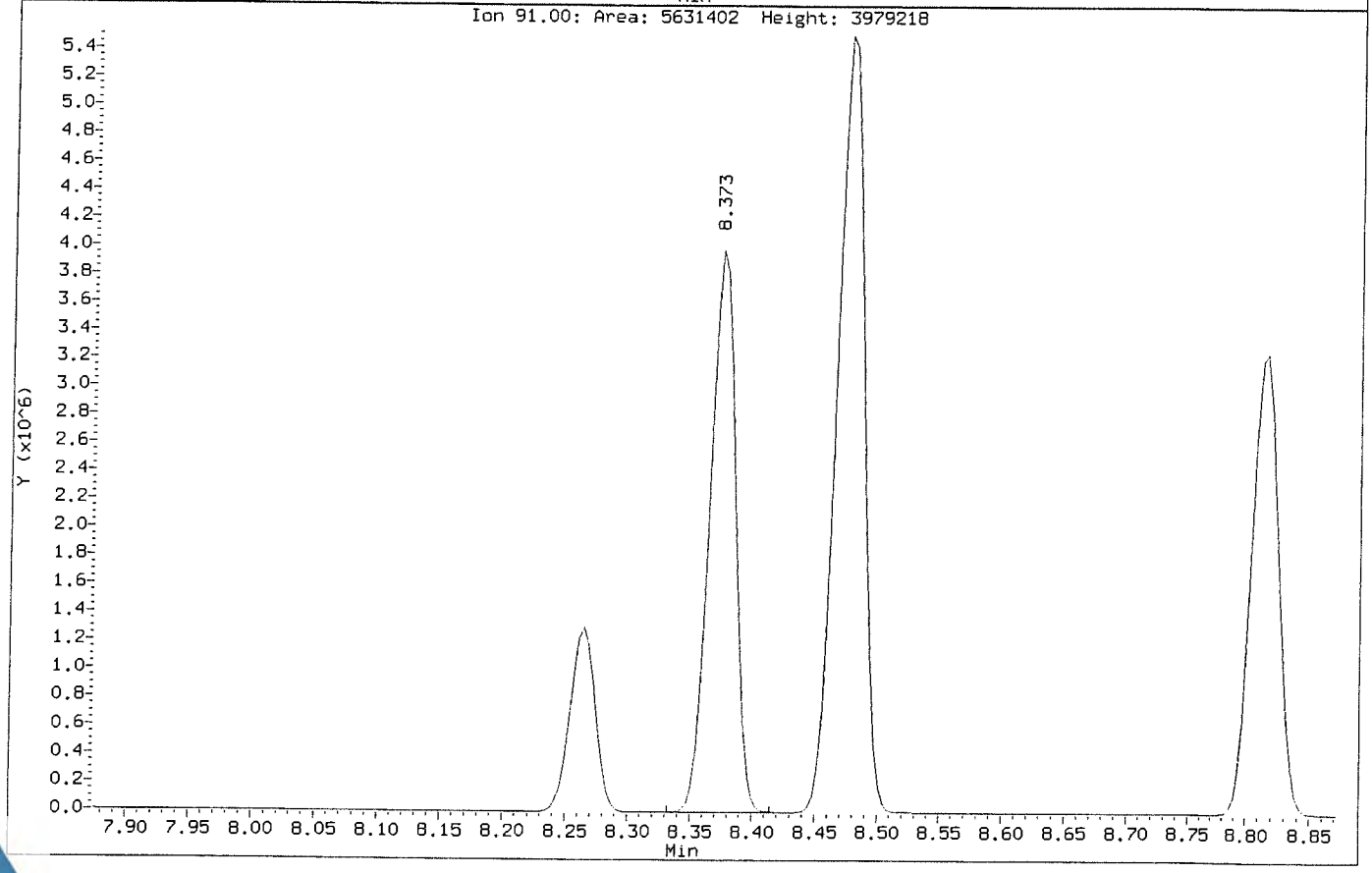
Injection Date: 13-NOV-2018 15:28
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: Ethylbenzene
CAS Number: 100-41-4





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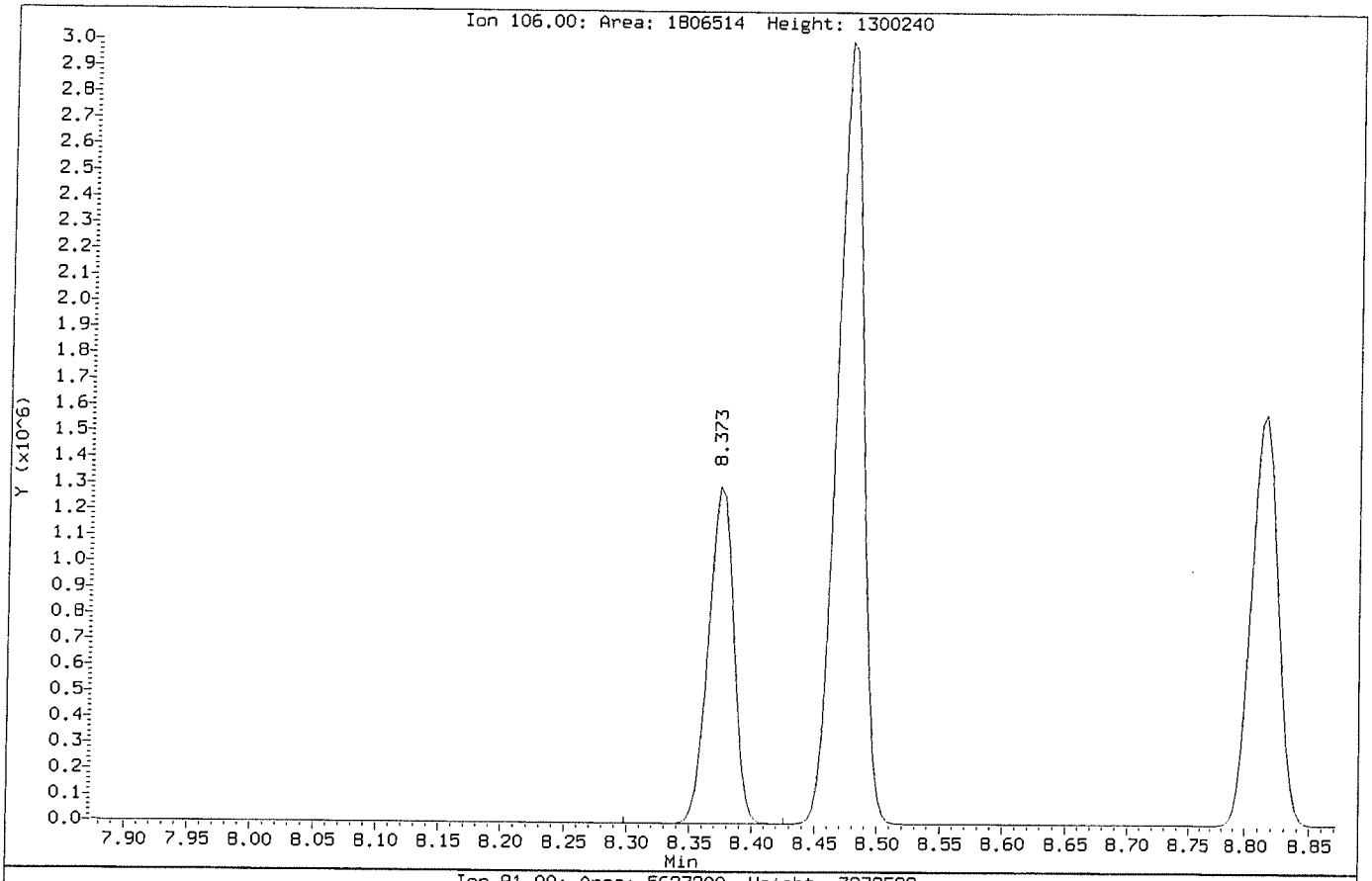
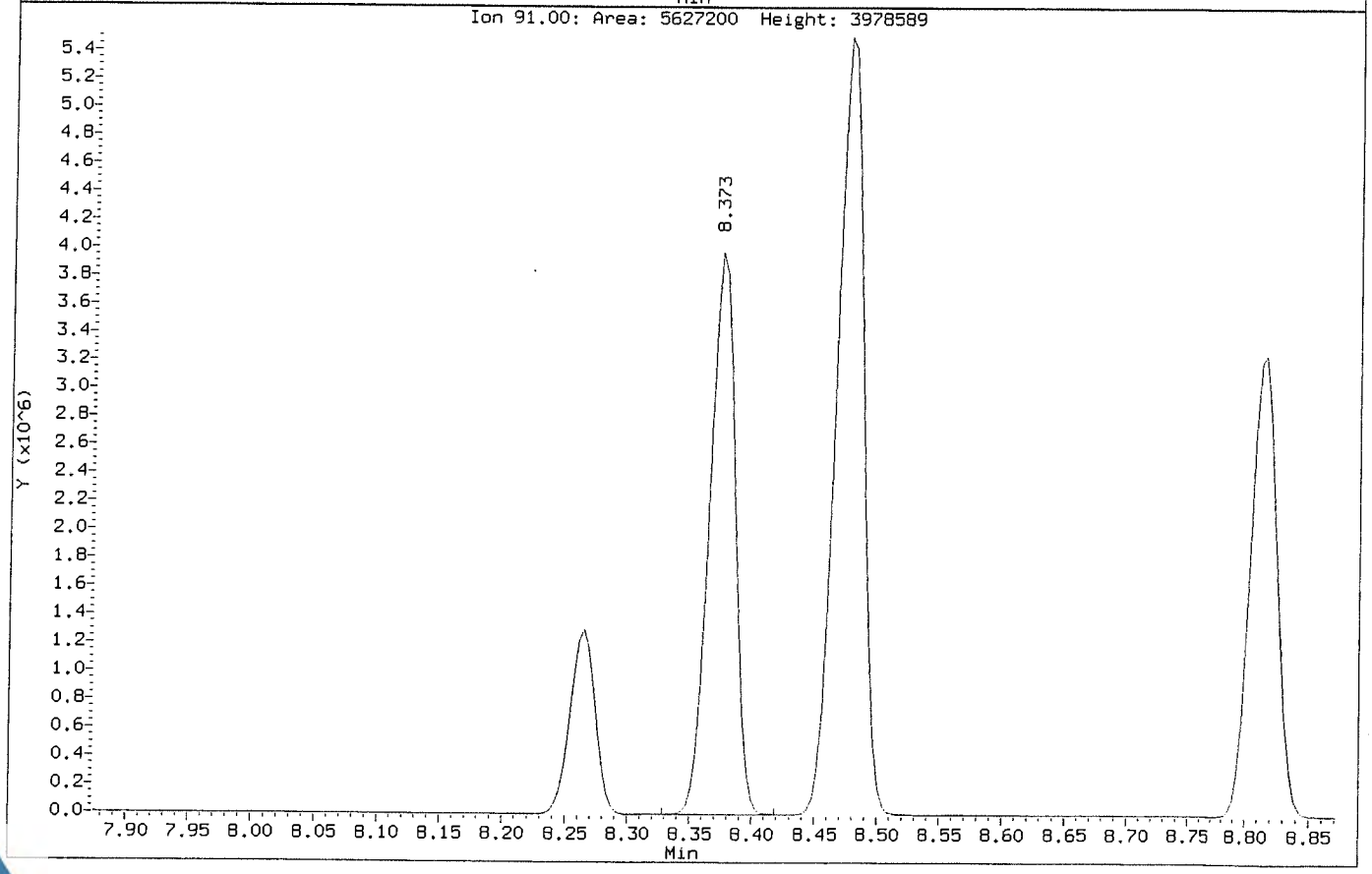
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: Ethylbenzene
CAS Number: 100-41-4





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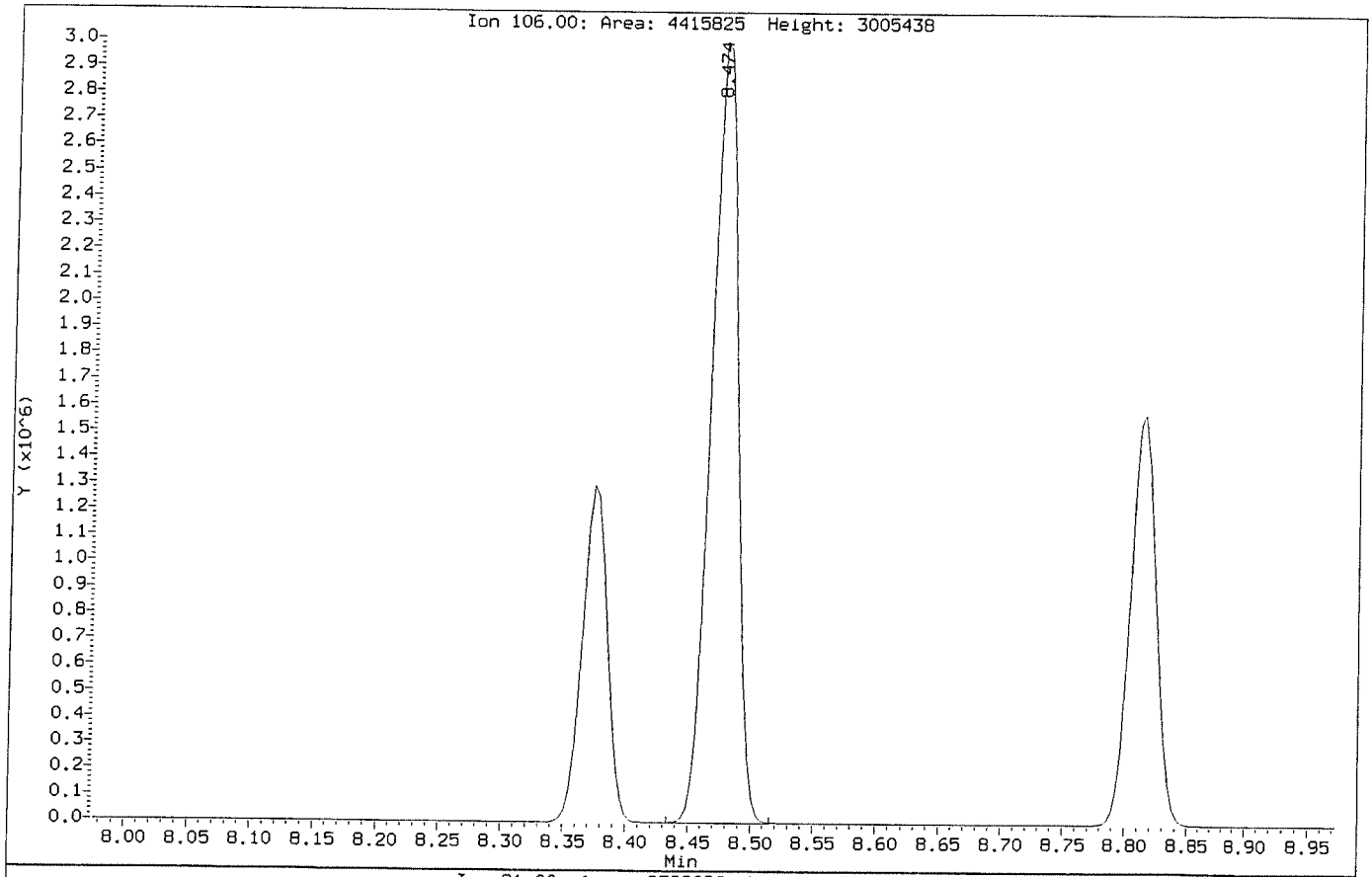
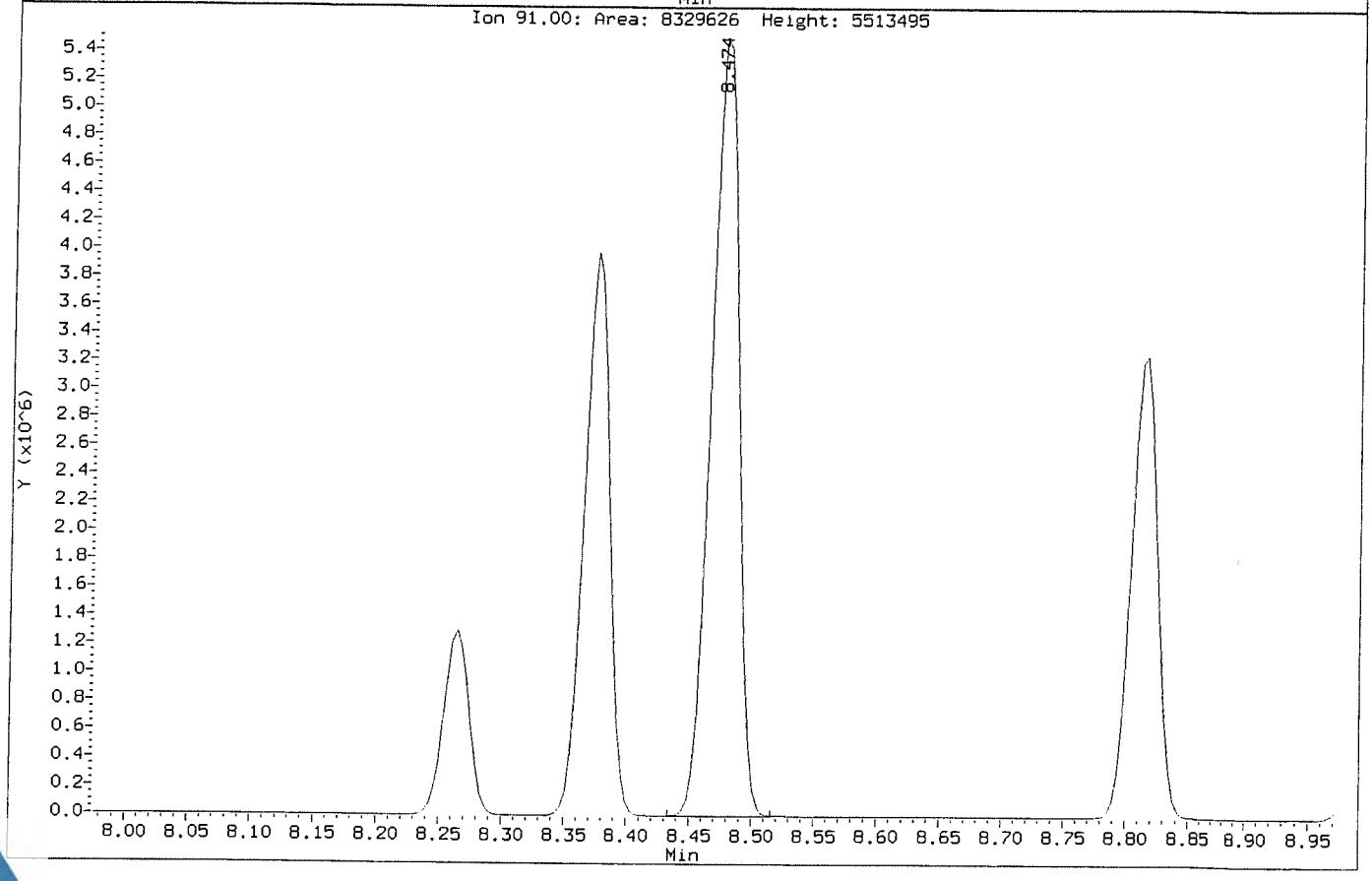
Injection Date: 13-NOV-2018 15:28
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: m,p-Xylenes
CAS Number:





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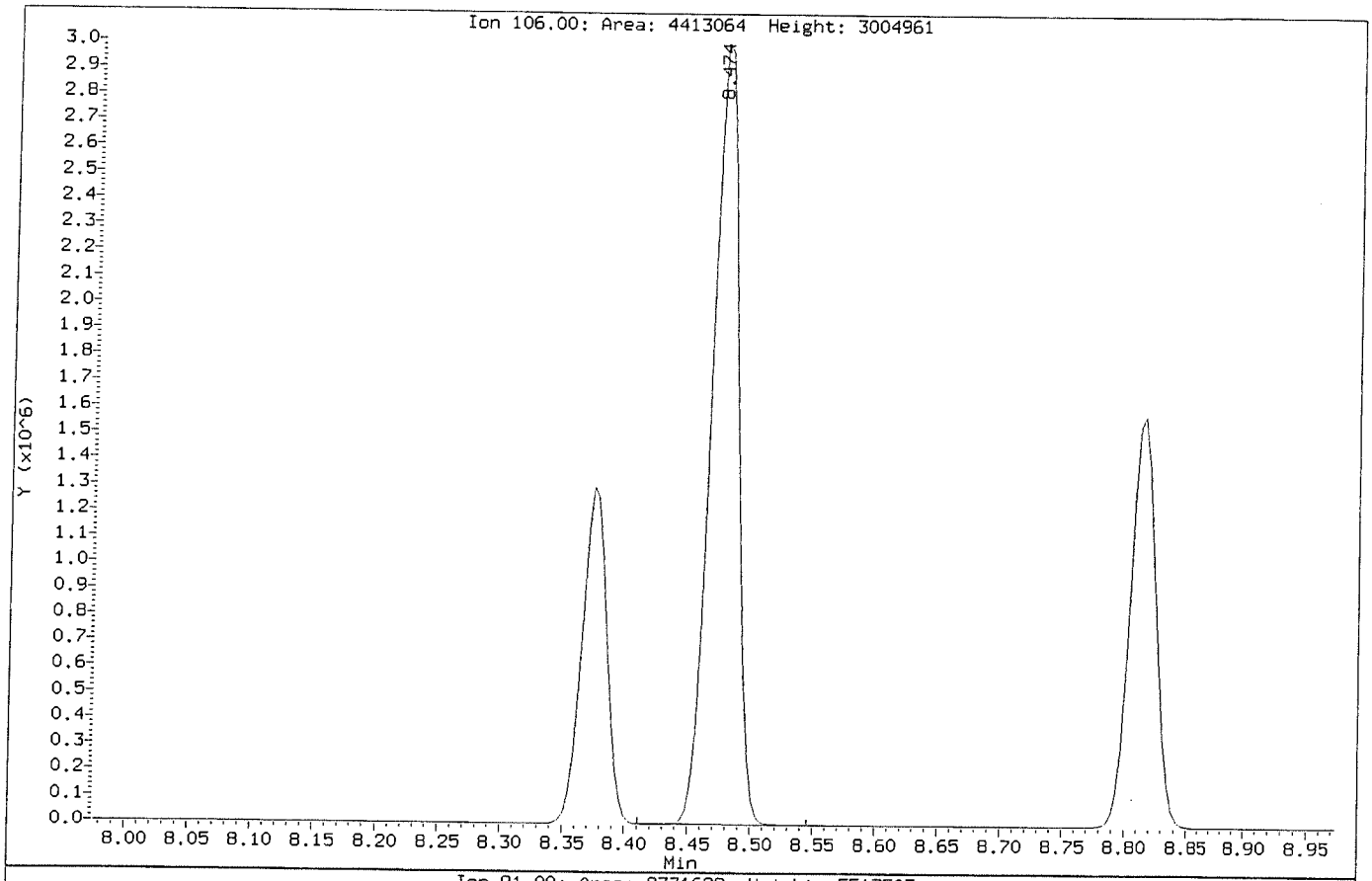
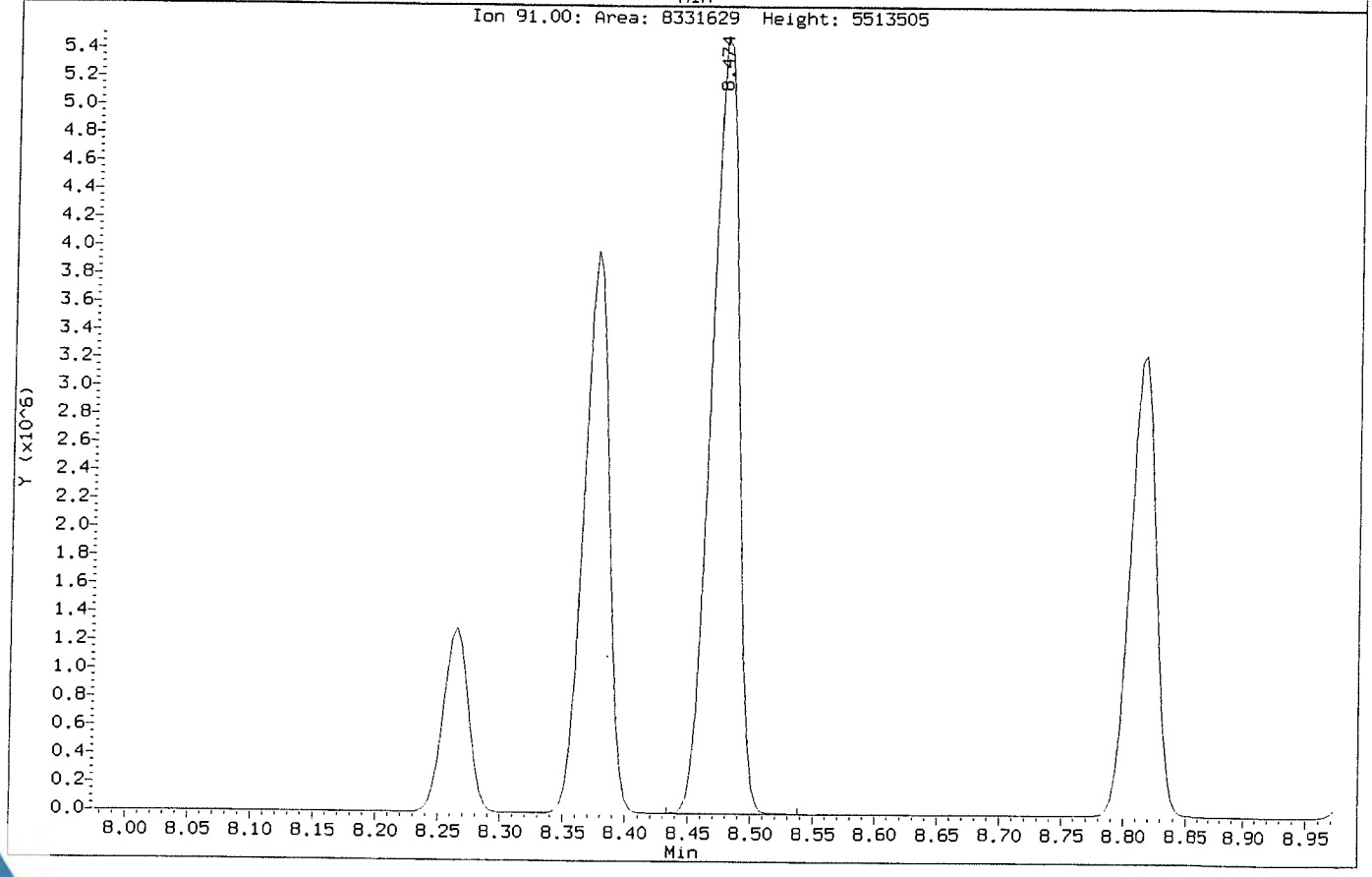
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: m,p-Xylenes
CAS Number:





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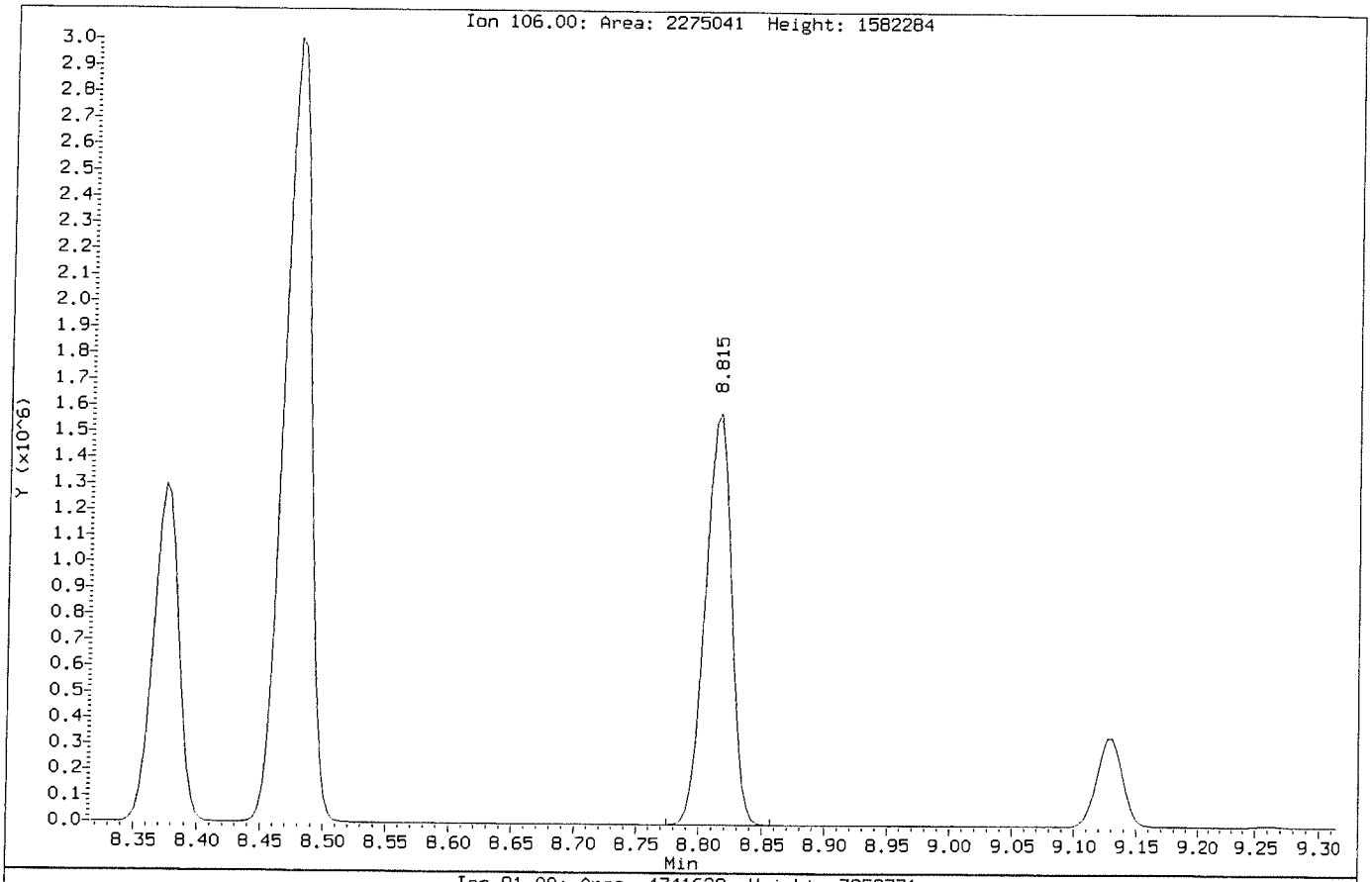
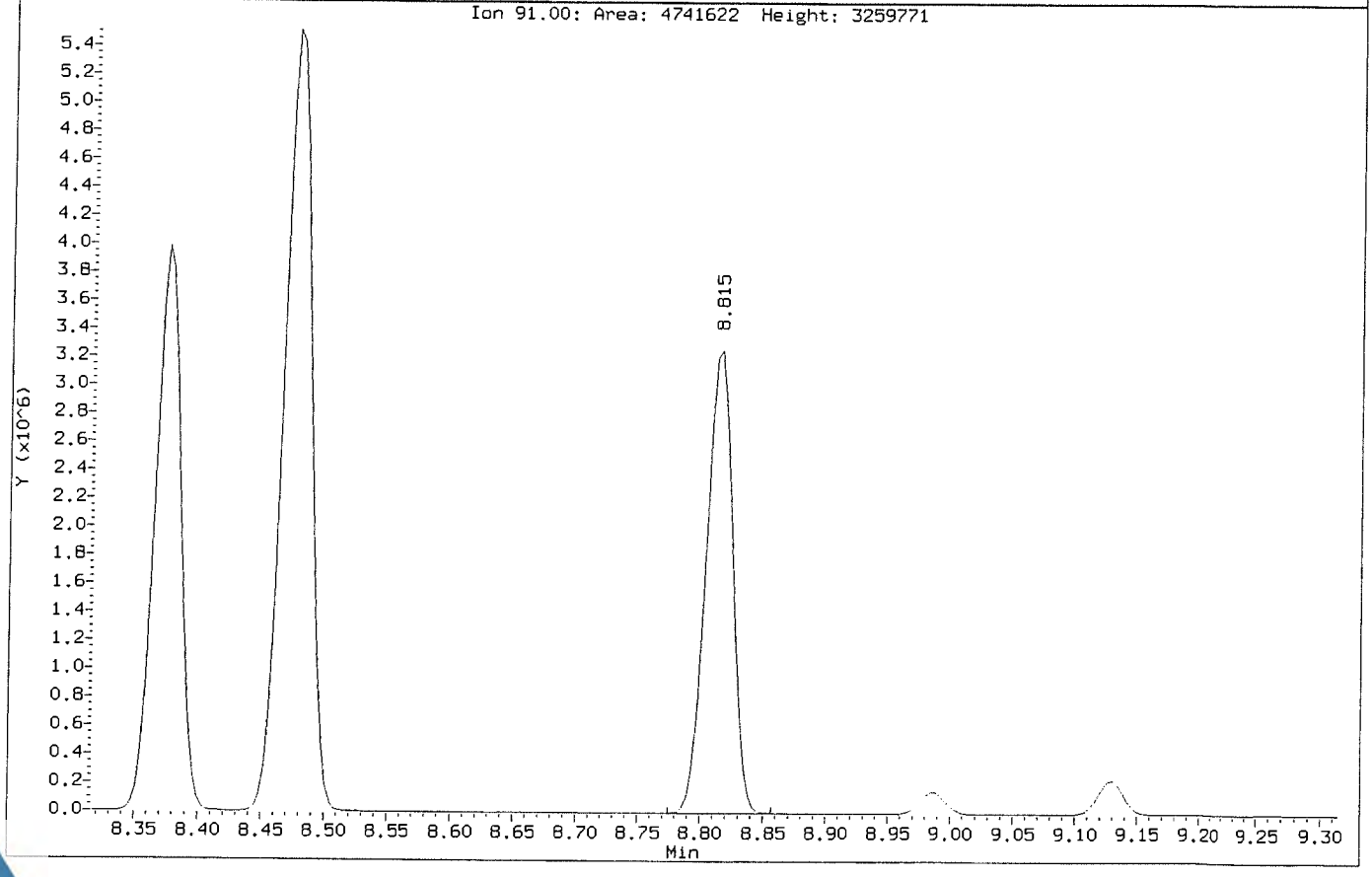
Injection Date: 13-NOV-2018 15:28
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: o-Xylene
CAS Number: 95-47-6





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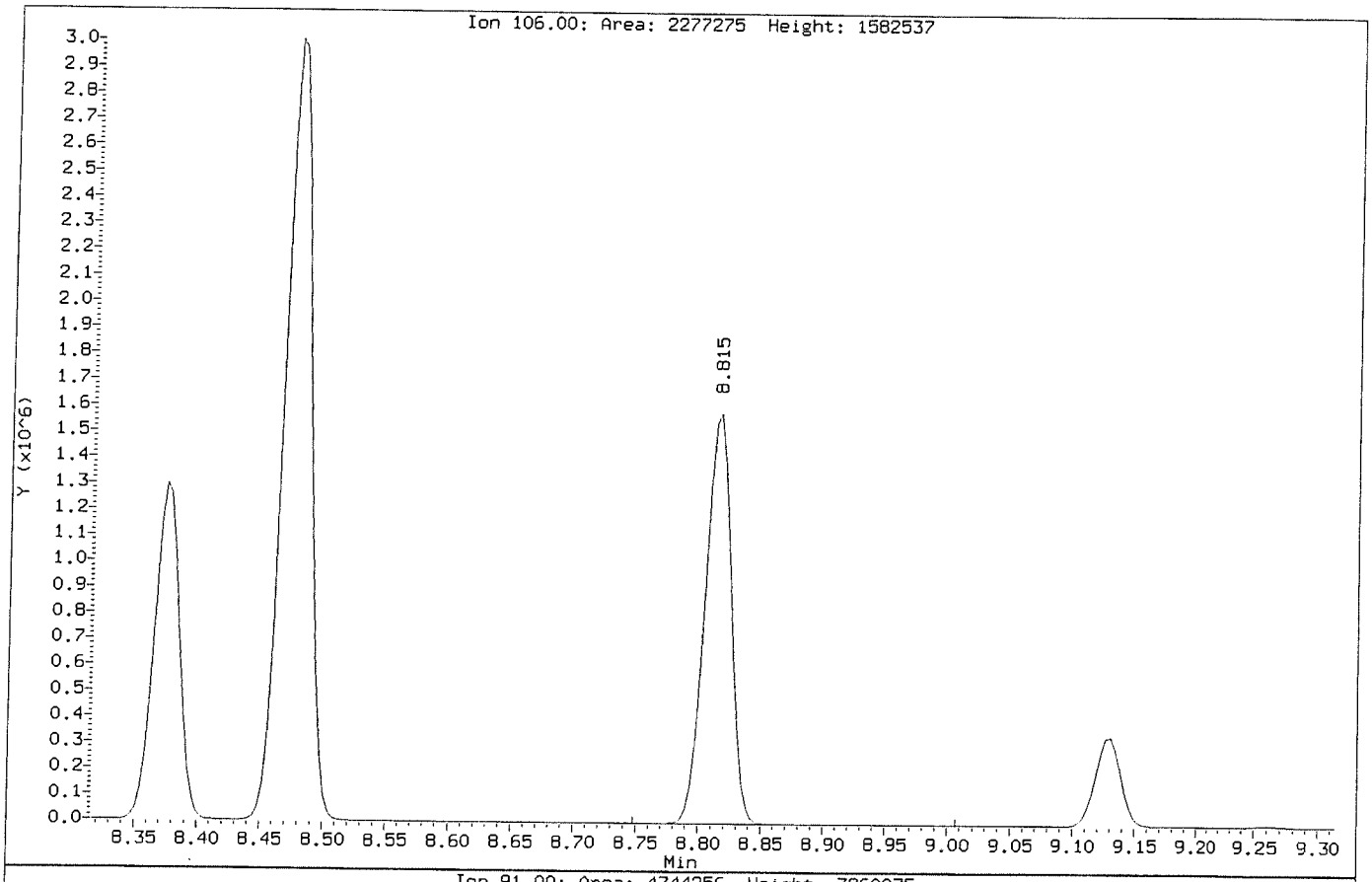
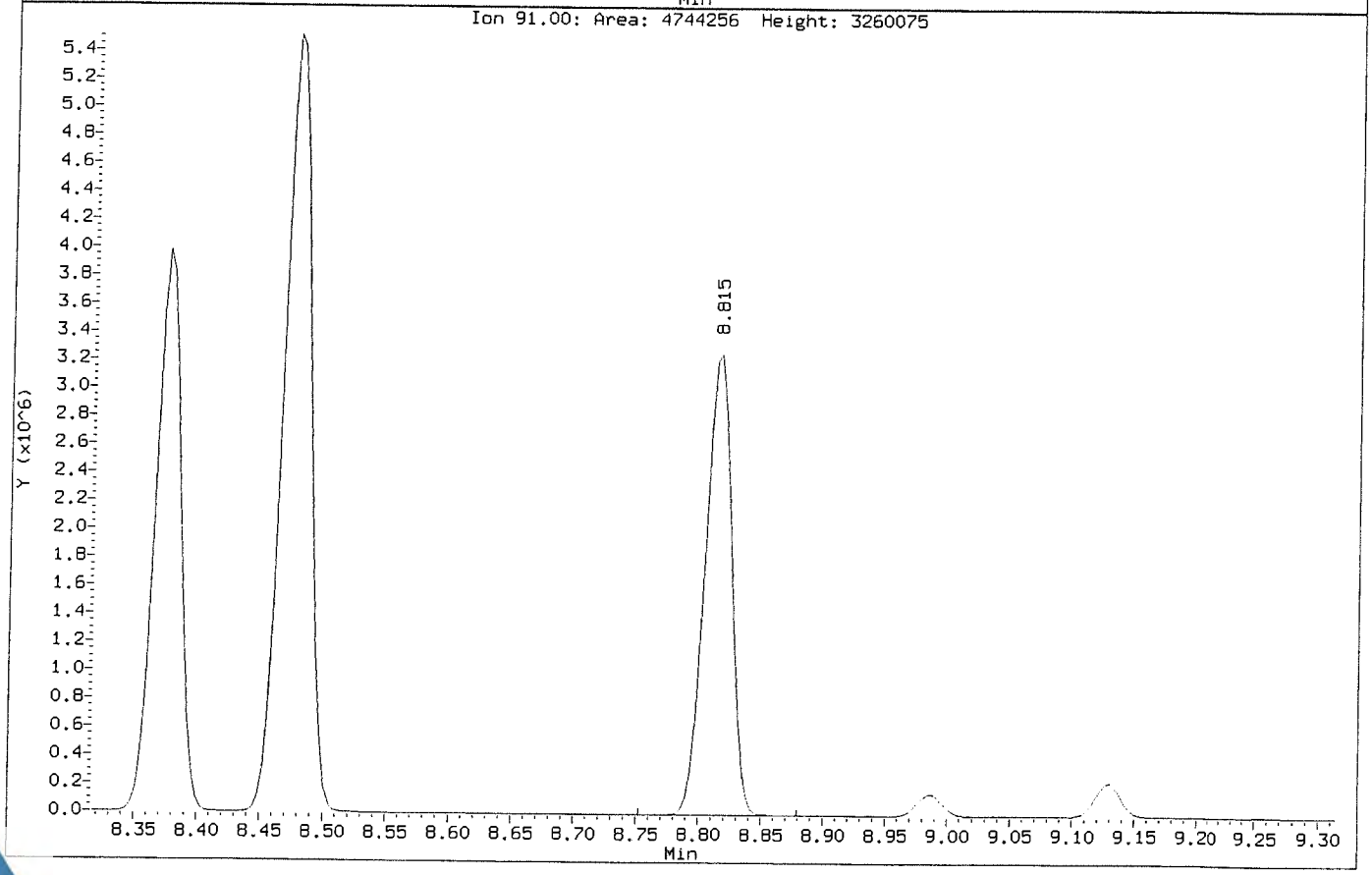
Injection Date: 13-NOV-2018 15:28
Instrument: VOA9.i
Client Sample ID: VSTD200

Compound: o-Xylene
CAS Number: 95-47-6





ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111313.D
Lab Smp Id: VICV050 Client Smp ID: VICV050
Inj Date : 13-NOV-2018 16:18
Operator : PC Inst ID: VOA9.i
Smp Info : VICV050;VICV050;2;;ICV
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181113.b\8260C.m
Meth Date : 24-Jan-2019 18:55 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 15:28 Cal File: U111311.D
Als bottle: 14 QC Sample: METHSPIKE
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

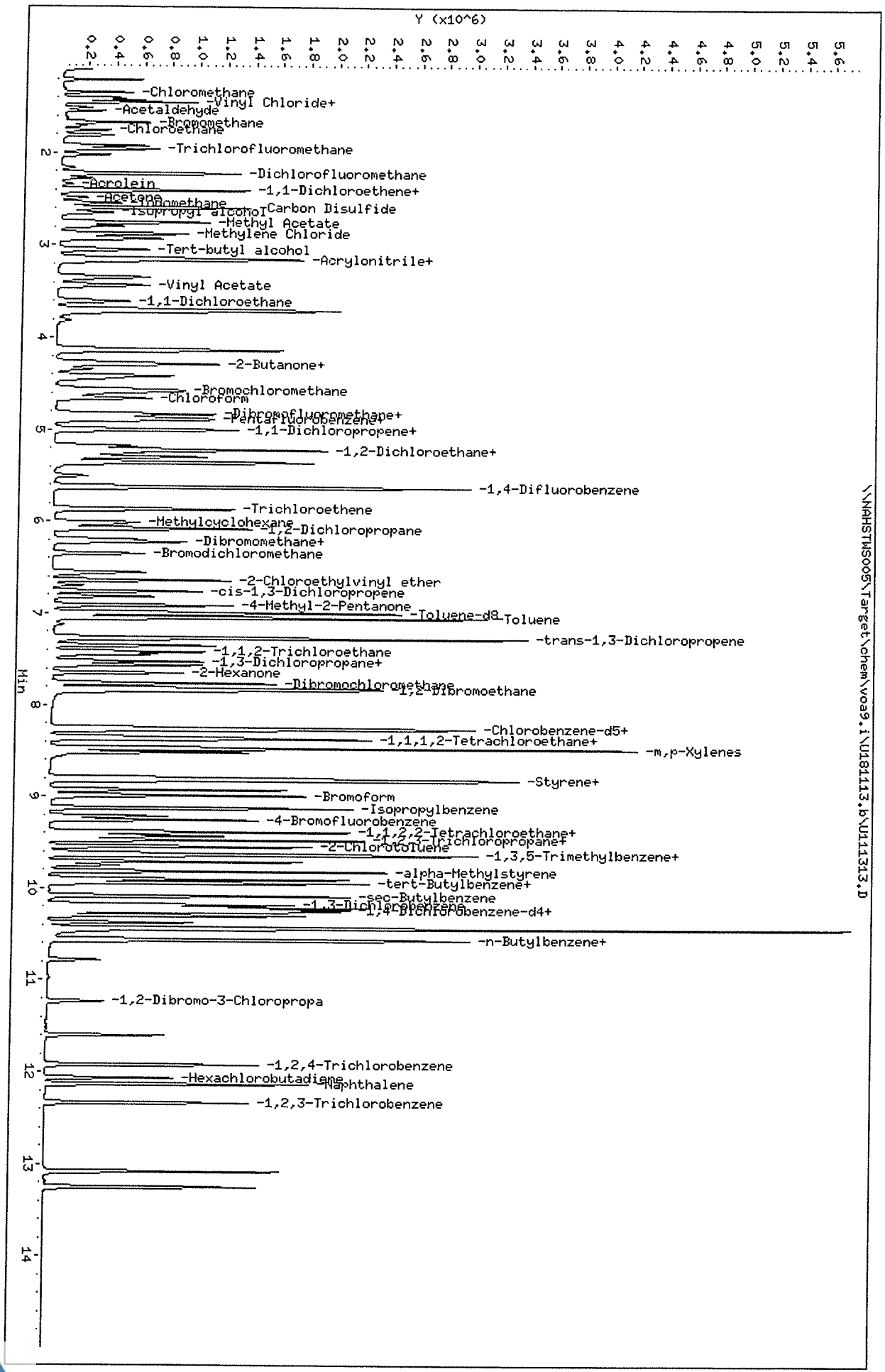
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.898	(1.000)	492069	50.0000	
* 36 1,4-Difluorobenzene	114	5.629	5.629	(1.000)	927951	50.0000	
* 47 Chlorobenzene-d5	117	8.253	8.253	(1.000)	869612	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.239	(1.000)	424507	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.834	(0.987)	285495	50.4842	50.48
$ 35 1,2-Dichloroethane-d4	65	5.179	5.179	(1.057)	379384	51.0366	51.03
$ 48 Toluene-d8	98	6.990	6.993	(0.847)	1145021	51.5678	51.56
$ 69 4-Bromofluorobenzene	95	9.258	9.261	(1.122)	441801	51.4072	51.40
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	274179	49.9849	49.98
31 1,1,1-Trichloroethane	97	4.830	4.830	(0.986)	416232	48.1554	48.15
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	462139	45.9603	45.96
138 Freon TF	101	2.409	2.405	(0.492)	226905	46.0312	46.03
53 1,1,2-Trichloroethane	83	7.421	7.424	(0.899)	253396	45.8339	45.83
22 1,1-Dichloroethane	63	3.608	3.608	(0.737)	513902	45.5744	45.57
11 1,1-Dichloroethene	96	2.405	2.405	(0.491)	253613	45.6608	45.66
32 1,1-Dichloropropene	75	5.006	5.010	(0.889)	399473	46.6112	46.61
93 1,2,3-Trichlorobenzene	180	12.335	12.339	(1.205)	387107	48.3006	48.30
71 1,2,3-Trichloropropane	75	9.430	9.434	(0.921)	517101	49.2816	49.28
90 1,2,4-Trichlorobenzene	180	11.923	11.926	(1.165)	396308	47.4733	47.47
79 1,2,4-Trimethylbenzene	105	9.944	9.943	(0.971)	1125014	47.7134	47.71
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.237	(1.097)	74206	47.8284	47.82
57 1,2-Dibromoethane	107	7.852	7.855	(0.951)	310006	48.4238	48.42

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111313.D Page 2
Report Date: 24-Jan-2019 18:55

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.573	(1.033)	609149	44.9344	44.93
33 1,2-Dichloroethane	62	5.254	5.257	(0.933)	438739	45.1829	45.18
42 1,2-Dichloropropane	63	6.082	6.086	(1.081)	312363	47.2789	47.27
75 1,3,5-Trimethylbenzene	105	9.629	9.628	(0.941)	1087962	47.7004	47.70
83 1,3-Dichlorobenzene	146	10.180	10.183	(0.995)	608880	45.5562	45.55
54 1,3-Dichloropropane	76	7.567	7.567	(0.917)	548032	46.1653	46.16
84 1,4-Dichlorobenzene	146	10.258	10.258	(1.002)	631760	48.3226	48.32
26 2,2-Dichloropropane	77	4.279	4.279	(0.874)	357603	51.2102	51.21
24 2-Butanone	43	4.343	4.343	(0.887)	319364	92.3297	92.32
76 2-Chlorotoluene	91	9.550	9.550	(0.933)	950278	45.7148	45.71
52 2-Hexanone	43	7.653	7.653	(0.927)	501801	99.2665	99.26
77 4-Chlorotoluene	91	9.640	9.643	(0.942)	1123555	46.8423	46.84
82 p-Isopropyltoluene	119	10.213	10.213	(0.998)	1142647	49.1524	49.15
45 4-Methyl-2-Pentanone	43	6.915	6.918	(0.838)	699041	96.3600	96.36
10 Acetone	43	2.487	2.491	(0.508)	216067	95.4641	95.46
37 Benzene	78	5.220	5.224	(0.927)	1188078	46.3202	46.32
74 Bromobenzene	156	9.385	9.385	(0.917)	321699	46.1973	46.19
29 Bromochloromethane	128	4.557	4.560	(0.930)	147658	50.9008	50.90
39 Bromodichloromethane	83	6.349	6.352	(1.128)	374186	48.5304	48.53
66 Bromoform	173	8.984	8.987	(1.089)	188320	47.7183	47.71(T)
6 Bromomethane	94	1.670	1.662	(0.341)	208101	50.9317	50.93
19 Carbon Disulfide	76	2.596	2.596	(0.530)	1686616	98.3287	98.32
34 Carbon Tetrachloride	117	4.999	4.999	(0.888)	330709	49.3949	49.39
59 Chlorobenzene	112	8.275	8.279	(1.003)	813973	45.3514	45.35
7 Chloroethane	64	1.756	1.749	(0.359)	230904	44.9734	44.97(M)
28 Chloroform	83	4.662	4.661	(0.952)	517425	45.6713	45.67
3 Chloromethane	50	1.344	1.344	(0.274)	306744	46.7074	46.70
27 cis-1,2-Dichloroethene	96	4.290	4.290	(0.876)	320390	45.9503	45.95
46 cis-1,3-Dichloropropene	75	6.761	6.761	(1.201)	516764	53.2223	53.22
55 Dibromochloromethane	129	7.758	7.762	(0.940)	286771	52.1150	52.11
44 Dibromomethane	93	6.191	6.195	(1.100)	195311	47.1700	47.16
2 Dichlorodifluoromethane	85	1.209	1.213	(0.247)	347869	47.8726	47.87
61 Ethylbenzene	106	8.373	8.373	(1.015)	424849	46.8143	46.81
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	145238	55.0778	55.07
67 Isopropylbenzene	105	9.126	9.130	(1.106)	1266469	47.9214	47.92
62 m,p-Xylenes	106	8.474	8.474	(1.027)	1058456	94.6512	94.65
17 Methylene Chloride	84	2.877	2.877	(0.587)	301983	48.0719	48.07
87 n-Butylbenzene	91	10.558	10.558	(1.031)	1100279	49.5091	49.50
73 n-Propylbenzene	91	9.475	9.478	(0.926)	1593592	47.5729	47.57
92 Naphthalene	128	12.133	12.136	(1.185)	1287047	51.2004	51.20
63 o-Xylene	106	8.811	8.815	(1.068)	530431	47.3909	47.39(H)
81 sec-Butylbenzene	105	10.086	10.090	(0.985)	1350043	48.4022	48.40
64 Styrene	104	8.826	8.826	(1.069)	941191	49.8117	49.81
78 tert-Butylbenzene	119	9.902	9.906	(0.967)	929608	47.8232	47.82
56 Tetrachloroethene	164	7.526	7.525	(0.912)	207441	45.5377	45.53
50 Toluene	91	7.050	7.049	(0.854)	1274589	46.1658	46.16
20 trans-1,2-Dichloroethene	96	3.147	3.147	(0.643)	282235	46.3646	46.36
51 trans-1,3-Dichloropropene	75	7.263	7.263	(1.290)	454600	47.3993	47.39
38 Trichloroethene	130	5.865	5.865	(1.042)	293292	46.3847	46.38
8 Trichlorofluoromethane	101	1.959	1.955	(0.400)	460052	46.7647	46.76
5 Vinyl Chloride	62	1.423	1.426	(0.291)	382169	47.6661	47.66

QC Flag Legend

T - Target compound detected outside RT window.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

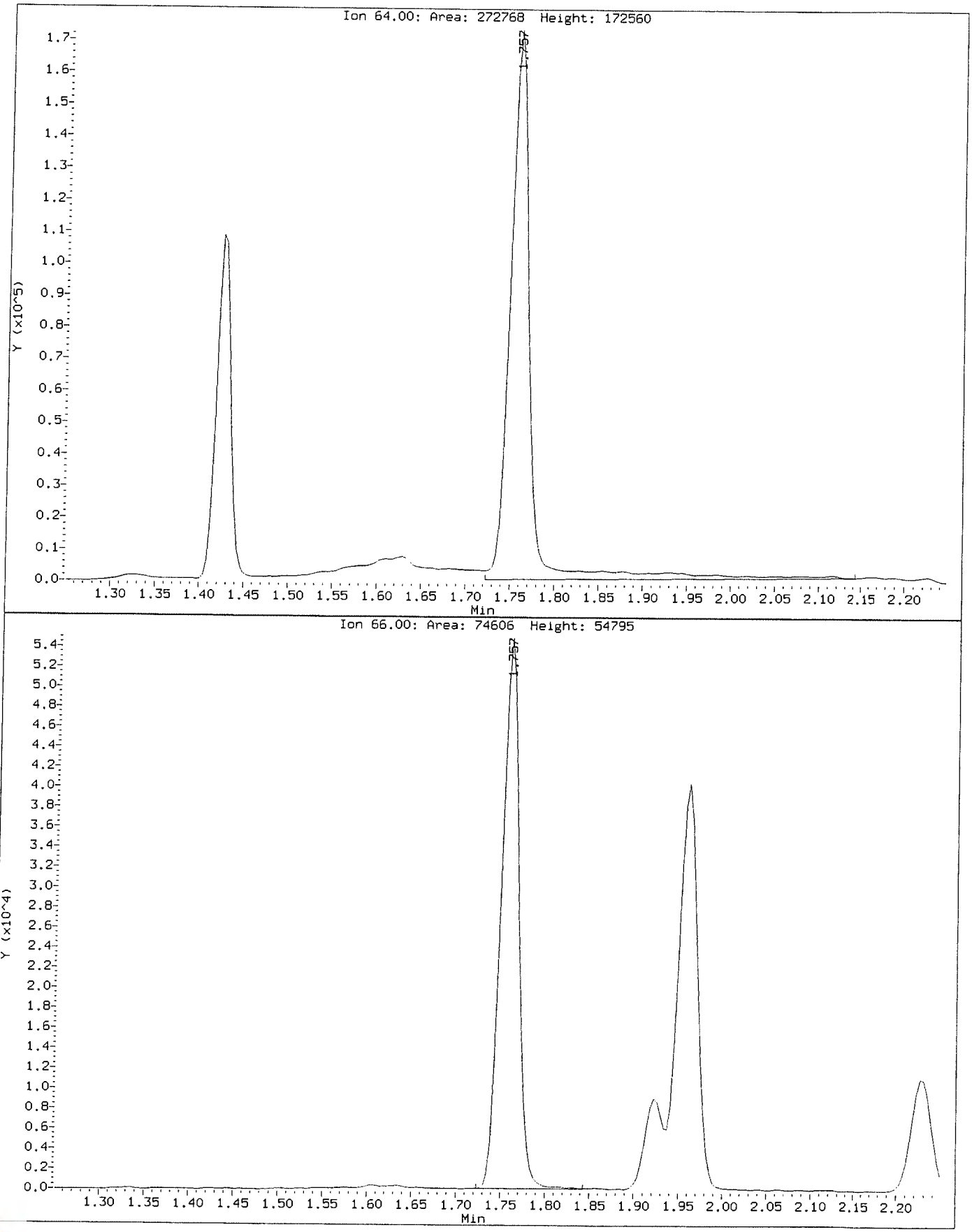


Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\U111313.D
Date : 13-NOV-2018 16:18
Client ID: VICV050
Sample Info: VICV050;VICV050;2;;ICV
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181113.b\Before\U111313.D
Injection Date: 13-NOV-2018 16:18
Instrument: VOA9.i
Client Sample ID: VICV050

Compound: Chloroethane
CAS Number: 75-00-3



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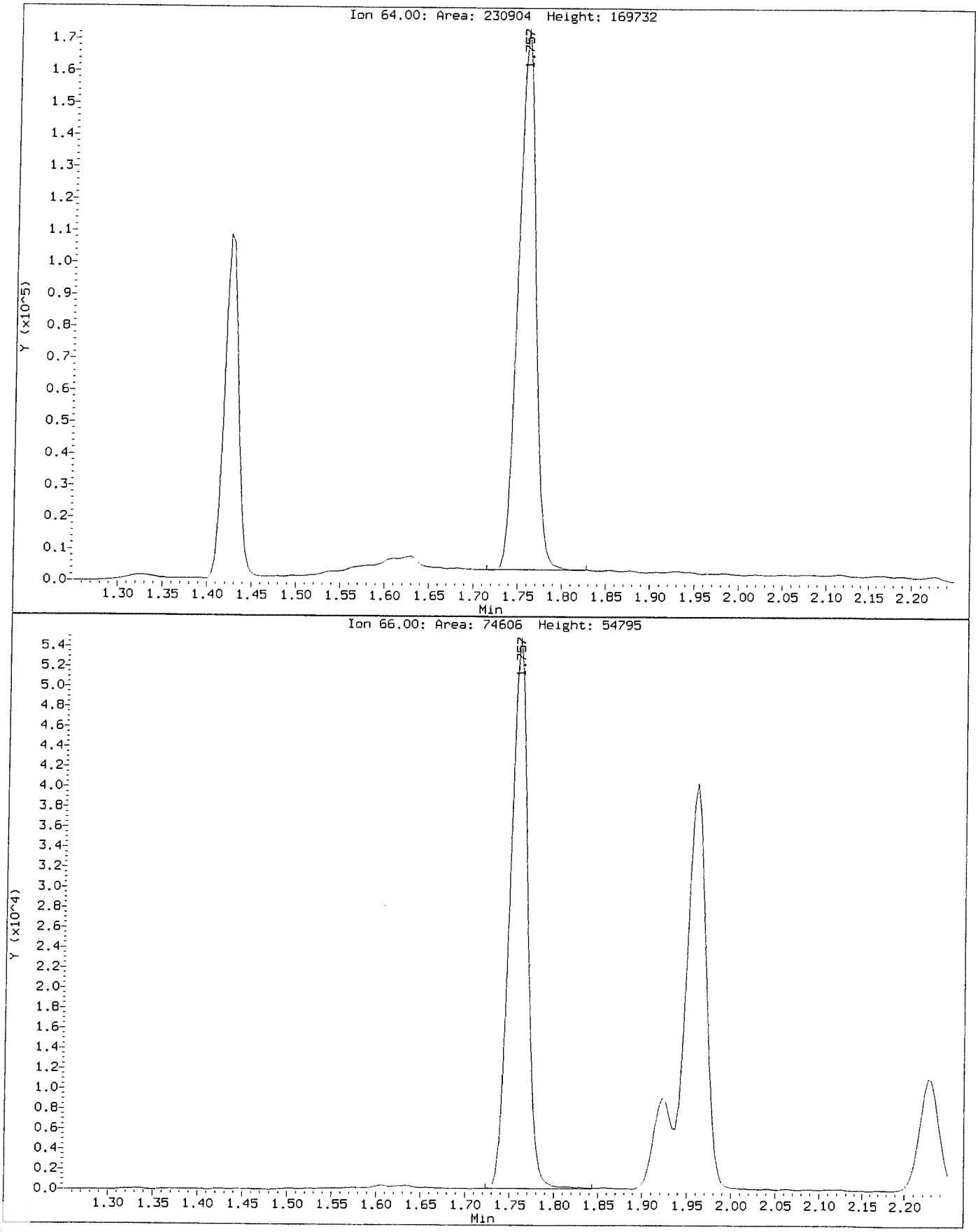
Injection Date: 13-NOV-2018 16:18
Instrument: VOA9.i
Client Sample ID: VICV050

Compound: Chloroethane
CAS Number: 75-00-3



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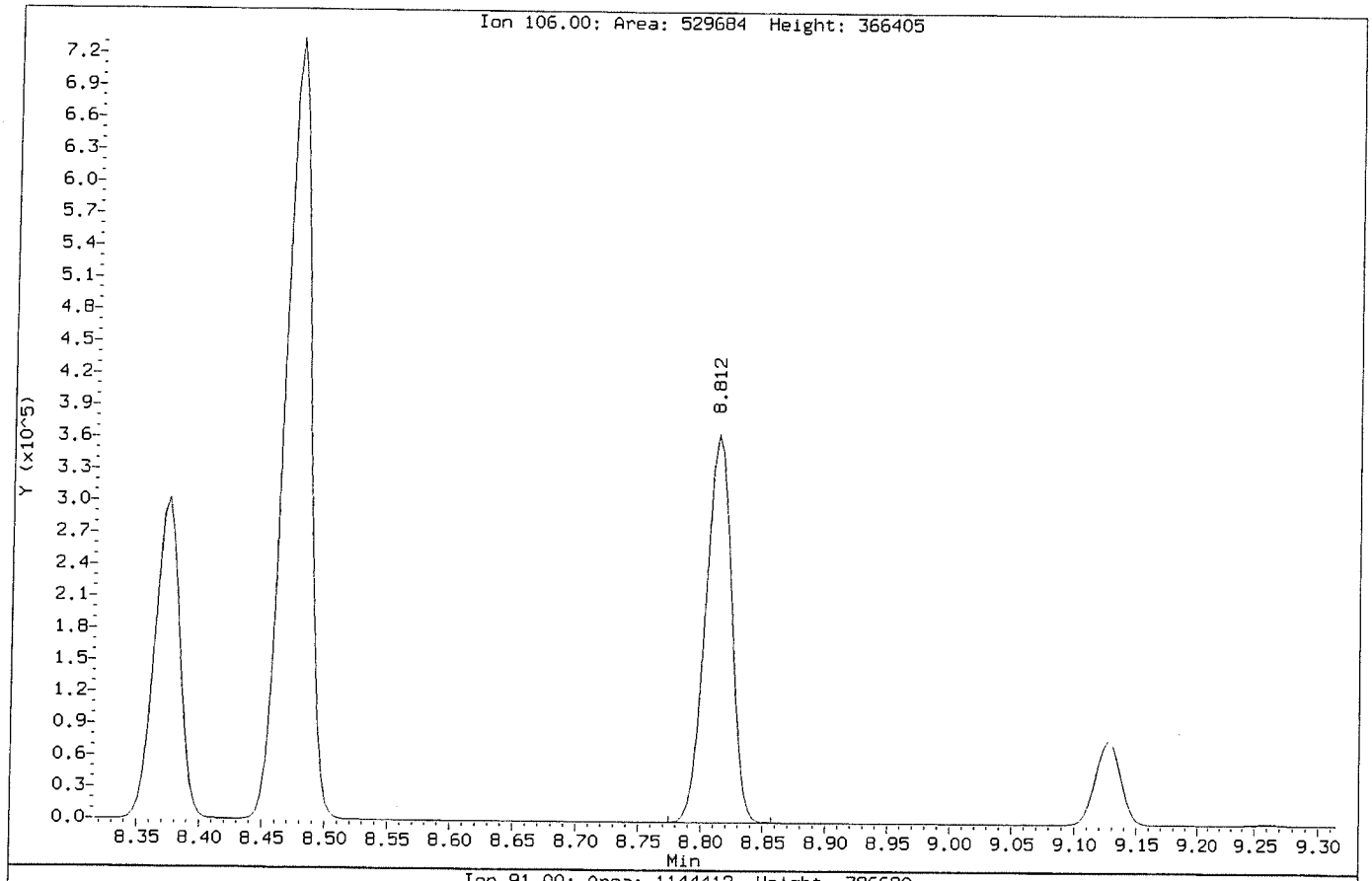
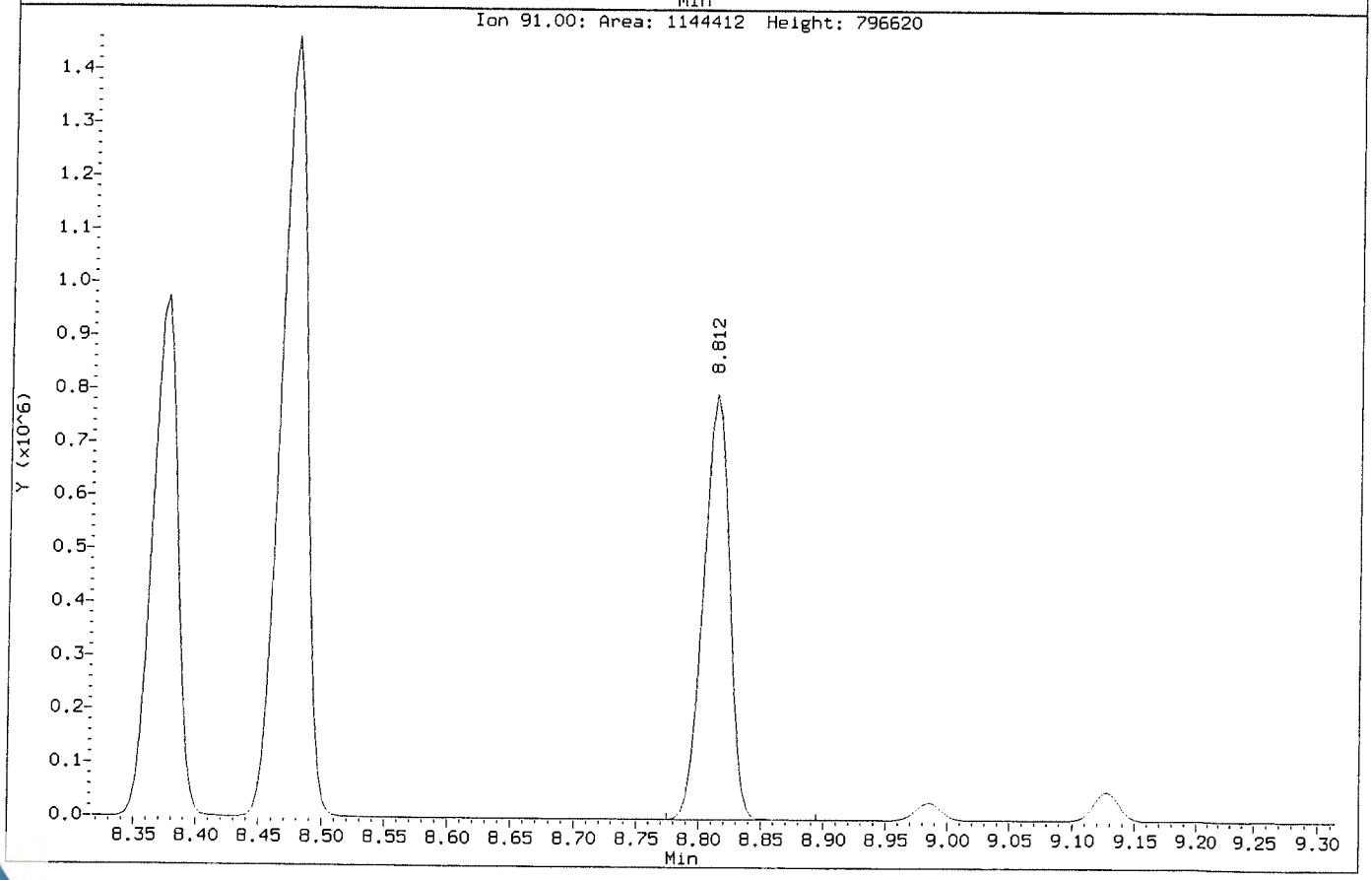
Injection Date: 13-NOV-2018 16:18
Instrument: VOA9.i
Client Sample ID: VICV050

Compound: o-Xylene
CAS Number: 95-47-6





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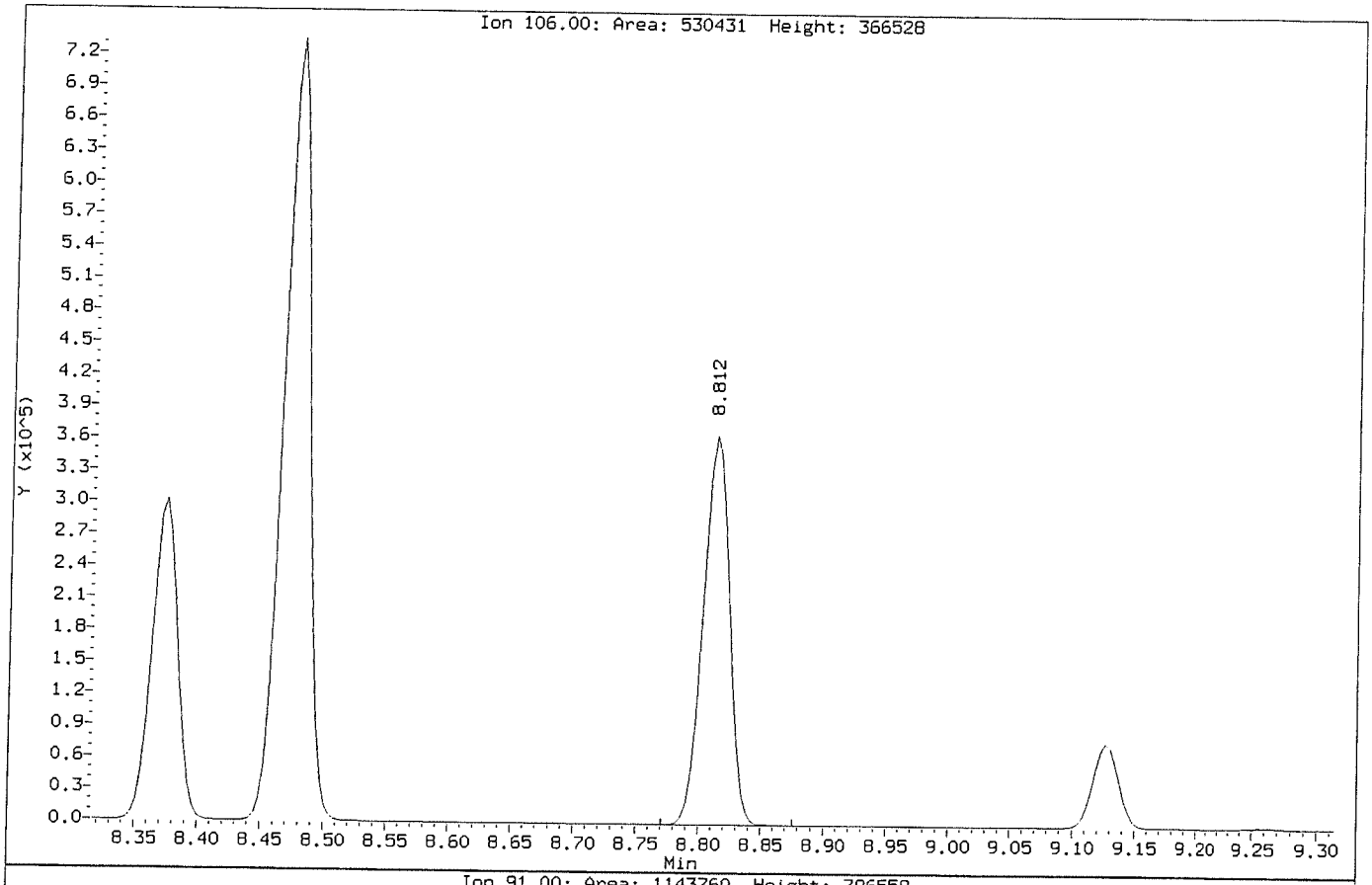
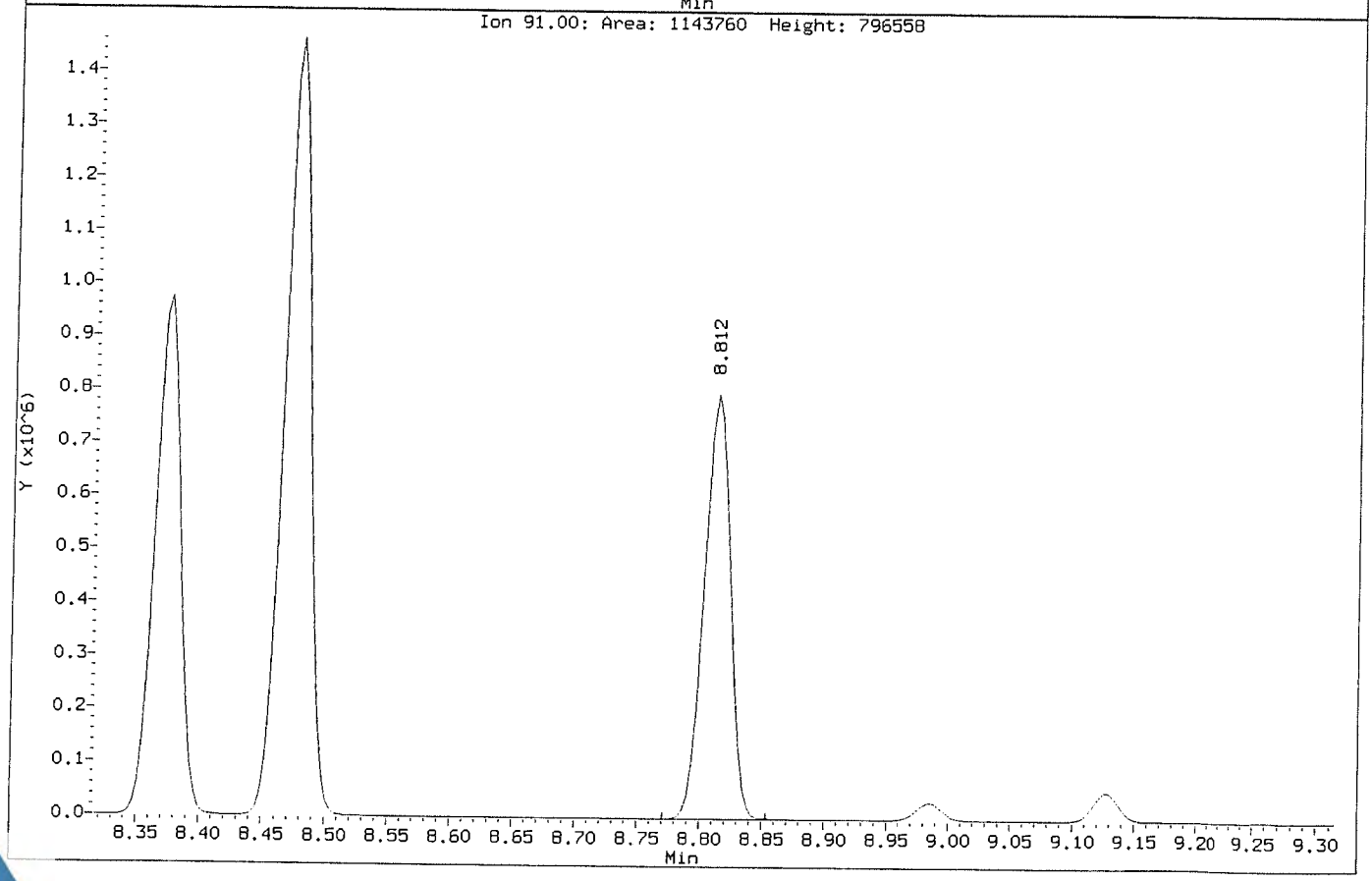
Injection Date: 13-NOV-2018 16:18
Instrument: VOA9.i
Client Sample ID: VICV050

Compound: o-Xylene
CAS Number: 95-47-6





MSVOA09 -Logbook

Batch: 34000 **Analyst:** Presenta Cabascango

Date: 12-18-2018 **Reviewer:**

Method: 8260 **Laboratory:** Houston

Comments:

#	Samp ID	Type	Analyzed	DF	Init Wt/Vol	Final Vol	File ID	Matrix	Status	pH
1	BFB	TUNE	12-18-2018 11:30 am	1.00	50 mL	50 mL	U121801.D	Liquid	Y	NA
	Auto find/purged									
2	VSTD050	CCV	12-18-2018 11:54 am	1.00	50 mL	50 mL	U121802.D	Liquid	Y	NA
	10 uL cal std/50 mL DI									
3	BLANK	MBLK	12-18-2018 12:19 pm	1.00	50 mL	50 mL	U121803.D	Liquid	Y	NA
4	BLANK	SAMP	12-18-2018 12:44 pm	1.00	50 mL	50 mL	U121804.D	Liquid	Y	NA
5	BLANK	SAMP	12-18-2018 01:09 pm	1.00	50 mL	50 mL	U121805.D	Liquid	Y	NA
6	VBLKW-181218	MBLK	12-18-2018 01:34 pm	1.00	50 mL	50 mL	U121806.D	Liquid	Y	NA
7	VLCSW-1812018	LCS	12-18-2018 01:58 pm	1.00	50 mL	50 mL	U121807.D	Liquid	Y	NA
	4 uL ICV std/50 mL DI									
8	HS18120442-01	SAMP	12-18-2018 02:23 pm	1.00	50 mL	50 mL	U121808.D	Liquid	Y	<2
9	HS18120278-05	SAMP	12-18-2018 02:48 pm	1.00	50 mL	50 mL	U121809.D	Liquid	Y	<2
10	HS18120278-02	SAMP	12-18-2018 03:13 pm	1.00	50 mL	50 mL	U121810.D	Liquid	Y	<2
11	HS18120278-04	SAMP	12-18-2018 03:37 pm	1.00	50 mL	50 mL	U121811.D	Liquid	Y	<2
12	HS18120278-03	SAMP	12-18-2018 04:02 pm	1.00	50 mL	50 mL	U121812.D	Liquid	Y	<2
13	HS18120278-01	SAMP	12-18-2018 04:27 pm	1.00	50 mL	50 mL	U121813.D	Liquid	Y	<2
14	HS18120375-01	SAMP	12-18-2018 04:51 pm	1.00	50 mL	50 mL	U121814.D	Liquid	Y	<2
15	HS18120375-03	SAMP	12-18-2018 05:16 pm	1.00	50 mL	50 mL	U121815.D	Liquid	Y	<2
16	HS18120278-03MS	MS	12-18-2018 05:41 pm	1.00	50 mL	50 mL	U121816.D	Liquid	Y	<2
	3.5 uL cal std/43 mL Sample									
17	HS18120278-03MSD	MSD	12-18-2018 06:06 pm	1.00	50 mL	50 mL	U121817.D	Liquid	Y	<2
	3.5 uL cal std/43 mL Sample									
18	HS18120360-01	SAMP	12-18-2018 06:31 pm	1.00	50 mL	50 mL	U121818.D	Liquid	Y	<2
19	HS18120360-02	SAMP	12-18-2018 06:55 pm	1.00	50 mL	50 mL	U121819.D	Liquid	Y	<2
20	HS18120412-02	SAMP	12-18-2018 07:20 pm	1.00	50 mL	50 mL	U121820.D	Liquid	Y	<2
21	HS18120412-04	SAMP	12-18-2018 07:45 pm	1.00	50 mL	50 mL	U121821.D	Liquid	Y	<2
22	HS18120412-05	SAMP	12-18-2018 08:09 pm	1.00	50 mL	50 mL	U121822.D	Liquid	Y	<2
23	HS18120412-08	SAMP	12-18-2018 08:34 pm	1.00	50 mL	50 mL	U121823.D	Liquid	Y	<2
24	HS18120412-09	SAMP	12-18-2018 08:59 pm	1.00	50 mL	50 mL	U121824.D	Liquid	Y	<2
25	HS18120412-10	SAMP	12-18-2018 09:24 pm	1.00	50 mL	50 mL	U121825.D	Liquid	Y	<2
26	HS18120412-11	SAMP	12-18-2018 09:48 pm	1.00	50 mL	50 mL	U121826.D	Liquid	Y	<2
27	HS18120412-12	SAMP	12-18-2018 10:13 pm	1.00	50 mL	50 mL	U121827.D	Liquid	Y	<2
28	VSTD050-END	CCV	12-18-2018 10:38 pm	1.00	50 mL	50 mL	U121828.D	Liquid	Y	NA
	10 uL cal std/50 mL DI									
29	BFB	TUNE	12-18-2018 11:03 pm	1.00	50 mL	50 mL	V121801.D	Liquid	Y	NA
30	VSTD050	CCV	12-18-2018 11:27 pm	1.00	50 mL	50 mL	V121802.D	Liquid	Y	NA
	10 uL cal std/50 mL DI									
31	CCB	SAMP	12-18-2018 11:52 pm	1.00	50 mL	50 mL	V121803.D	Liquid	Y	NA
	CCB									
32	VLCSW-1812018	LCS	12-19-2018 12:17 am	1.00	50 mL	50 mL	V121804.D	Liquid	Y	NA
	4 uL ICV std/50 mL DI									
33	BLANK	SAMP	12-19-2018 12:42 am	1.00	50 mL	50 mL	V121805.D	Liquid	Y	NA
34	VBLKW-181218	MBLK	12-19-2018 01:06 am	1.00	50 mL	50 mL	V121806.D	Liquid	Y	NA
35	HS18120336-11	SAMP	12-19-2018 01:31 am	1.00	50 mL	50 mL	V121807.D	Liquid	Y	<2
36	HS18120336-09	SAMP	12-19-2018 01:56 am	1.00	50 mL	50 mL	V121808.D	Liquid	Y	<2

MSVOA09 -Logbook

#	Samp ID	Type	Analyzed	DF	Init Wt/Vol	Final Vol	File ID	Matrix	Status	pH
37	HS18120336-10	SAMP	12-19-2018 02:21 am	1.00	50 mL	50 mL	V121809.D	Liquid	Y	<2
38	HS18120336-13	SAMP	12-19-2018 02:45 am	1.00	50 mL	50 mL	V121810.D	Liquid	Y	<2
39	HS18120336-14	SAMP	12-19-2018 03:10 am	1.00	50 mL	50 mL	V121811.D	Liquid	Y	<2
40	HS18120336-07	SAMP	12-19-2018 03:35 am	1.00	50 mL	50 mL	V121812.D	Liquid	Y	<2
41	HS18120336-14MS	MS	12-19-2018 04:00 am	1.00	50 mL	50 mL	V121813.D	Liquid	Y	<2
	3.5 uL cal std/43 mL Sample									
42	HS18120336-14MSD	MSD	12-19-2018 04:25 am	1.00	50 mL	50 mL	V121814.D	Liquid	Y	<2
	3.5 uL cal std/43 mL Sample									
43	BLANK	SAMP	12-19-2018 04:49 am	1.00	50 mL	50 mL	V121815.D	Liquid	Y	NA
	Cleanup blk									
44	HS18120336-15	SAMP	12-19-2018 05:14 am	1.00	50 mL	50 mL	V121816.D	Liquid	Y	<2
45	HS18120336-16	SAMP	12-19-2018 05:39 am	1.00	50 mL	50 mL	V121817.D	Liquid	Y	<2
46	HS18120336-17	SAMP	12-19-2018 06:04 am	1.00	50 mL	50 mL	V121818.D	Liquid	Y	<2
47	HS18120336-18	SAMP	12-19-2018 06:28 am	1.00	50 mL	50 mL	V121819.D	Liquid	Y	<2
48	HS18120336-19	SAMP	12-19-2018 06:53 am	1.00	50 mL	50 mL	V121820.D	Liquid	Y	<2
49	HS18120336-20	SAMP	12-19-2018 07:18 am	1.00	50 mL	50 mL	V121821.D	Liquid	Y	<2
50	HS18120336-03	SAMP	12-19-2018 07:43 am	10.00	5 mL	50 mL	V121822.D	Liquid	Y	<2
51	HS18120336-21	SAMP	12-19-2018 08:07 am	10.00	5 mL	50 mL	V121823.D	Liquid	Y	<2
52	HS18120336-01	SAMP	12-19-2018 08:32 am	1.00	50 mL	50 mL	V121824.D	Liquid	Y	<2
53	HS18120336-02	SAMP	12-19-2018 08:57 am	1.00	50 mL	50 mL	V121825.D	Liquid	Y	<2
54	HS18120336-02	SAMP	12-19-2018 09:22 am	10.00	5 mL	50 mL	V121826.D	Liquid	Y	<2
55	HS18120336-04	SAMP	12-19-2018 09:46 am	25.00	2 mL	50 mL	V121827.D	Liquid	Y	<2
56	HS18120336-05	SAMP	12-19-2018 10:11 am	100.0(	500 µL	50 mL	V121828.D	Liquid	Y	<2
57	HS18120336-08	SAMP	12-19-2018 10:36 am	10.00	5 mL	50 mL	V121829.D	Liquid	Y	<2

Chemical	Value
SURR SPK ID	30502-52-03
IS ID	30502-52-04
ICV STD ID	30603-45-01
LCS/MS ID	30603-45-01
CAL STD ID	30502-55-01/02
BFB Ion 95 Response	30502-52-03

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

	CLIENT SAMPLE NO.	SMC1 (DCE) #	SMC2 #	SMC3 (TOL) #	OTHER #	TOT OUT
01	VBLKW-181218	90	87	104	98	0
02	VLCSW-181218	88	89	105	102	0
03	HS18120278-0	89	88	106	98	0
04	HS18120278-0	90	88	105	98	0
05	HS18120278-0	91	88	105	97	0
06	HS18120278-0	91	89	105	98	0
07	HS18120278-0	91	87	106	99	0
08	HS18120278-0	88	90	106	103	0
09	HS18120278-0	87	90	105	102	0
10						
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		QC LIMITS
SMC1 (DCE)	= 1,2-Dichloroethane-d4	(0-130)
SMC2	= Dibromofluoromethane	(0-130)
SMC3 (TOL)	= Toluene-d8	(0-130)
OTHER	= 4-Bromofluorobenzene	(0-130)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE NO.

VBLKW-181218

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Lab File ID: U121806 Lab Sample ID: VBLKW-181218

Date Analyzed: 12/18/18 Time Analyzed: 1334

GC Column: DB624 ID: 0.18 (mm) Heated Purge: (Y/N) N

Instrument ID: VOA9

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	VLCSW-181218	VLCSW-1812018	U121807	1358
02	HS18120278-0	HS18120278-05	U121809	1448
03	HS18120278-0	HS18120278-02	U121810	1513
04	HS18120278-0	HS18120278-04	U121811	1537
05	HS18120278-0	HS18120278-03	U121812	1602
06	HS18120278-0	HS18120278-01	U121813	1627
07	HS18120278-0	HS18120278-03M	U121816	1741
08	HS18120278-0	HS18120278-03M	U121817	1806
09				
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COMMENTS:

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Lab File ID: U121801 BFB Injection Date: 12/18/18

Instrument ID: VOA9 BFB Injection Time: 1130

GC Column: DB624 ID: 0.25 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	19.0
75	30.0 - 60.0% of mass 95	49.8
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.8
173	Less than 2.0% of mass 174	0.6 (0.9)1
174	Greater than 50.0% of mass 95	67.5
175	5.0 - 9.0% of mass 174	5.0 (7.5)1
176	95.0 - 101.0% of mass 174	64.3 (95.2)1
177	5.0 - 9.0% of mass 176	4.4 (6.8)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD050	VSTD050	U121802	12/18/18	1154
02	VBLKW-181218	VBLKW-181218	U121806	12/18/18	1334
03	VLCSW-181218	VLCSW-1812018	U121807	12/18/18	1358
04	HS18120278-0	HS18120278-05	U121809	12/18/18	1448
05	HS18120278-0	HS18120278-02	U121810	12/18/18	1513
06	HS18120278-0	HS18120278-04	U121811	12/18/18	1537
07	HS18120278-0	HS18120278-03	U121812	12/18/18	1602
08	HS18120278-0	HS18120278-01	U121813	12/18/18	1627
09	HS18120278-0	HS18120278-03M	U121816	12/18/18	1741
10	HS18120278-0	HS18120278-03M	U121817	12/18/18	1806
11	VSTD050-END	VSTD050-END	U121828	12/18/18	2238
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

FORM V VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Instrument ID: VOA9 Calibration Date: 12/18/18 Time: 1154

Lab File ID: U121802 Init. Calib. Date(s): 11/13/18 11/13/18

Init. Calib. Times: 1123 1528

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE	
cis-1,3-Dichloropropene	0.5230000	0.6465575	0.6465575	0.2	-23.62	20.00	AVRG	<-
trans-1,3-Dichloropropene	52.675131	50.000000	0.5461798	0.1	-5.35	20.00	LINR	
1,3-Dichlorobenzene	1.5740000	1.5484671	1.5484671	0.6	1.62	20.00	AVRG	
2,2-Dichloropropane	0.7100000	0.7232802	0.7232802	0.1	-1.87	20.00	AVRG	
1,1-Dichloropropene	0.4620000	0.4695681	0.4695681	0.1	-1.64	20.00	AVRG	
Dibromomethane	0.2230000	0.2383912	0.2383912	0.1	-6.90	20.00	AVRG	
1,2-Dibromoethane	0.3680000	0.4105056	0.4105056	0.1	-11.55	20.00	AVRG	
trans-1,2-Dichloroethene	0.6180000	0.6145443	0.6145443	0.1	0.56	20.00	AVRG	
1,1,1,2-Tetrachloroethane	0.3150000	0.3490986	0.3490986	0.1	-10.82	20.00	AVRG	
1,1,1-Trichloroethane	0.8780000	0.8174927	0.8174927	0.1	6.89	20.00	AVRG	
1,1,2,2-Tetrachloroethane	1.1840000	1.2619648	1.2619648	0.3	-6.58	20.00	AVRG	
Freon TF	0.5010000	0.4411715	0.4411715	0.1	11.94	20.00	AVRG	
1,1,2-Trichloroethane	0.3180000	0.3468275	0.3468275	0.1	-9.06	20.00	AVRG	
1,1-Dichloroethane	1.1460000	1.1593607	1.1593607	0.2	-1.16	20.00	AVRG	
1,1-Dichloroethene	0.5640000	0.5229133	0.5229133	0.1	7.28	20.00	AVRG	
Trichlorofluoromethane	1.0000000	0.8793023	0.8793023	0.1	12.07	20.00	AVRG	
1,2,3-Trichlorobenzene	0.9440000	0.9415381	0.9415381	0.1	0.26	20.00	AVRG	
Toluene	1.5870000	1.6824304	1.6824304	0.4	-6.01	20.00	AVRG	
1,2,4-Trichlorobenzene	0.9830000	0.9593526	0.9593526	0.2	2.40	20.00	AVRG	
1,2,4-Trimethylbenzene	2.7770000	2.8110755	2.8110755	0.1	-1.23	20.00	AVRG	
Tetrachloroethene	0.2620000	0.2582452	0.2582452	0.2	1.43	20.00	AVRG	
Trichloroethene	0.3410000	0.3482725	0.3482725	0.2	-2.13	20.00	AVRG	
1,2-Dichlorobenzene	1.5970000	1.5610963	1.5610963	0.4	2.25	20.00	AVRG	
1,2-Dichloroethane	0.5230000	0.5358117	0.5358117	0.1	-2.45	20.00	AVRG	
1,2-Dichloropropane	0.3560000	0.4081818	0.4081818	0.1	-14.66	20.00	AVRG	
1,3,5-Trimethylbenzene	2.6860000	2.6747190	2.6747190	0.1	0.42	20.00	AVRG	
1,3-Dichloropropane	0.6820000	0.7530752	0.7530752	0.1	-10.42	20.00	AVRG	
1,4-Dichlorobenzene	51.442257	50.000000	1.5842138	0.4	-2.88	20.00	LINR	
2-Butanone	0.3510000	0.3780984	0.3780984	0.1	-7.72	20.00	AVRG	
2-Chlorotoluene	2.4480000	2.4612724	2.4612724	0.1	-0.54	20.00	AVRG	
2-Hexanone	0.2910000	0.3474431	0.3474431	0.1	-19.40	20.00	AVRG	
4-Chlorotoluene	2.8250000	2.8609952	2.8609952	0.1	-1.27	20.00	AVRG	
tert-Butylbenzene	2.2890000	2.1959507	2.1959507	0.1	4.06	20.00	AVRG	
4-Methyl-2-Pentanone	0.4170000	0.4939195	0.4939195	0.1	-18.44	20.00	AVRG	
Acetone	116.62060	100.00000	0.2660475	0.1	-16.62	20.00	LINR	
Benzene	1.3820000	1.5172987	1.5172987	0.5	-9.79	20.00	AVRG	
Bromobenzene	0.8200000	0.8421597	0.8421597	0.1	-2.70	20.00	AVRG	
Bromochloromethane	0.2950000	0.3212433	0.3212433	0.1	-8.90	20.00	AVRG	
Bromodichloromethane	0.4160000	0.4489122	0.4489122	0.2	-7.91	20.00	AVRG	
Bromoform	51.101037	50.000000	0.2324213	0.1	-2.20	20.00	2RDR	
Bromomethane	49.310917	50.000000	0.4089300	0.1	1.38	20.00	LINR	
Carbon Disulfide	1.7430000	1.7437932	1.7437932	0.1	-0.04	20.00	AVRG	

FORM VII VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS1812027

Instrument ID: VOA9 Calibration Date: 12/18/18 Time: 1154

Lab File ID: U121802 Init. Calib. Date(s): 11/13/18 11/13/18

Init. Calib. Times: 1123 1528

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Carbon Tetrachloride	0.3610000	0.3527906	0.3527906	0.1	2.27	20.00	AVRG
Chlorobenzene	1.0320000	1.0688845	1.0688845	0.5	-3.57	20.00	AVRG
Chloroethane	0.5220000	0.5894615	0.5894615	0.1	-12.92	20.00	AVRG
Chloroform	1.1510000	1.1257192	1.1257192	0.2	2.20	20.00	AVRG
Chloromethane	54.624901	50.000000	0.7295676	0.1	-9.25	20.00	LINR
cis-1,2-Dichloroethene	0.7080000	0.7157616	0.7157616	0.1	-1.10	20.00	AVRG
Dibromochloromethane	0.3160000	0.3664098	0.3664098	0.1	-15.95	20.00	AVRG
Dichlorodifluoromethane	45.628360	50.000000	0.6731022	0.1	8.74	20.00	LINR
Ethylbenzene	0.5220000	0.5380548	0.5380548	0.1	-3.08	20.00	AVRG
Hexachlorobutadiene	52.567087	50.000000	0.3256090	0.1	-5.13	20.00	2RDR
Isopropylbenzene	1.5190000	1.5234829	1.5234829	0.1	-0.30	20.00	AVRG
m,p-Xylenes	0.6430000	0.6693961	0.6693961	0.1	-4.10	20.00	AVRG
Methylene Chloride	54.858775	50.000000	0.6990960	0.1	-9.72	20.00	LINR
n-Butylbenzene	48.066789	50.000000	2.5142860	0.5	3.87	20.00	2RDR
n-Propylbenzene	3.9460000	3.8807774	3.8807774	0.1	1.65	20.00	AVRG
Naphthalene	2.9610000	3.2489303	3.2489303	0.2	-9.72	20.00	AVRG
o-Xylene	0.6430000	0.6879226	0.6879226	0.3	-6.99	20.00	AVRG
sec-Butylbenzene	3.2850000	3.1297727	3.1297727	0.1	4.72	20.00	AVRG
Styrene	1.0860000	1.2201447	1.2201447	0.3	-12.35	20.00	AVRG
Vinyl Chloride	51.879882	50.000000	0.8460555	0.1	-3.76	20.00	LINR
1,2,3-Trichloropropane	1.2360000	1.4092705	1.4092705	0.1	-14.02	20.00	AVRG
p-Isopropyltoluene	2.7380000	2.7103419	2.7103419	0.1	1.01	20.00	AVRG
1,2-Dibromo-3-Chloropropane	50.173425	50.000000	0.1836278	0.05	-0.35	20.00	2RDR
1,2-Dichloroethane-d4	43.245011	50.000000	0.6572483	0.1	13.51	20.00	LINR
Dibromofluoromethane	44.581548	50.000000	0.5140022	0.1	10.84	20.00	LINR
Toluene-d8	52.614842	50.000000	1.3425803	0.1	-5.23	20.00	LINR
4-Bromofluorobenzene	51.456730	50.000000	0.5085233	0.1	-2.91	20.00	LINR

FORM VII VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Instrument ID: VOA9 Calibration Date: 12/18/18 Time: 2238

Lab File ID: U121828 Init. Calib. Date(s): 11/13/18 11/13/18

Init. Calib. Times: 1123 1528

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
cis-1,3-Dichloropropene	0.5230000	0.6466884	0.6466884	0.2	-23.65	50.00	AVRG
trans-1,3-Dichloropropene	53.133378	50.000000	0.5510684	0.1	-6.27	50.00	LINR
1,3-Dichlorobenzene	1.5740000	1.7106867	1.7106867	0.6	-8.68	50.00	AVRG
2,2-Dichloropropane	0.7100000	0.6404728	0.6404728	0.1	9.79	50.00	AVRG
1,1-Dichloropropene	0.4620000	0.5286470	0.5286470	0.1	-14.42	50.00	AVRG
Dibromomethane	0.2230000	0.2539122	0.2539122	0.1	-13.86	50.00	AVRG
1,2-Dibromoethane	0.3680000	0.4256392	0.4256392	0.1	-15.66	50.00	AVRG
trans-1,2-Dichloroethene	0.6180000	0.6666931	0.6666931	0.1	-7.88	50.00	AVRG
1,1,1,2-Tetrachloroethane	0.3150000	0.3662992	0.3662992	0.1	-16.28	50.00	AVRG
1,1,1-Trichloroethane	0.8780000	0.9103416	0.9103416	0.1	-3.68	50.00	AVRG
1,1,2,2-Tetrachloroethane	1.1840000	1.3534768	1.3534768	0.3	-14.31	50.00	AVRG
Freon TF	0.5010000	0.5016712	0.5016712	0.1	-0.13	50.00	AVRG
1,1,2-Trichloroethane	0.3180000	0.3650401	0.3650401	0.1	-14.79	50.00	AVRG
1,1-Dichloroethane	1.1460000	1.2639722	1.2639722	0.2	-10.29	50.00	AVRG
1,1-Dichloroethene	0.5640000	0.5974985	0.5974985	0.1	-5.94	50.00	AVRG
Trichlorofluoromethane	1.0000000	1.0104580	1.0104580	0.1	-1.04	50.00	AVRG
1,2,3-Trichlorobenzene	0.9440000	1.0802737	1.0802737	0.1	-14.44	50.00	AVRG
Toluene	1.5870000	1.8086645	1.8086645	0.4	-13.97	50.00	AVRG
1,2,4-Trichlorobenzene	0.9830000	1.0938787	1.0938787	0.2	-11.28	50.00	AVRG
1,2,4-Trimethylbenzene	2.7770000	3.1721952	3.1721952	0.1	-14.23	50.00	AVRG
Tetrachloroethene	0.2620000	0.2834701	0.2834701	0.2	-8.19	50.00	AVRG
Trichloroethene	0.3410000	0.3749842	0.3749842	0.2	-9.97	50.00	AVRG
1,2-Dichlorobenzene	1.5970000	1.7181328	1.7181328	0.4	-7.58	50.00	AVRG
1,2-Dichloroethane	0.5230000	0.5649710	0.5649710	0.1	-8.02	50.00	AVRG
1,2-Dichloropropane	0.3560000	0.4374567	0.4374567	0.1	-22.88	50.00	AVRG
1,3,5-Trimethylbenzene	2.6860000	3.0544334	3.0544334	0.1	-13.72	50.00	AVRG
1,3-Dichloropropane	0.6820000	0.7865748	0.7865748	0.1	-15.33	50.00	AVRG
1,4-Dichlorobenzene	56.946464	50.000000	1.7535811	0.4	-13.89	50.00	LINR
2-Butanone	0.3510000	0.4012917	0.4012917	0.1	-14.33	50.00	AVRG
2-Chlorotoluene	2.4480000	2.7298598	2.7298598	0.1	-11.51	50.00	AVRG
2-Hexanone	0.2910000	0.3660335	0.3660335	0.1	-25.78	50.00	AVRG
4-Chlorotoluene	2.8250000	3.1924179	3.1924179	0.1	-13.00	50.00	AVRG
tert-Butylbenzene	2.2890000	2.5457033	2.5457033	0.1	-11.21	50.00	AVRG
4-Methyl-2-Pentanone	0.4170000	0.5218160	0.5218160	0.1	-25.14	50.00	AVRG
Acetone	122.09079	100.00000	0.2780700	0.1	-22.09	50.00	LINR
Benzene	1.3820000	1.6389691	1.6389691	0.5	-18.59	50.00	AVRG
Bromobenzene	0.8200000	0.9092601	0.9092601	0.1	-10.88	50.00	AVRG
Bromochloromethane	0.2950000	0.3411471	0.3411471	0.1	-15.64	50.00	AVRG
Bromodichloromethane	0.4160000	0.4767845	0.4767845	0.2	-14.61	50.00	AVRG
Bromoform	52.879749	50.000000	0.2407700	0.1	-5.76	50.00	2RDR
Bromomethane	44.656794	50.000000	0.3687847	0.1	10.69	50.00	LINR
Carbon Disulfide	1.7430000	1.9606682	1.9606682	0.1	-12.49	50.00	AVRG

FORM VII VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS1812027

Instrument ID: VOA9 Calibration Date: 12/18/18 Time: 2238

Lab File ID: U121828 Init. Calib. Date(s): 11/13/18 11/13/18

Init. Calib. Times: 1123 1528

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Carbon Tetrachloride	0.3610000	0.3940237	0.3940237	0.1	-9.15	50.00	AVRG
Chlorobenzene	1.0320000	1.1394195	1.1394195	0.5	-10.41	50.00	AVRG
Chloroethane	0.5220000	0.6632847	0.6632847	0.1	-27.07	50.00	AVRG
Chloroform	1.1510000	1.2121159	1.2121159	0.2	-5.31	50.00	AVRG
Chloromethane	53.566027	50.000000	0.7153657	0.1	-7.13	50.00	LINR
cis-1,2-Dichloroethene	0.7080000	0.7735681	0.7735681	0.1	-9.26	50.00	AVRG
Dibromochloromethane	0.3160000	0.3813545	0.3813545	0.1	-20.68	50.00	AVRG
Dichlorodifluoromethane	52.388430	50.000000	0.7750621	0.1	-4.78	50.00	LINR
Ethylbenzene	0.5220000	0.5882191	0.5882191	0.1	-12.68	50.00	AVRG
Hexachlorobutadiene	55.694377	50.000000	0.3462056	0.1	-11.39	50.00	2RDR
Isopropylbenzene	1.5190000	1.7162602	1.7162602	0.1	-12.99	50.00	AVRG
m,p-Xylenes	0.6430000	0.7307393	0.7307393	0.1	-13.64	50.00	AVRG
Methylene Chloride	59.054019	50.000000	0.7518827	0.1	-18.11	50.00	LINR
n-Butylbenzene	55.289556	50.000000	2.9039165	0.5	-10.58	50.00	2RDR
n-Propylbenzene	3.9460000	4.4409755	4.4409755	0.1	-12.54	50.00	AVRG
Naphthalene	2.9610000	3.6557846	3.6557846	0.2	-23.46	50.00	AVRG
o-Xylene	0.6430000	0.7445051	0.7445051	0.3	-15.79	50.00	AVRG
sec-Butylbenzene	3.2850000	3.6733768	3.6733768	0.1	-11.82	50.00	AVRG
Styrene	1.0860000	1.3008233	1.3008233	0.3	-19.78	50.00	AVRG
Vinyl Chloride	59.125421	50.000000	0.9653842	0.1	-18.25	50.00	LINR
1,2,3-Trichloropropane	1.2360000	1.4416158	1.4416158	0.1	-16.64	50.00	AVRG
p-Isopropyltoluene	2.7380000	3.1397602	3.1397602	0.1	-14.67	50.00	AVRG
1,2-Dibromo-3-Chloropropane	53.275827	50.000000	0.1953092	0.05	-6.55	50.00	2RDR
1,2-Dichloroethane-d4	43.667004	50.000000	0.6634090	0.1	12.66	50.00	LINR
Dibromofluoromethane	45.002139	50.000000	0.5187186	0.1	10.0	50.00	LINR
Toluene-d8	52.704142	50.000000	1.3447872	0.1	-5.41	50.00	LINR
4-Bromofluorobenzene	51.164093	50.000000	0.5056900	0.1	-2.33	50.00	LINR

FORM VII VOA

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Lab File ID (Standard): U121802 Date Analyzed: 12/18/18

Instrument ID: VOA9 Time Analyzed: 1154

GC Column: DB624 ID: 0.18 (mm) Heated Purge: (Y/N) N

		IS1(DCB) AREA #	IS1(DCB) RT #	IS2(CBZ) AREA #	IS2(CBZ) RT #	IS3(DFB) AREA #	IS3(DFB) RT #
	12 HOUR STD	323219	10.24	657840	8.25	710257	5.63
	UPPER LIMIT	646438	10.74	1315680	8.75	1420514	6.13
	LOWER LIMIT	161610	9.74	328920	7.75	355129	5.13
	CLIENT SAMPLE NO.						
01	VBLKW-181218	292418	10.24	636133	8.25	694572	5.63
02	VLCSW-181218	316393	10.24	655559	8.25	714075	5.63
03	HS18120278-0	290869	10.24	640292	8.25	702137	5.63
04	HS18120278-0	291140	10.24	631599	8.25	697785	5.63
05	HS18120278-0	294161	10.24	641402	8.25	700337	5.63
06	HS18120278-0	290407	10.24	635273	8.25	700993	5.63
07	HS18120278-0	293976	10.24	634287	8.25	701381	5.63
08	HS18120278-0	308103	10.24	641586	8.25	699438	5.63
09	HS18120278-0	315859	10.24	656441	8.25	706692	5.63
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (CBZ) = Chlorobenzene-d5
IS3 (DFB) = 1,4-Difluorobenzene

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ALS LABORATORY GROUP Contract:

Lab Code: ALS-HS Case No.: SAS No.: SDG No.: HS18120278

Lab File ID (Standard): U121802 Date Analyzed: 12/18/18

Instrument ID: VOA9 Time Analyzed: 1154

GC Column: DB624 ID: 0.18 (mm) Heated Purge: (Y/N) N

		IS4 AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	402866	4.89				
	UPPER LIMIT	805732	5.39				
	LOWER LIMIT	201433	4.39				
	CLIENT SAMPLE NO.						
01	VBLKW-181218	385775	4.90				
02	VLCSW-181218	400551	4.90				
03	HS18120278-0	395597	4.90				
04	HS18120278-0	388196	4.90				
05	HS18120278-0	392367	4.89				
06	HS18120278-0	386598	4.89				
07	HS18120278-0	389639	4.89				
08	HS18120278-0	392642	4.90				
09	HS18120278-0	400954	4.90				
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS4 = Pentafluorobenzene

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121801.D

Date : 18-DEC-2018 11:30

Client ID: BFB

Instrument: VOA9.i

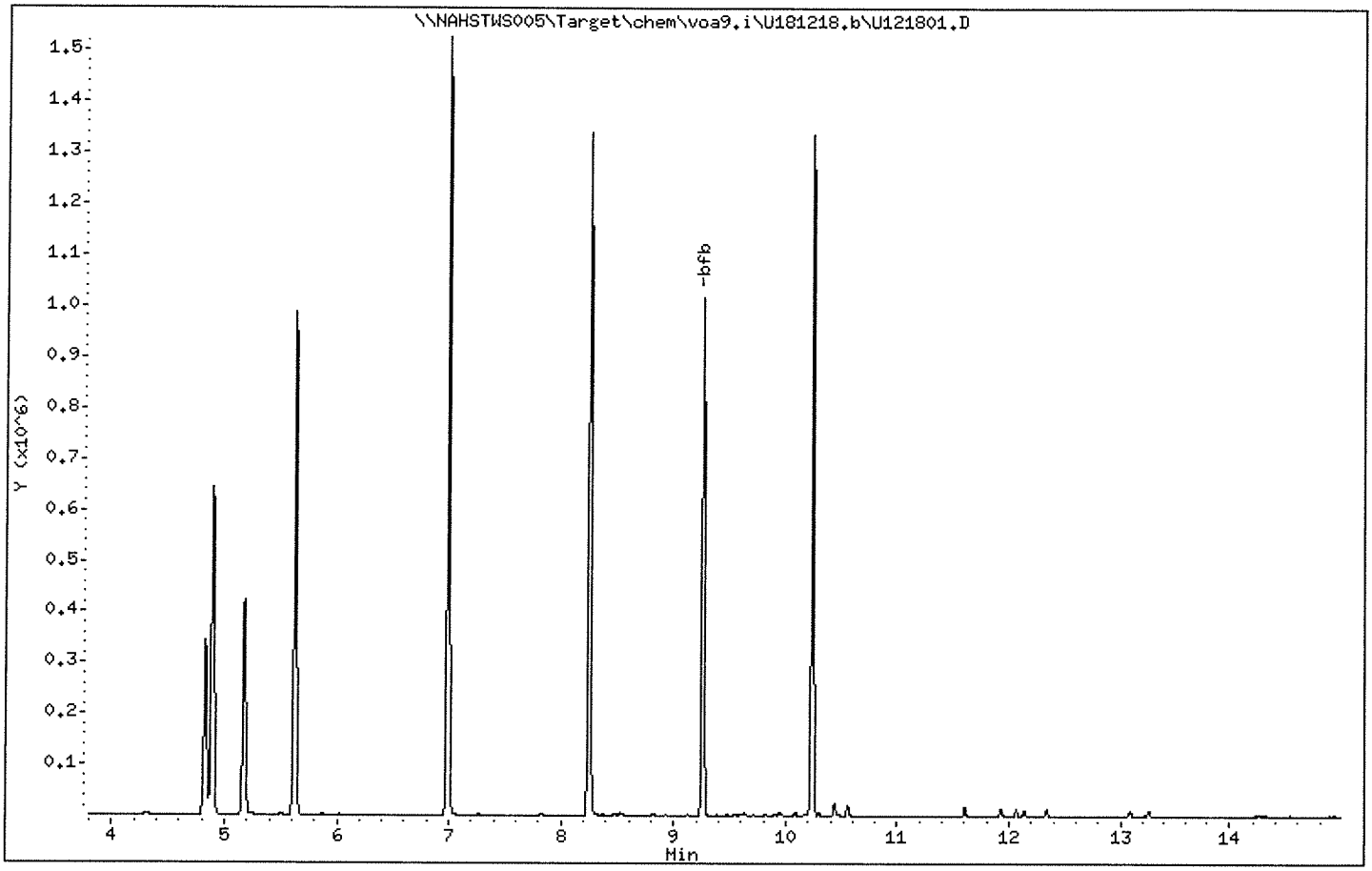
Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25



Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121801.D

Date : 18-DEC-2018 11:30

Client ID: BFB

Instrument: VOA9.i

Sample Info: BFB;BFB;3;;BFB

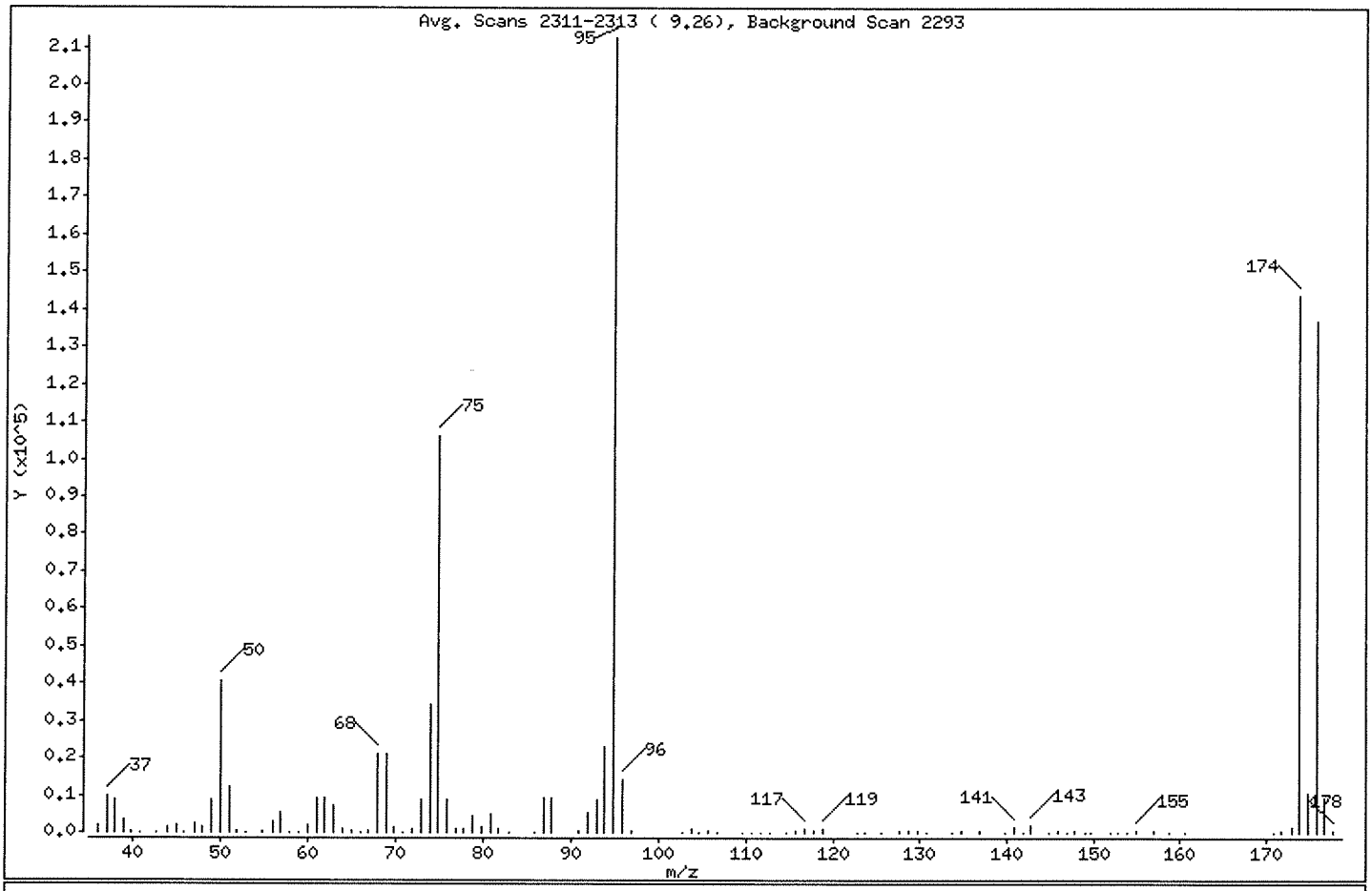
Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25

1 bfb



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	18.97
75	30.00 - 60.00% of mass 95	49.82
96	5.00 - 9.00% of mass 95	6.77
173	Less than 2.00% of mass 174	0.58 (0.86)
174	Greater than 50.00% of mass 95	67.51
175	5.00 - 9.00% of mass 174	5.03 (7.45)
176	95.00 - 101.00% of mass 174	64.26 (95.19)
177	5.00 - 9.00% of mass 176	4.37 (6.81)

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121801.D

Date : 18-DEC-2018 11:30

Client ID: BFB

Instrument: VOA9.i

Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25

Data File: U121801.D

Spectrum: Avg. Scans 2311-2313 (9.26), Background Scan 2293

Location of Maximum: 94.95

Number of points: 105

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	1745	65.00	498	95.90	14398	140.80	1565
37.00	9863	66.00	107	96.90	464	141.80	168
38.00	8582	67.00	526	102.70	99	142.70	1760
39.00	3513	67.90	21248	103.80	776	144.70	199
39.90	474	68.90	20816	104.70	243	145.70	256
40.90	63	69.90	1621	105.80	661	146.70	84
42.80	125	70.90	95	106.80	195	147.70	442
43.90	1399	71.90	1053	109.70	103	148.80	106
45.00	1717	72.90	8643	110.80	121	149.60	172
45.90	235	73.90	34248	111.80	100	151.80	97
47.00	2542	74.90	105976	112.70	110	152.60	124
47.90	1329	75.90	8769	114.70	104	153.70	83
49.00	8644	76.90	1149	115.70	565	154.70	418
50.00	40360	77.80	942	116.70	942	156.70	306
51.00	12336	78.80	4640	117.80	537	158.70	199
51.90	520	79.90	1305	118.80	798	160.60	120
53.00	58	80.80	4993	122.80	55	170.80	70
54.90	574	81.80	1016	123.70	105	171.70	550
56.00	2742	82.90	170	125.60	74	172.80	1236
57.00	5368	85.80	210	127.70	539	173.70	143616
57.90	243	86.90	9507	128.70	330	174.70	10700
58.90	56	87.80	9344	129.70	649	175.70	136704
60.00	1763	90.80	654	130.70	234	176.70	9304
61.00	9399	91.90	5372	133.60	54	177.70	263
61.90	9161	92.90	8580	134.70	303		
63.00	7143	93.90	22776	136.70	247		
63.90	856	94.90	212736	139.70	98		

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121802.D Page 1
Report Date: 25-Jan-2019 20:37

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121802.D
Lab Smp Id: VSTD050 Client Smp ID: VSTD050
Inj Date : 18-DEC-2018 11:54
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD050;VSTD050;2;;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 2 Continuing Calibration Sample
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

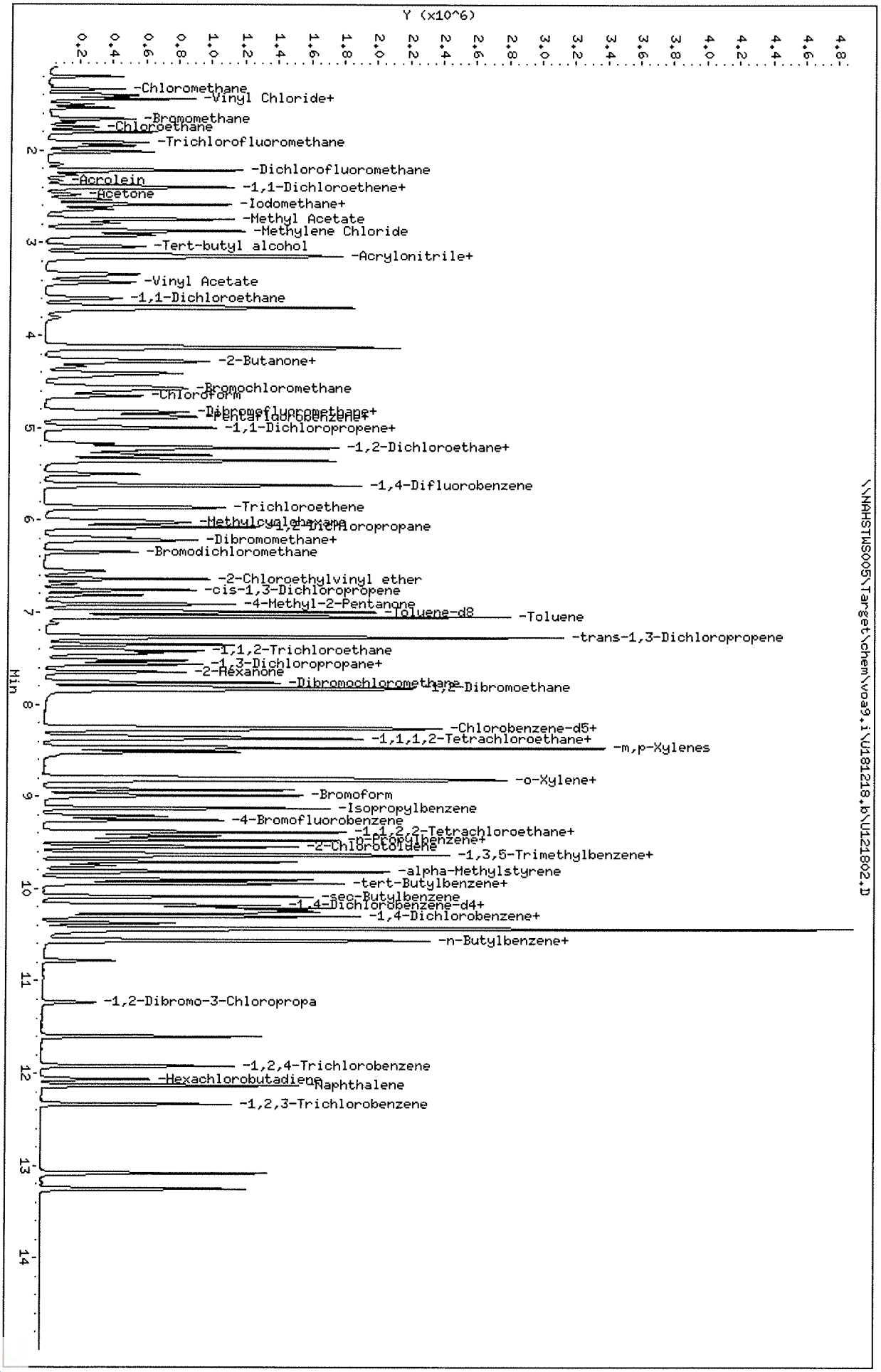
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	402866	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	710257	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	657840	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	323219	50.0000	
$ 30 Dibromofluoromethane	113	4.827	4.827	(0.986)	207074	50.0000	44.58
$ 35 1,2-Dichloroethane-d4	65	5.171	5.171	(1.057)	264783	50.0000	43.24
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	883203	50.0000	52.61
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	334527	50.0000	51.45
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	229651	50.0000	55.34
31 1,1,1-Trichloroethane	97	4.827	4.827	(0.986)	329340	50.0000	46.53
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	407891	50.0000	53.27
138 Freon TF	101	2.397	2.397	(0.490)	177733	50.0000	44.03
53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	228157	50.0000	54.55
22 1,1-Dichloroethane	63	3.601	3.601	(0.736)	467067	50.0000	50.59
11 1,1-Dichloroethene	96	2.397	2.397	(0.490)	210664	50.0000	46.32
32 1,1-Dichloropropene	75	5.003	5.003	(0.889)	333514	50.0000	50.84
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	304323	50.0000	49.87
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	455503	50.0000	57.01
90 1,2,4-Trichlorobenzene	180	11.923	11.923	(1.165)	310081	50.0000	48.78
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	908593	50.0000	50.61
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	59352	50.0000	50.17
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	270047	50.0000	55.76

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121802.D Page 2
Report Date: 25-Jan-2019 20:37

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.570	10.570	(1.033)	504576	50.0000	48.88
33 1,2-Dichloroethane	62	5.250	5.250	(0.933)	380564	50.0000	51.20
42 1,2-Dichloropropane	63	6.079	6.079	(1.081)	289914	50.0000	57.33
75 1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	864520	50.0000	49.78
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	500494	50.0000	49.18
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	495403	50.0000	55.16
84 1,4-Dichlorobenzene	146	10.255	10.255	(1.002)	512048	50.0000	51.44
26 2,2-Dichloropropane	77	4.272	4.272	(0.873)	291385	50.0000	50.96
24 2-Butanone	43	4.335	4.335	(0.886)	304646	100.000	107.57
76 2-Chlorotoluene	91	9.546	9.546	(0.933)	795530	50.0000	50.26
52 2-Hexanone	43	7.649	7.649	(0.927)	457124	100.000	119.53
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	924728	50.0000	50.63
82 p-Isopropyltoluene	119	10.210	10.210	(0.997)	876034	50.0000	49.49
45 4-Methyl-2-Pentanone	43	6.915	6.915	(0.838)	649840	100.000	118.41
10 Acetone	43	2.476	2.476	(0.506)	214363	100.000	116.62
37 Benzene	78	5.216	5.216	(0.927)	1077672	50.0000	54.89
74 Bromobenzene	156	9.381	9.381	(0.917)	272202	50.0000	51.33
29 Bromochloromethane	128	4.553	4.553	(0.930)	129418	50.0000	54.49
39 Bromodichloromethane	83	6.348	6.348	(1.129)	318843	50.0000	54.02
66 Bromoform	173	8.984	8.984	(1.089)	152896	50.0000	51.10(T)
6 Bromomethane	94	1.663	1.663	(0.340)	164744	50.0000	49.31
19 Carbon Disulfide	76	2.585	2.585	(0.528)	1405030	100.000	100.04
34 Carbon Tetrachloride	117	4.991	4.991	(0.887)	250572	50.0000	48.89
59 Chlorobenzene	112	8.275	8.275	(1.003)	703155	50.0000	51.78
7 Chloroethane	64	1.745	1.745	(0.357)	237474	50.0000	56.49
28 Chloroform	83	4.654	4.654	(0.951)	453514	50.0000	48.89
3 Chloromethane	50	1.336	1.336	(0.273)	293918	50.0000	54.62
27 cis-1,2-Dichloroethene	96	4.283	4.283	(0.875)	288356	50.0000	50.51
46 cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	459222	50.0000	61.79
55 Dibromochloromethane	129	7.758	7.758	(0.940)	241039	50.0000	57.90
44 Dibromomethane	93	6.187	6.187	(1.100)	169319	50.0000	53.42
2 Dichlorodifluoromethane	85	1.202	1.202	(0.246)	271170	50.0000	45.62
61 Ethylbenzene	106	8.369	8.369	(1.015)	353954	50.0000	51.56
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	105243	50.0000	52.56
67 Isopropylbenzene	105	9.126	9.126	(1.106)	1002208	50.0000	50.13
62 m,p-Xylenes	106	8.474	8.474	(1.027)	880711	100.000	104.10
17 Methylene Chloride	84	2.866	2.866	(0.586)	281642	50.0000	54.85
87 n-Butylbenzene	91	10.558	10.558	(1.031)	812665	50.0000	48.06
73 n-Propylbenzene	91	9.475	9.475	(0.926)	1254341	50.0000	49.17
92 Naphthalene	128	12.133	12.133	(1.185)	1050116	50.0000	54.86
63 o-Xylene	106	8.811	8.811	(1.068)	452543	50.0000	53.45
81 sec-Butylbenzene	105	10.086	10.086	(0.985)	1011602	50.0000	47.63
64 Styrene	104	8.826	8.826	(1.070)	802660	50.0000	56.15
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	709773	50.0000	47.95
56 Tetrachloroethene	164	7.522	7.522	(0.912)	169884	50.0000	49.29
50 Toluene	91	7.046	7.046	(0.854)	1106770	50.0000	52.99
20 trans-1,2-Dichloroethene	96	3.136	3.136	(0.641)	247579	50.0000	49.67
51 trans-1,3-Dichloropropene	75	7.259	7.259	(1.291)	387928	50.0000	52.67
38 Trichloroethene	130	5.861	5.861	(1.042)	247363	50.0000	51.11
8 Trichlorofluoromethane	101	1.948	1.948	(0.398)	354241	50.0000	43.98
5 Vinyl Chloride	62	1.415	1.415	(0.289)	340847	50.0000	51.87

QC Flag Legend

T - Target compound detected outside RT window.



Data File: \\NAHSTWS005\Target\chem\voa9,i\U181218,b\U121802.D
Date : 18-DEC-2018 11:54
Client ID: VSTD050
Sample Info: VSTD050;VSTD050;2;;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121806.D Page 1
Report Date: 25-Jan-2019 20:37

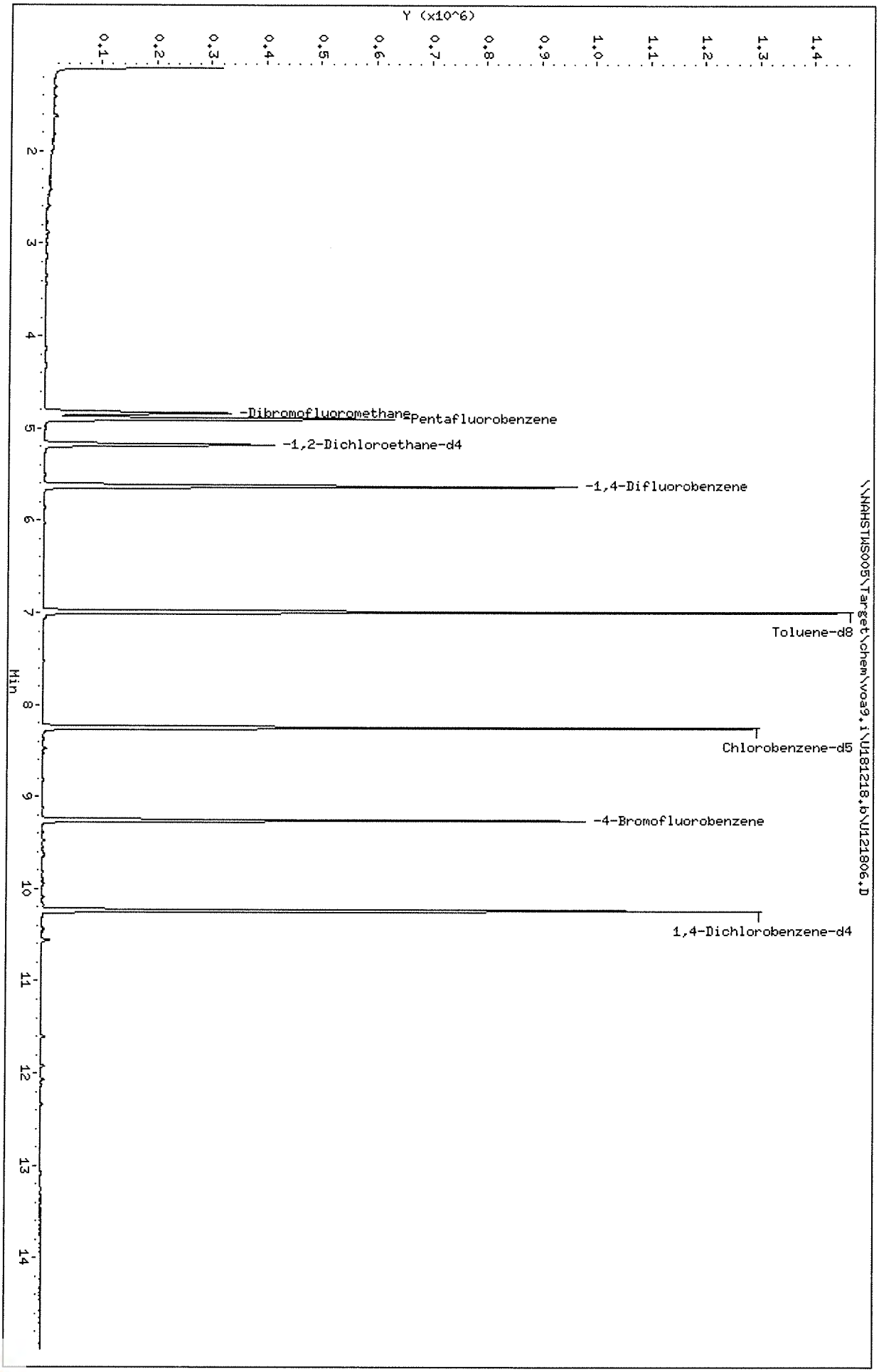
ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121806.D
Lab Smp Id: VBLKW-181218 Client Smp ID: VBLKW-181218
Inj Date : 18-DEC-2018 13:34
Operator : PC Inst ID: VOA9.i
Smp Info : VBLKW-181218;VBLKW-181218;3;;BLANK
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 6 QC Sample: BLANK
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.894	(1.000)	385775	50.0000	
* 36 1,4-Difluorobenzene	114	5.629	5.625	(1.000)	694572	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	636133	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	292418	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.827	(0.987)	194447	43.6934	43.69
$ 35 1,2-Dichloroethane-d4	65	5.179	5.171	(1.057)	264506	45.1904	45.19
$ 48 Toluene-d8	98	6.989	6.990	(0.847)	845972	52.1004	52.10
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	307890	48.9242	48.92



Data File: \\NAHSTWS005\Target\chem\voa9,i\U181218,b\U121806,D
Date : 18-DEC-2018 13:34
Client ID: VBLKW-181218
Sample Info: VBLKW-181218;VBLKW-181218;3;;BLANK
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121807.D Page 1
Report Date: 25-Jan-2019 20:37

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121807.D
Lab Smp Id: VLCSW-1812018 Client Smp ID: VLCSW-181218
Inj Date : 18-DEC-2018 13:58
Operator : PC Inst ID: VOA9.i
Smp Info : VLCSW-1812018;VLCSW-181218;3;;LCS
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 7 QC Sample: LCS
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

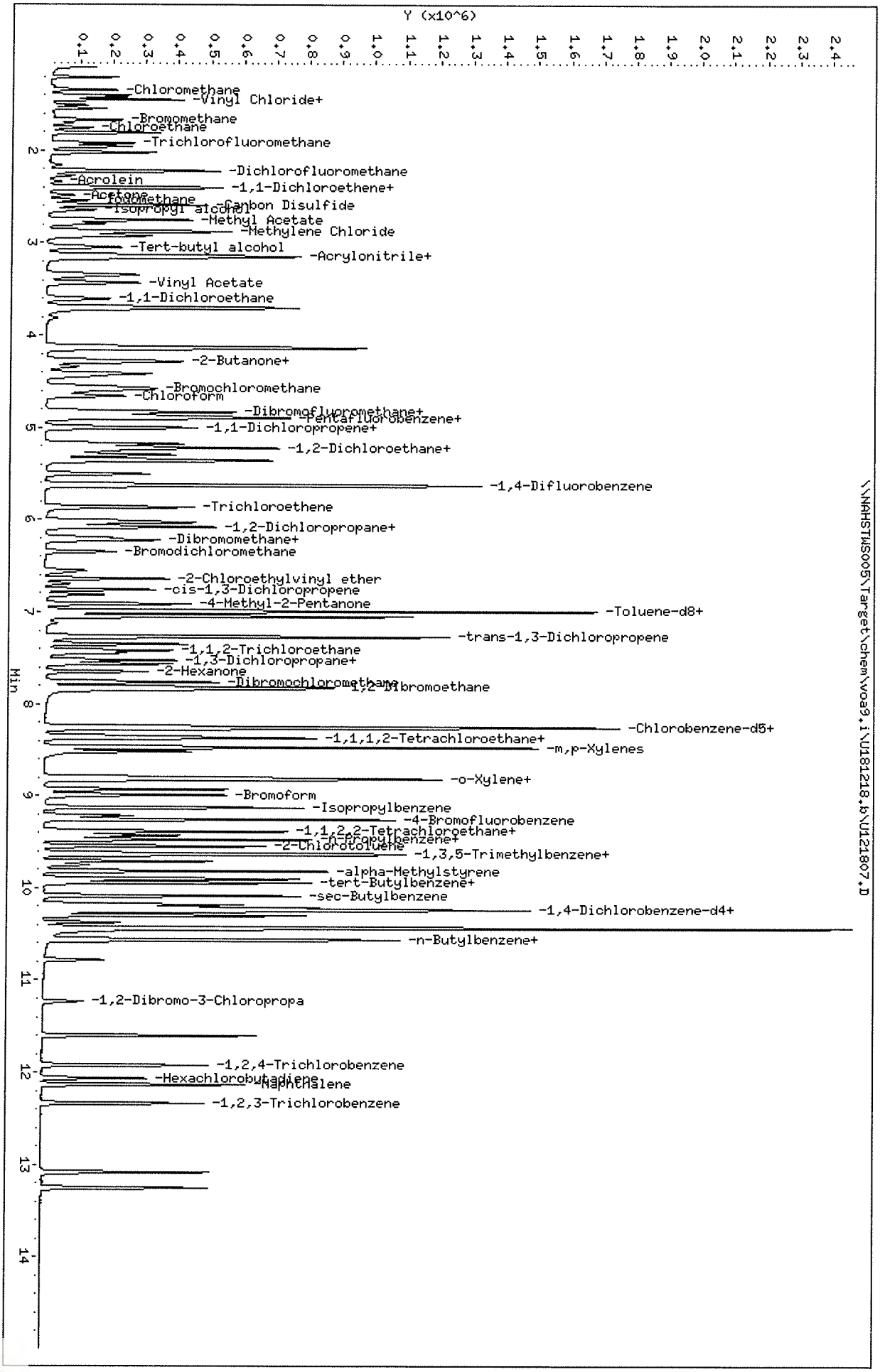
Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.897	4.894	(1.000)	400551	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	714075	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	655559	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.235	10.236	(1.000)	316393	50.0000	
$ 30 Dibromofluoromethane	113	4.830	4.827	(0.986)	205791	44.5608	44.56
$ 35 1,2-Dichloroethane-d4	65	5.175	5.171	(1.057)	268992	44.2250	44.22
$ 48 Toluene-d8	98	6.989	6.990	(0.847)	881545	52.7015	52.70
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	331590	51.1768	51.17
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	89740	21.7022	21.70
31 1,1,1-Trichloroethane	97	4.830	4.827	(0.986)	141124	20.0576	20.05
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	161937	21.6080	21.60
138 Freon TF	101	2.404	2.397	(0.491)	86910	21.6594	21.65
53 1,1,2-Trichloroethane	83	7.420	7.421	(0.900)	91272	21.8997	21.89
22 1,1-Dichloroethane	63	3.604	3.601	(0.736)	192391	20.9601	20.96
11 1,1-Dichloroethene	96	2.401	2.397	(0.490)	93258	20.6265	20.62
32 1,1-Dichloropropene	75	5.006	5.003	(0.890)	149174	22.6192	22.61
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	132556	22.1911	22.19
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	171993	21.9927	21.99
90 1,2,4-Trichlorobenzene	180	11.926	11.923	(1.165)	136376	21.9186	21.91
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	405685	23.0850	23.08
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	21955	19.6877	19.68
57 1,2-Dibromoethane	107	7.851	7.852	(0.952)	107069	22.1853	22.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121807.D Page 2
Report Date: 25-Jan-2019 20:37

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
88 1,2-Dichlorobenzene	146	10.573	10.570	(1.033)	214077	21.1877	21.18
33 1,2-Dichloroethane	62	5.253	5.250	(0.934)	155334	20.7882	20.78
42 1,2-Dichloropropane	63	6.082	6.079	(1.081)	117753	23.1612	23.16
75 1,3,5-Trimethylbenzene	105	9.624	9.625	(0.940)	394362	23.1986	23.19
83 1,3-Dichlorobenzene	146	10.179	10.180	(0.995)	216187	21.7022	21.70
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	199341	22.2751	22.27
84 1,4-Dichlorobenzene	146	10.254	10.255	(1.002)	223543	22.9189	22.91
26 2,2-Dichloropropane	77	4.275	4.272	(0.873)	120949	21.2777	21.27
24 2-Butanone	43	4.339	4.335	(0.886)	119439	42.4199	42.41
76 2-Chlorotoluene	91	9.546	9.546	(0.933)	348424	22.4891	22.48
52 2-Hexanone	43	7.649	7.649	(0.927)	177505	46.5796	46.57
77 4-Chlorotoluene	91	9.639	9.640	(0.942)	405202	22.6659	22.66
82 p-Isopropyltoluene	119	10.209	10.210	(0.997)	413164	23.8459	23.84
45 4-Methyl-2-Pentanone	43	6.914	6.915	(0.838)	254420	46.5221	46.52
10 Acetone	43	2.483	2.476	(0.507)	83187	42.8169	42.81
37 Benzene	78	5.220	5.216	(0.928)	446907	22.6413	22.64
74 Bromobenzene	156	9.381	9.381	(0.917)	112076	21.5942	21.59
29 Bromochloromethane	128	4.556	4.553	(0.930)	52445	22.2096	22.20
39 Bromodichloromethane	83	6.348	6.348	(1.129)	123749	20.8569	20.85
66 Bromoform	173	8.983	8.984	(1.089)	55015	19.2965	19.29
6 Bromomethane	94	1.670	1.663	(0.341)	73853	23.2782	23.27
19 Carbon Disulfide	76	2.592	2.585	(0.529)	604634	43.3037	43.30
34 Carbon Tetrachloride	117	4.999	4.991	(0.889)	111990	21.7369	21.73
59 Chlorobenzene	112	8.275	8.275	(1.003)	294755	21.7849	21.78
7 Chloroethane	64	1.752	1.745	(0.358)	96365	23.0575	23.05
28 Chloroform	83	4.657	4.654	(0.951)	184450	20.0006	20.00
3 Chloromethane	50	1.344	1.336	(0.274)	127839	24.0254	24.02
27 cis-1,2-Dichloroethene	96	4.286	4.283	(0.875)	118161	20.8186	20.81
46 cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	170301	22.7929	22.79
55 Dibromochloromethane	129	7.758	7.758	(0.940)	90639	21.8502	21.85
44 Dibromomethane	93	6.191	6.187	(1.101)	68292	21.4333	21.43
2 Dichlorodifluoromethane	85	1.209	1.202	(0.247)	125172	21.7200	21.71
61 Ethylbenzene	106	8.372	8.369	(1.015)	153825	22.4885	22.48
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	50567	26.6066	26.60
67 Isopropylbenzene	105	9.126	9.126	(1.106)	460914	23.1350	23.13
62 m,p-Xylenes	106	8.474	8.474	(1.027)	384675	45.6281	45.62
17 Methylene Chloride	84	2.873	2.866	(0.587)	117281	22.5682	22.56
87 n-Butylbenzene	91	10.558	10.558	(1.031)	393164	24.1807	24.18
73 n-Propylbenzene	91	9.475	9.475	(0.926)	584534	23.4126	23.41
92 Naphthalene	128	12.132	12.133	(1.185)	427693	22.8281	22.82
63 o-Xylene	106	8.811	8.811	(1.068)	193177	22.8984	22.89
81 sec-Butylbenzene	105	10.086	10.086	(0.985)	490713	23.6050	23.60
64 Styrene	104	8.826	8.826	(1.070)	333195	23.3919	23.39
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	335135	23.1322	23.13
56 Tetrachloroethene	164	7.525	7.522	(0.912)	76788	22.3606	22.36
50 Toluene	91	7.049	7.046	(0.855)	469480	22.5570	22.55
20 trans-1,2-Dichloroethene	96	3.143	3.136	(0.642)	102720	20.7300	20.72
51 trans-1,3-Dichloropropene	75	7.263	7.259	(1.291)	140882	19.9713	19.97
38 Trichloroethene	130	5.865	5.861	(1.043)	106178	21.8218	21.82
8 Trichlorofluoromethane	101	1.955	1.948	(0.399)	163417	20.4069	20.40
5 Vinyl Chloride	62	1.422	1.415	(0.290)	148850	23.0721	23.07



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Date : 18-DEC-2018 13:58
Client ID: VLCSW-181218
Sample Info: VLCSW-1812018;VLCSW-181218;3;;LCS
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121809.D Page 1
Report Date: 25-Jan-2019 20:37

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121809.D
Lab Smp Id: HS18120278-05 Client Smp ID: HS18120278-05
Inj Date : 18-DEC-2018 14:48
Operator : PC Inst ID: VOA9.i
Smp Info : HS18120278-05;HS18120278-05;;;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

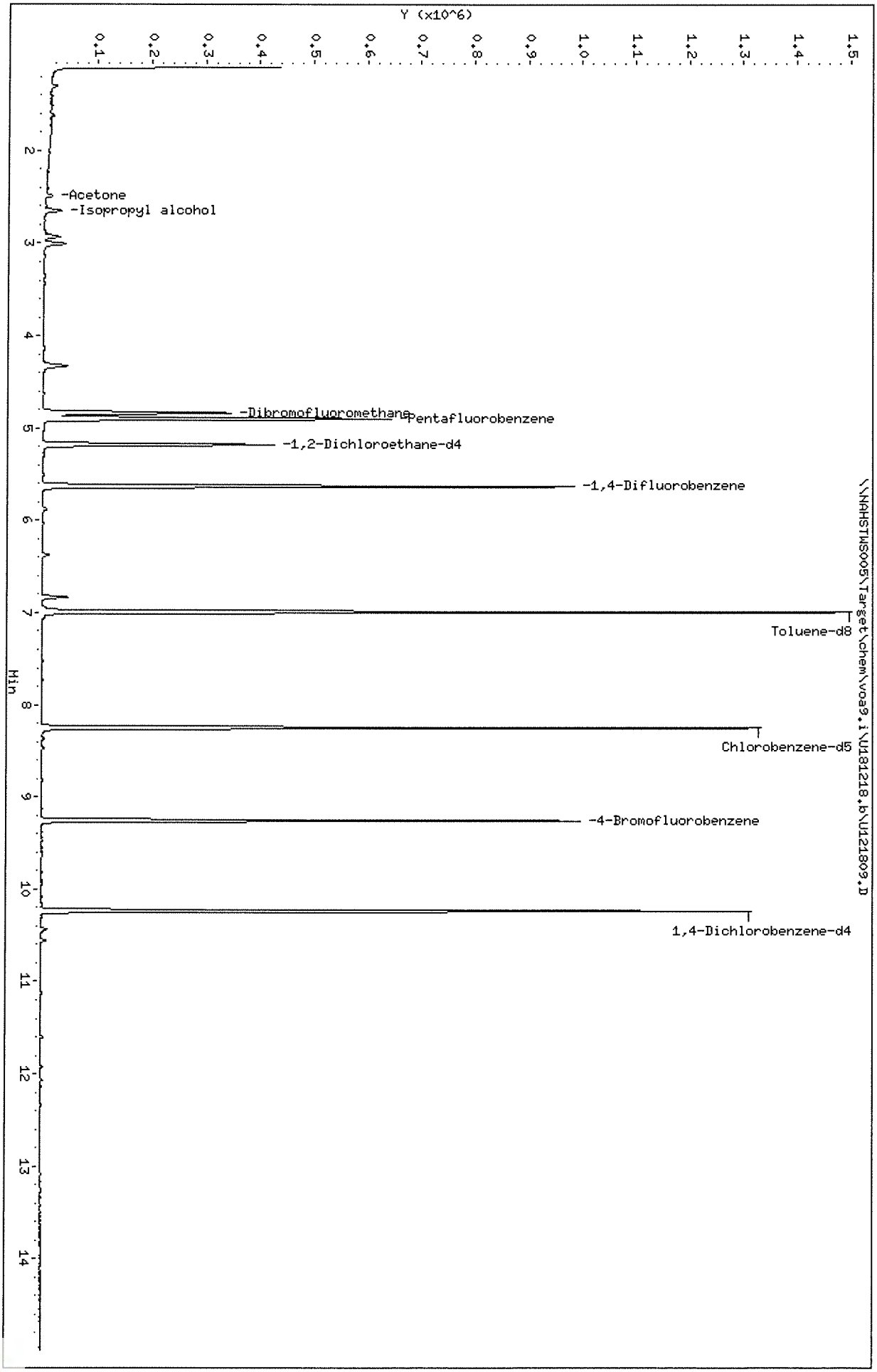
Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.894	(1.000)	395597	50.0000	
* 36 1,4-Difluorobenzene	114	5.629	5.625	(1.000)	702137	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	640292	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	290869	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.827	(0.987)	200474	43.9360	43.93
$ 35 1,2-Dichloroethane-d4	65	5.179	5.171	(1.057)	268570	44.7280	44.72
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	864694	52.9340	52.93
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	310925	49.0890	49.08
10 Acetone	43	2.487	2.476	(0.508)	12388	2.69362	2.69(a)

QC Flag Legend

a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).



Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121809.D
Date : 18-DEC-2018 14:48
Client ID: HS18120278-05
Sample Info: HS18120278-05;HS18120278-05;;;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121809.D

Date : 18-DEC-2018 14:48

Client ID: HS18120278-05

Instrument: VOA9.i

Sample Info: HS18120278-05;HS18120278-05;;;

Purge Volume: 5.0

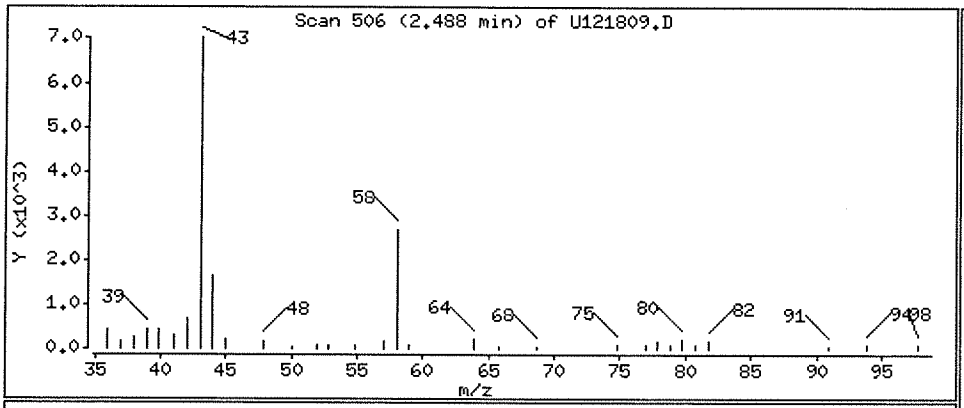
Operator: PC

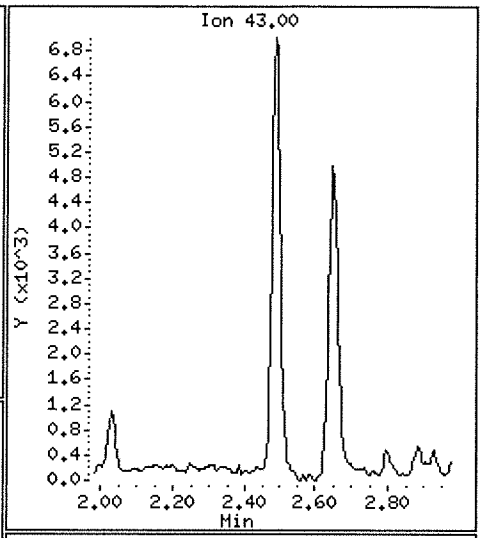
Column phase: DB624

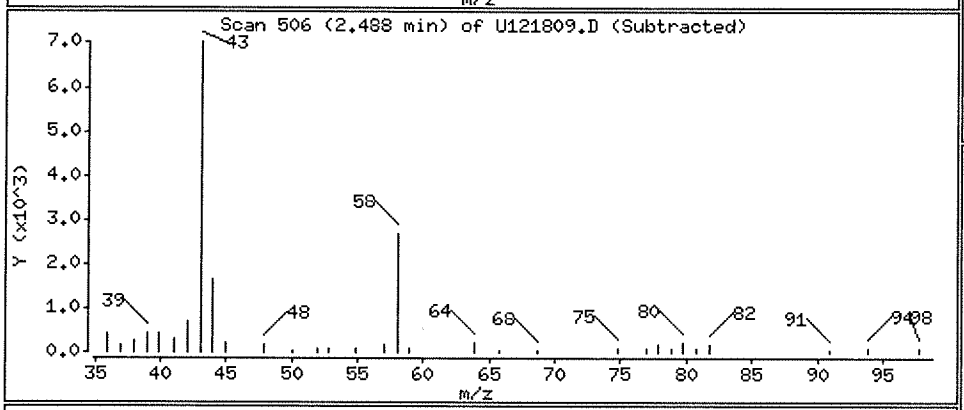
Column diameter: 0.18

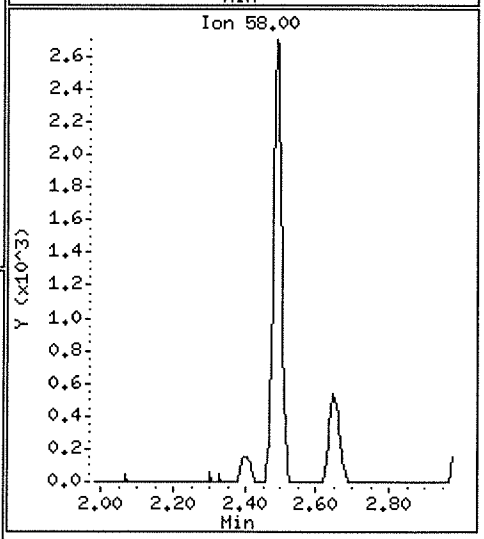
10 Acetone

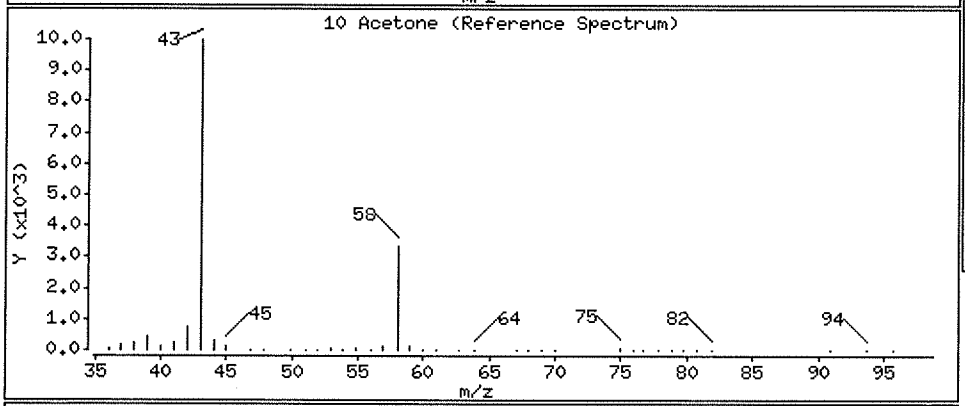
Concentration: 2.69 ug/l

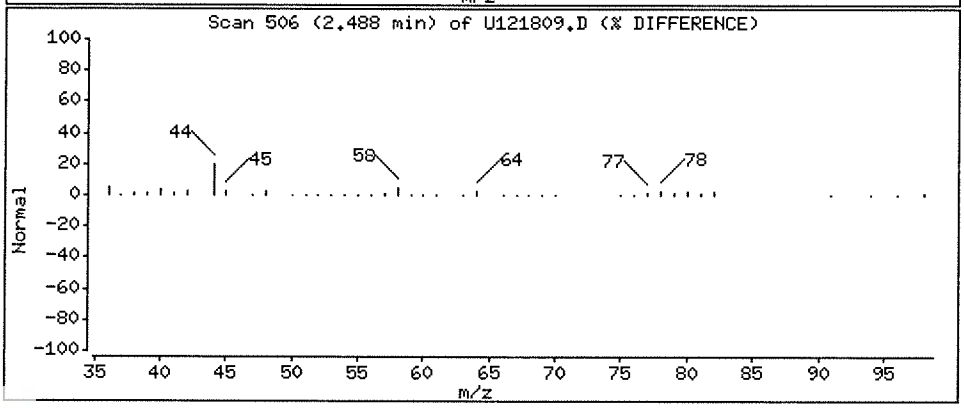












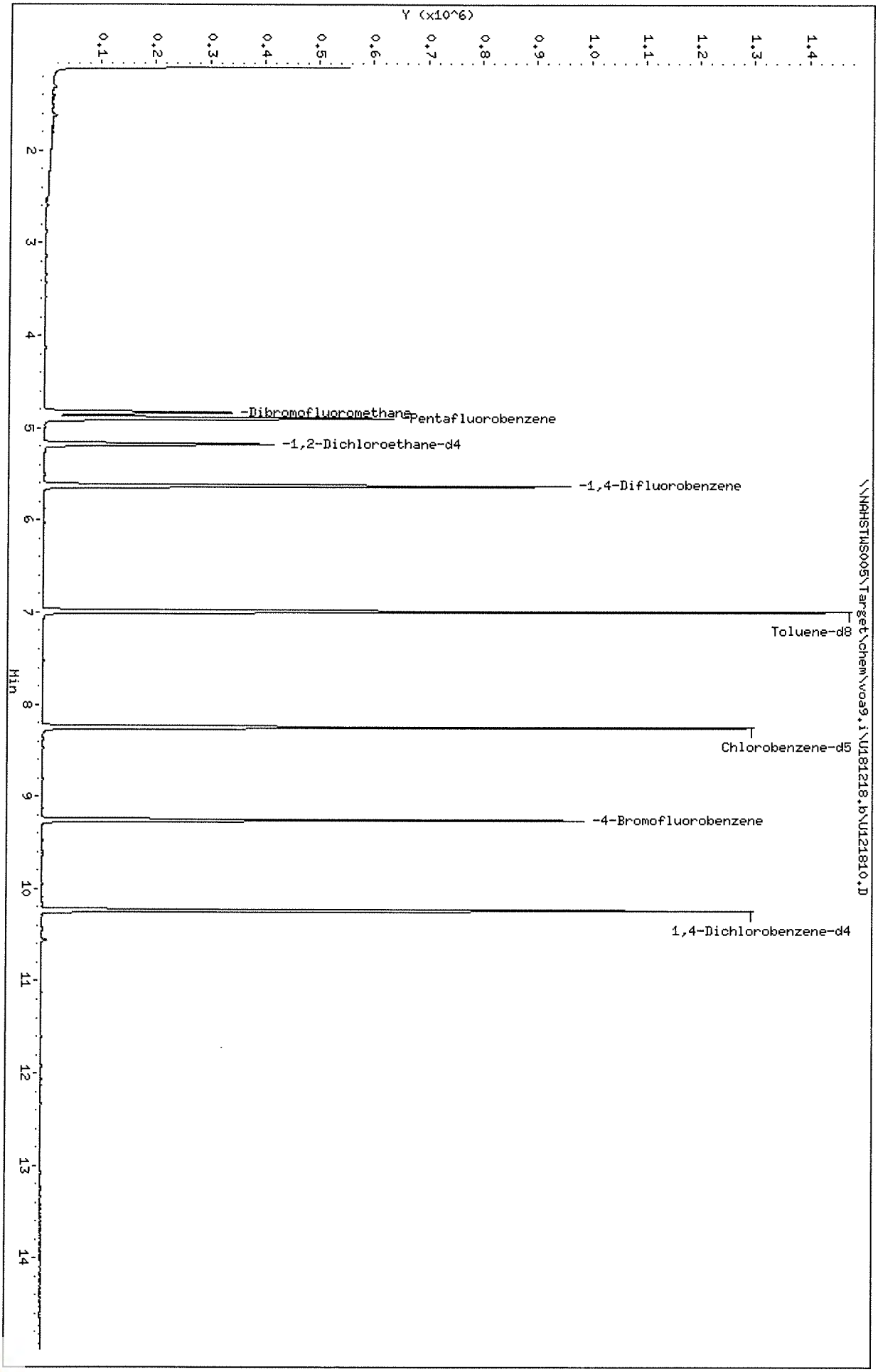
ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121810.D
Lab Smp Id: HS18120278-02 Client Smp ID: HS18120278-02
Inj Date : 18-DEC-2018 15:13
Operator : PC Inst ID: VOA9.i
Smp Info : HS18120278-02;HS18120278-02;;;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 10
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.894	(1.000)	388196	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	697785	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	631599	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	291140	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.827	(0.987)	197885	44.2028	44.20
$ 35 1,2-Dichloroethane-d4	65	5.179	5.171	(1.057)	266481	45.2460	45.24
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	849387	52.7055	52.70
$ 69 4-Bromofluorobenzene	95	9.258	9.257	(1.122)	305442	48.8827	48.88



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Date : 18-DEC-2018 15:13
Client ID: HS18120278-02
Sample Info: HS18120278-02;HS18120278-02;;;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9.i
Operator: PC
Column diameter: 0.18

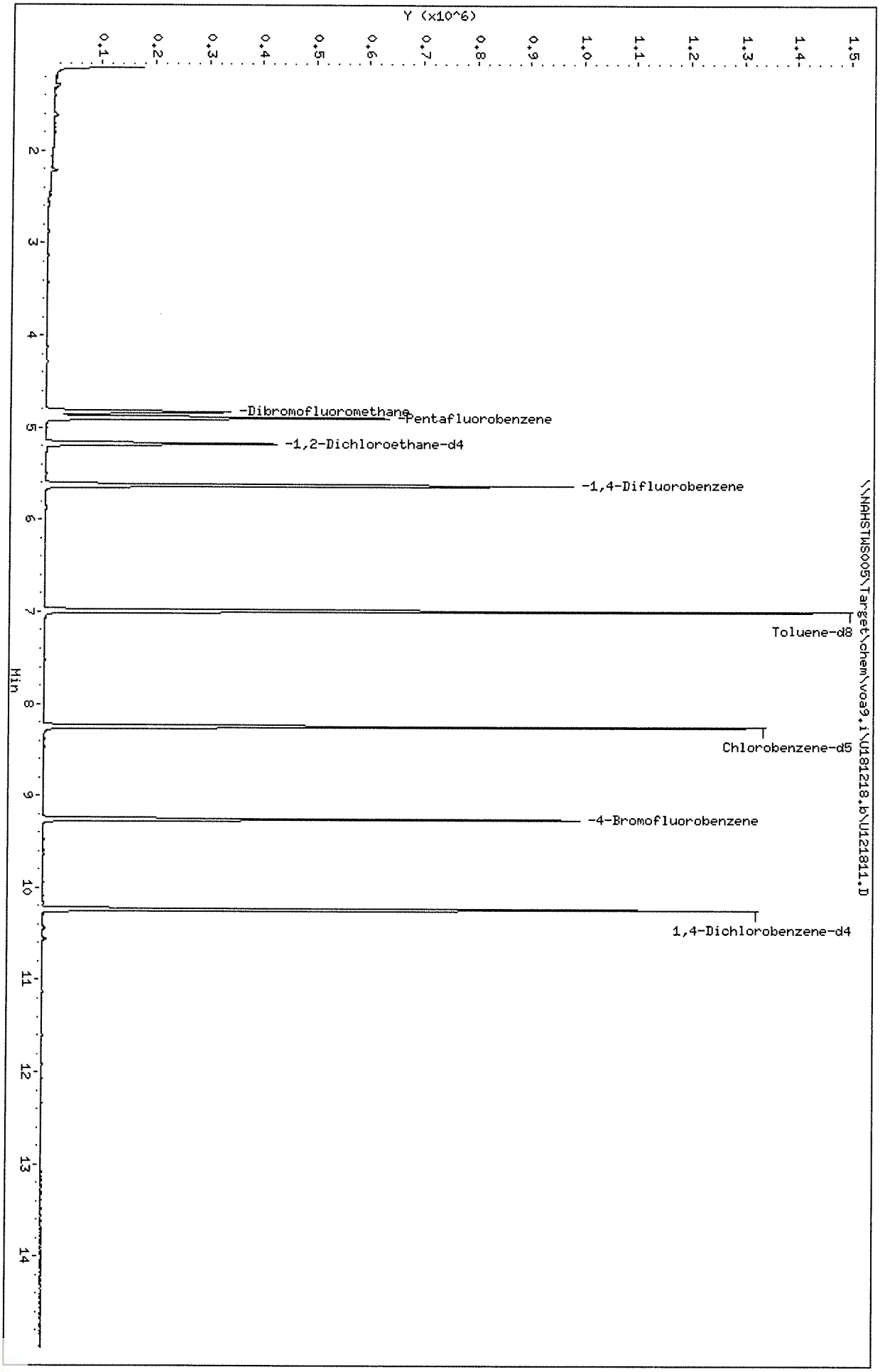
ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121811.D
Lab Smp Id: HS18120278-04 Client Smp ID: HS18120278-04
Inj Date : 18-DEC-2018 15:37
Operator : PC Inst ID: VOA9.i
Smp Info : HS18120278-04;HS18120278-04;;;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 11
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	392367	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	700337	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	641402	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	294161	50.0000	
$ 30 Dibromofluoromethane	113	4.830	4.827	(0.987)	199144	44.0057	44.00
$ 35 1,2-Dichloroethane-d4	65	5.175	5.171	(1.057)	271864	45.6858	45.68
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	859102	52.4867	52.48
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	307071	48.3816	48.38



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Date : 18-DEC-2018 15:37
Client ID: HS18120278-04
Sample Info: HS18120278-04;HS18120278-04;;;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121812.D Page 1
Report Date: 25-Jan-2019 20:37

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121812.D
Lab Smp Id: HS18120278-03 Client Smp ID: HS18120278-03
Inj Date : 18-DEC-2018 16:02
Operator : PC Inst ID: VOA9.i
Smp Info : HS18120278-03;HS18120278-03;;;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

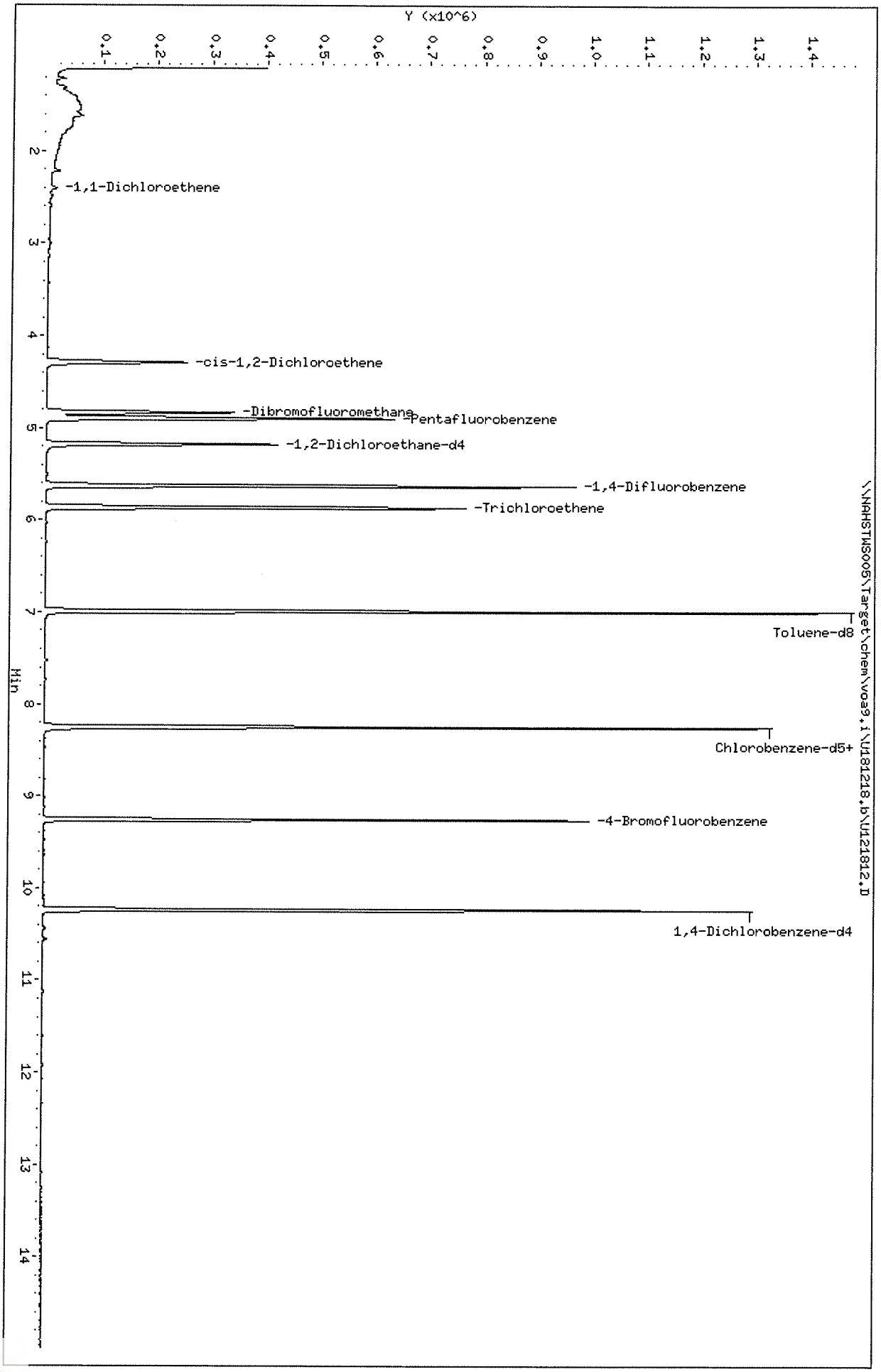
Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	386598	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	700993	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	635273	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	290407	50.0000	
$ 30 Dibromofluoromethane	113	4.830	4.827	(0.987)	198561	44.5467	44.54
$ 35 1,2-Dichloroethane-d4	65	5.175	5.171	(1.057)	268050	45.7183	45.71
$ 48 Toluene-d8	98	6.990	6.990	(0.847)	853104	52.6275	52.62
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	306625	48.7862	48.78
11 1,1-Dichloroethene	96	2.401	2.397	(0.491)	3101	0.71062	0.71(a)
59 Chlorobenzene	112	8.275	8.275	(1.003)	20224	1.54246	1.54(a)
27 cis-1,2-Dichloroethene	96	4.287	4.283	(0.876)	118604	21.6508	21.65
38 Trichloroethene	130	5.861	5.861	(1.042)	227152	47.5556	47.55

QC Flag Legend

a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).



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Date : 18-DEC-2018 16:02
Client ID: HS18120278-03
Sample Info: HS18120278-03;HS18120278-03;;;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121812.D

Date : 18-DEC-2018 16:02

Client ID: HS18120278-03

Instrument: VOA9.i

Sample Info: HS18120278-03;HS18120278-03;;;

Purge Volume: 5.0

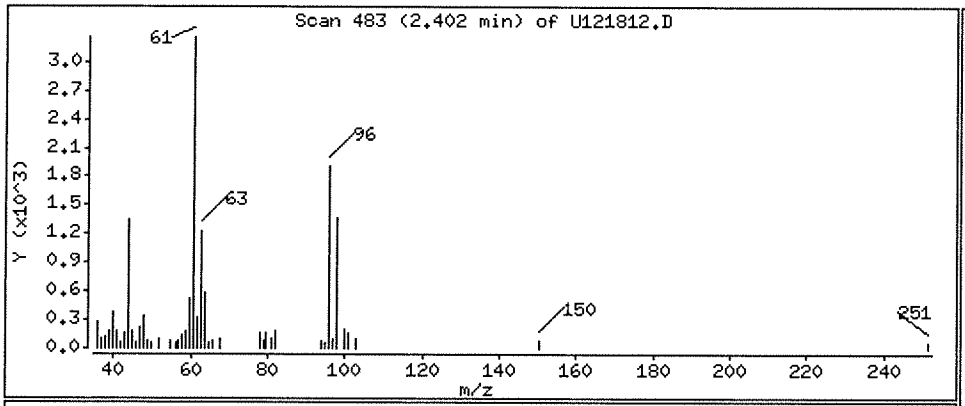
Operator: PC

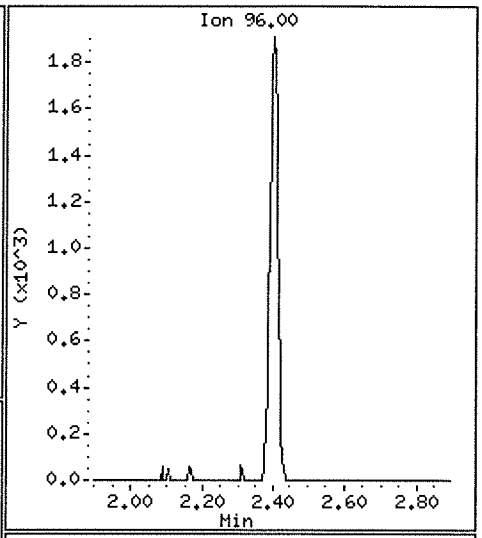
Column phase: DB624

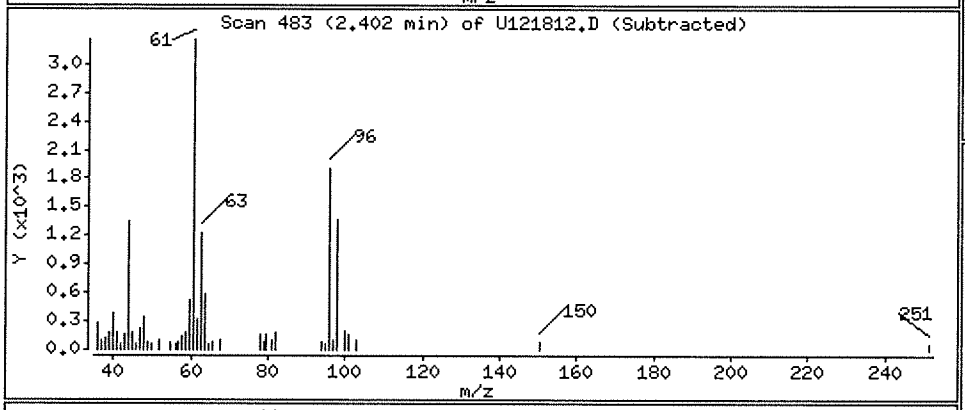
Column diameter: 0.18

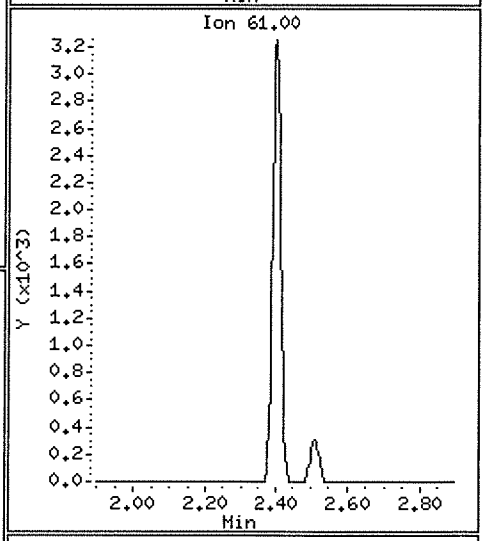
11 1,1-Dichloroethene

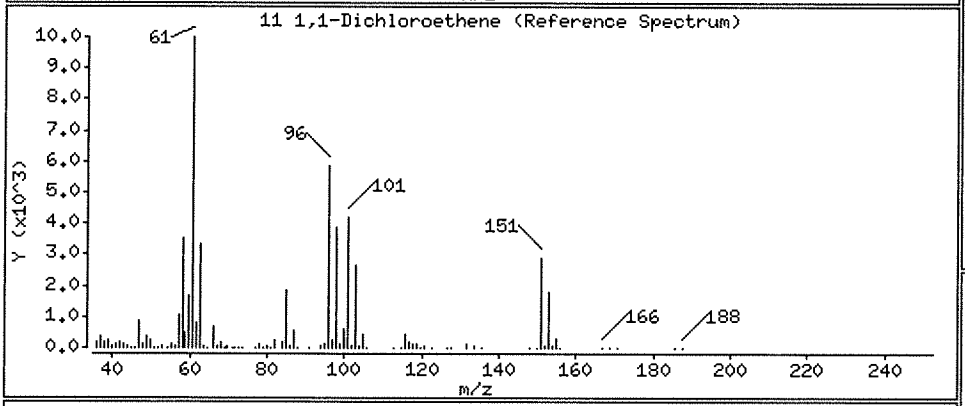
Concentration: 0.71 ug/l

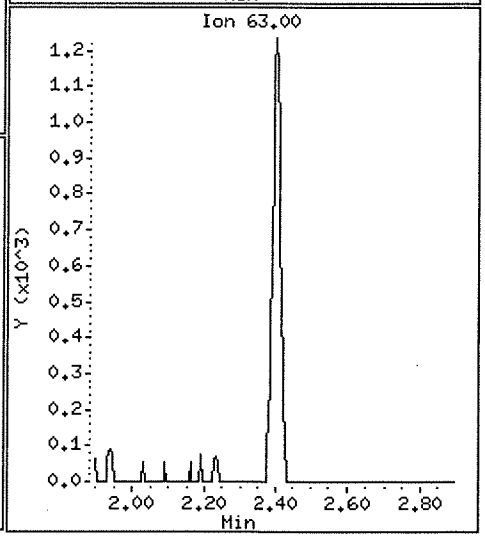


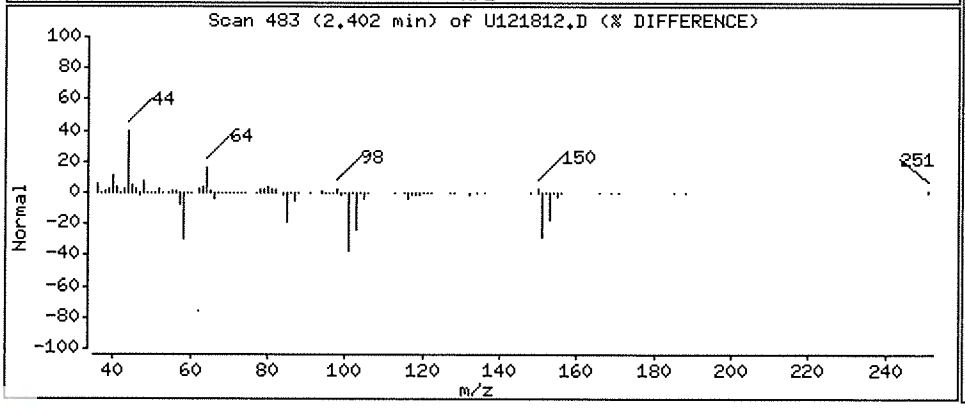












Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121812.D

Date : 18-DEC-2018 16:02

Client ID: HS18120278-03

Instrument: VOA9.i

Sample Info: HS18120278-03;HS18120278-03;;;

Purge Volume: 5.0

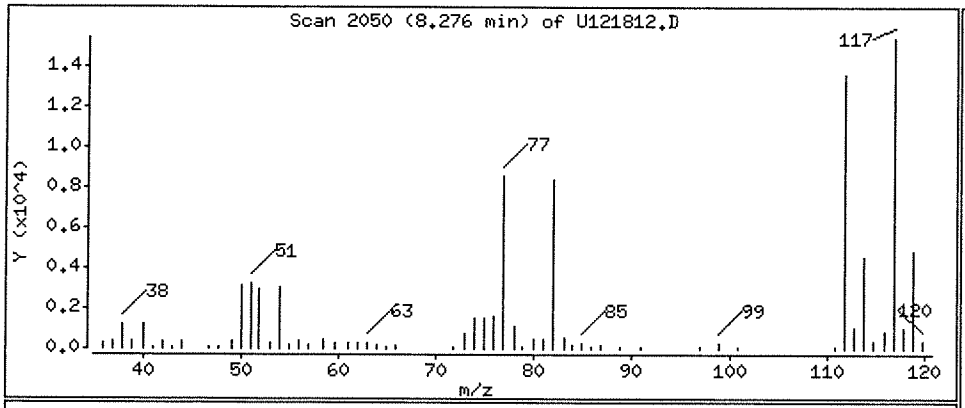
Operator: PC

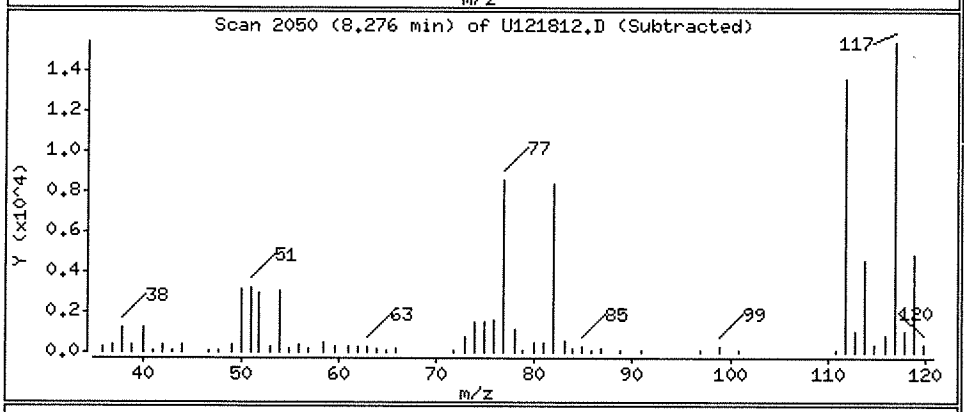
Column phase: DB624

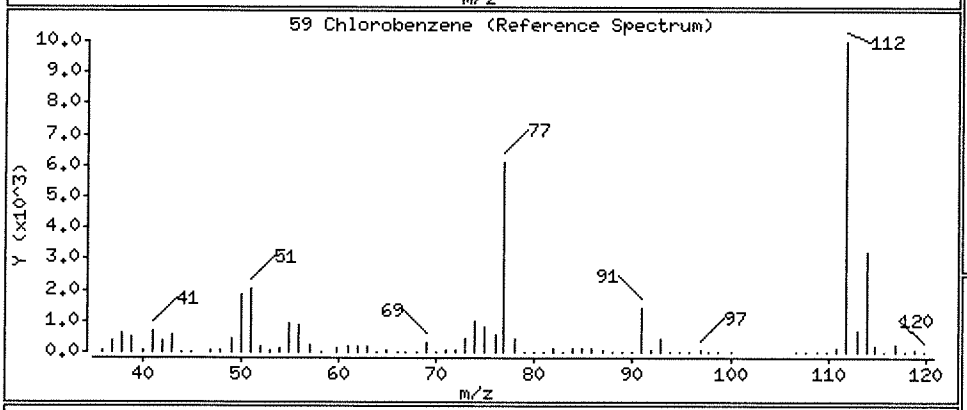
Column diameter: 0.18

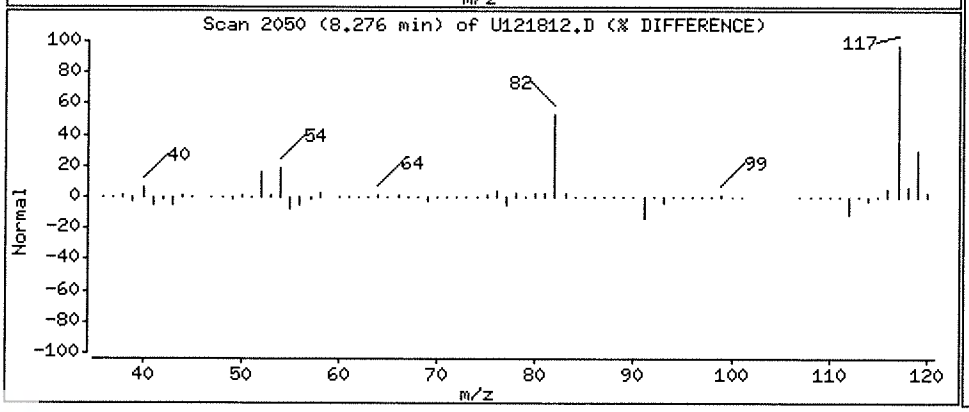
59 Chlorobenzene

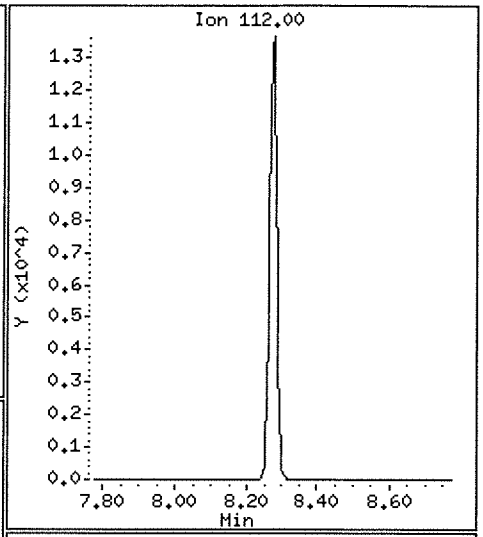
Concentration: 1.54 ug/l

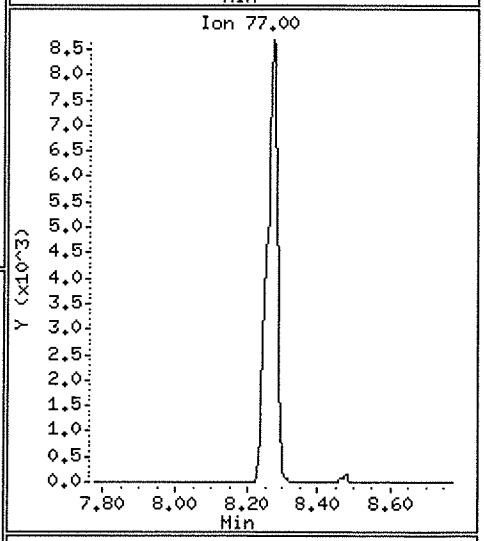


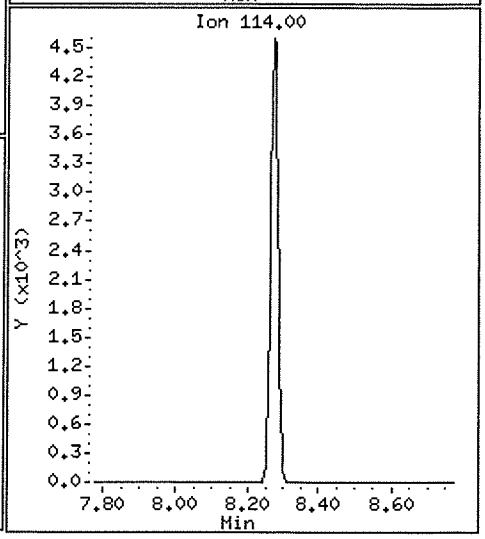












Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121812.D

Date : 18-DEC-2018 16:02

Client ID: HS18120278-03

Instrument: VOA9.i

Sample Info: HS18120278-03;HS18120278-03;;;

Purge Volume: 5.0

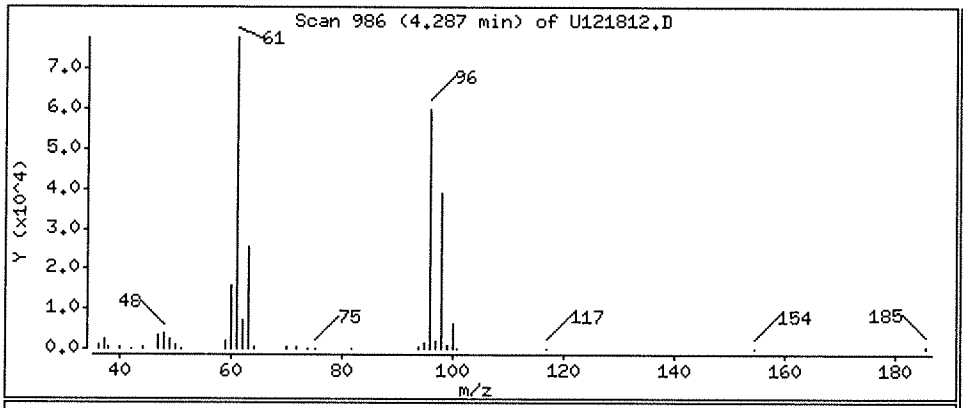
Operator: PC

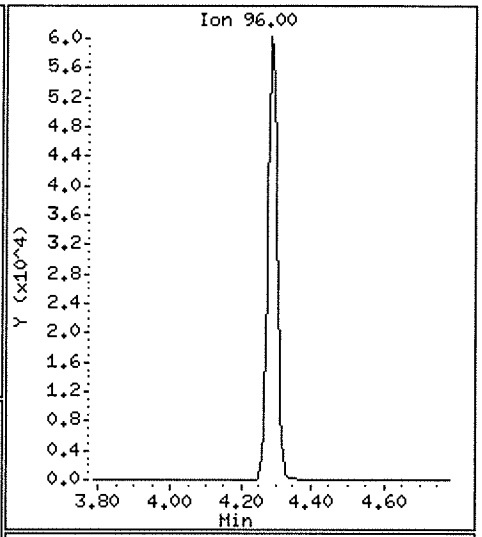
Column phase: DB624

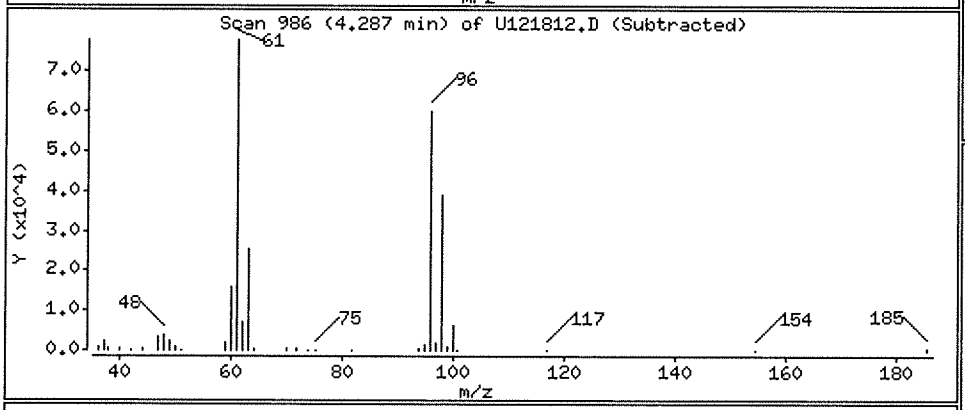
Column diameter: 0.18

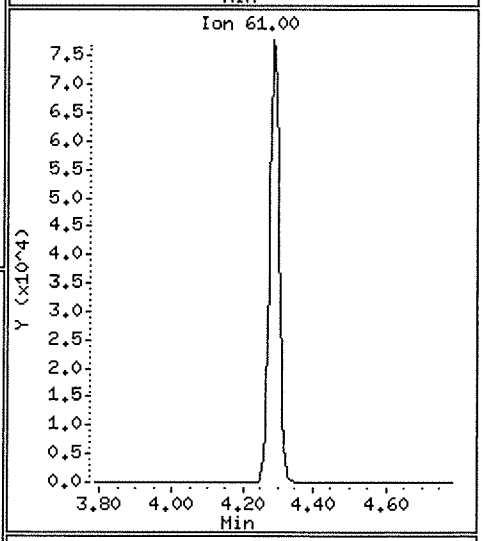
27 cis-1,2-Dichloroethene

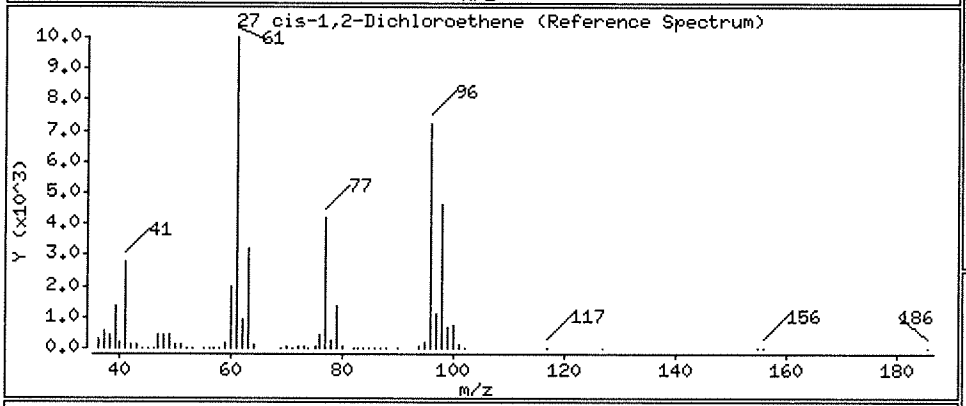
Concentration: 21.65 ug/l

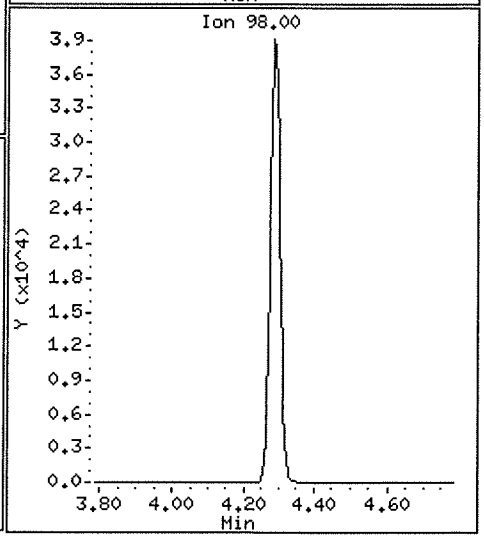


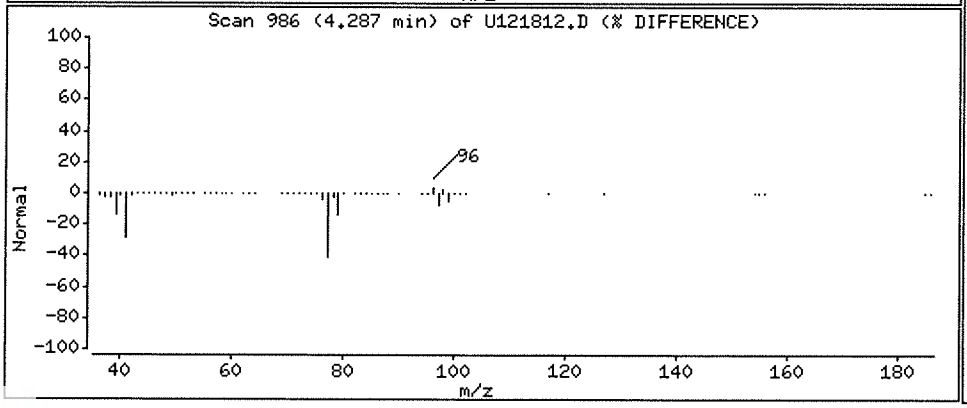












Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121812.D

Date : 18-DEC-2018 16:02

Client ID: HS18120278-03

Instrument: VOA9.i

Sample Info: HS18120278-03;HS18120278-03;;;

Purge Volume: 5.0

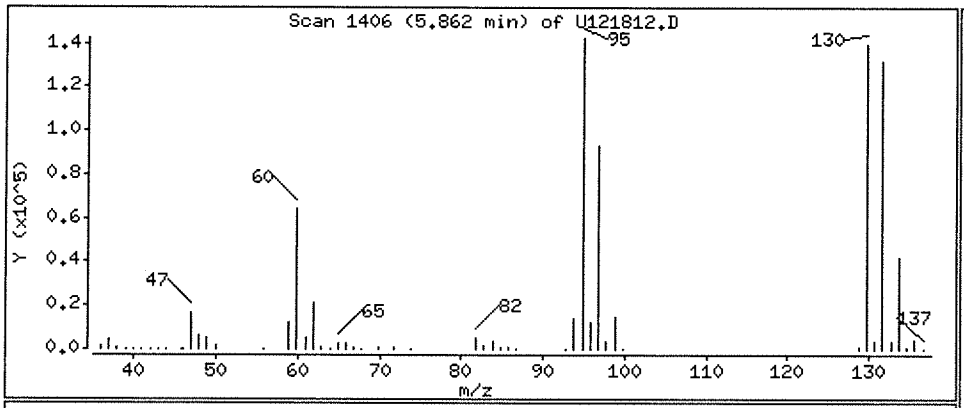
Operator: PC

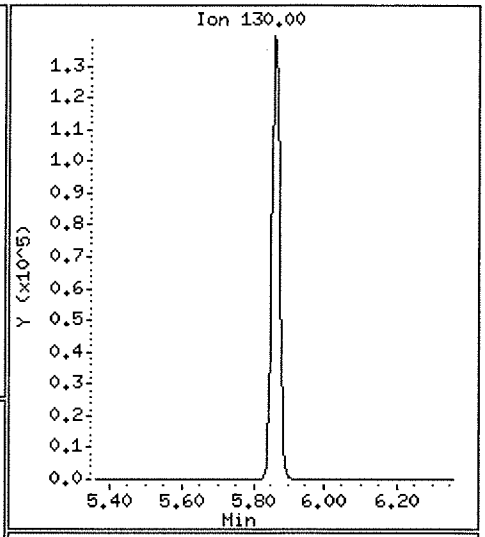
Column phase: DB624

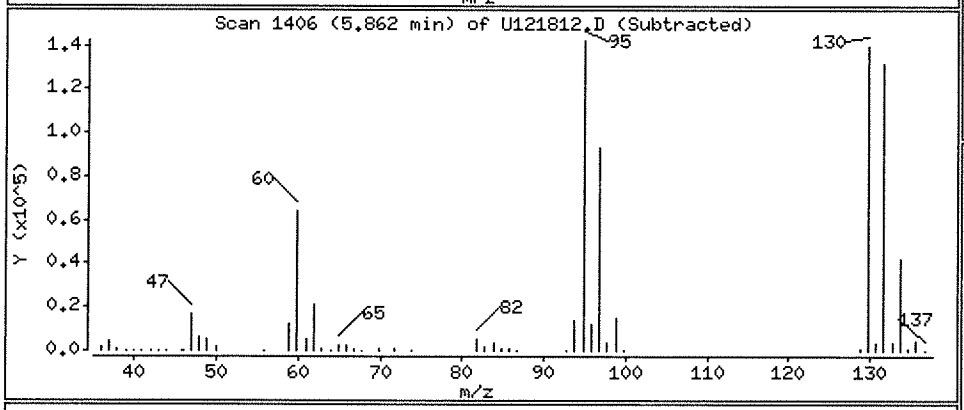
Column diameter: 0.18

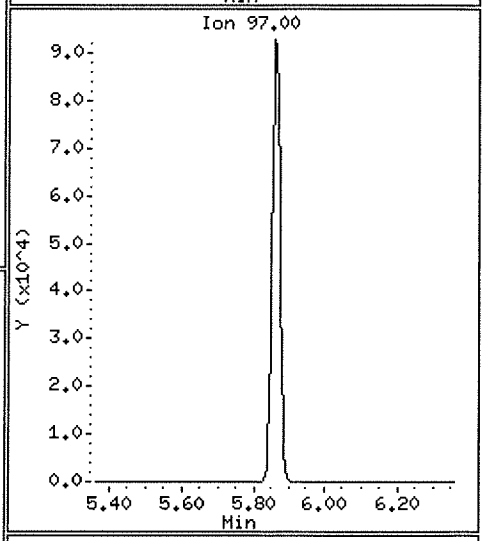
38 Trichloroethene

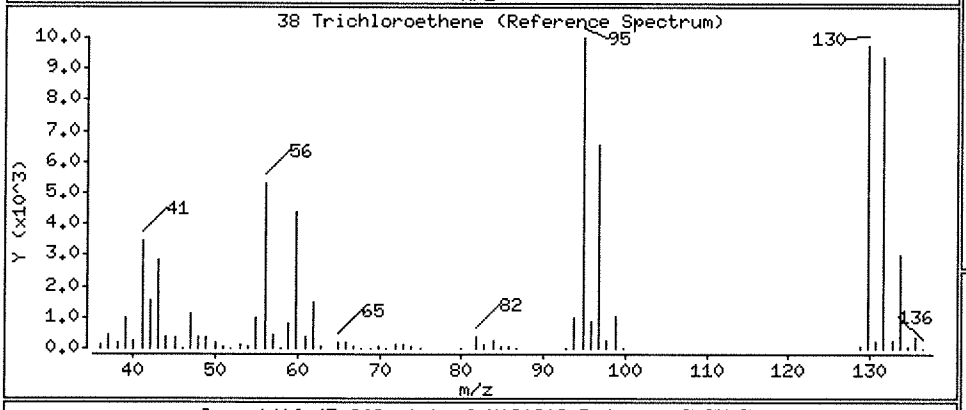
Concentration: 47.55 ug/l

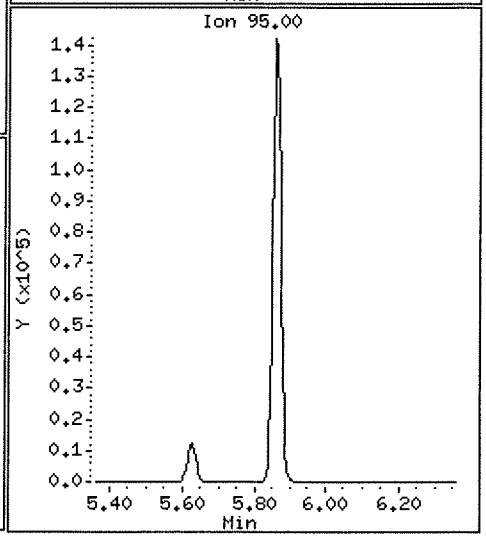


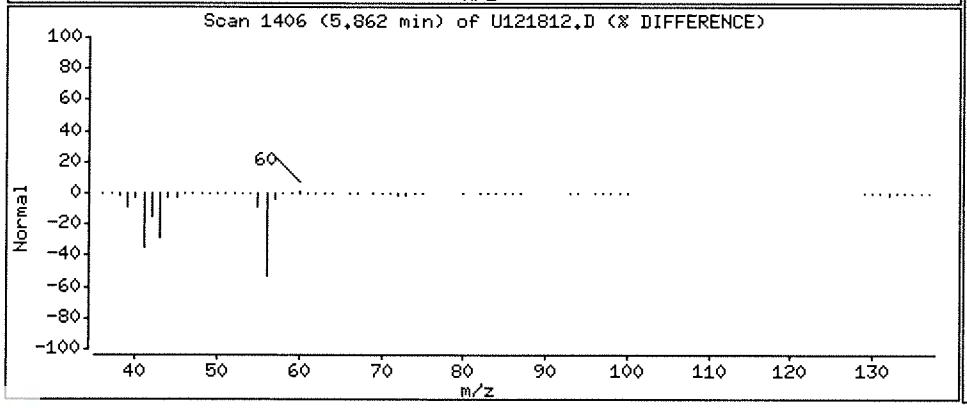












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Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121813.D
Lab Smp Id: HS18120278-01 Client Smp ID: HS18120278-01
Inj Date : 18-DEC-2018 16:27
Operator : PC Inst ID: VOA9.i
Smp Info : HS18120278-01;HS18120278-01;;;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 13
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

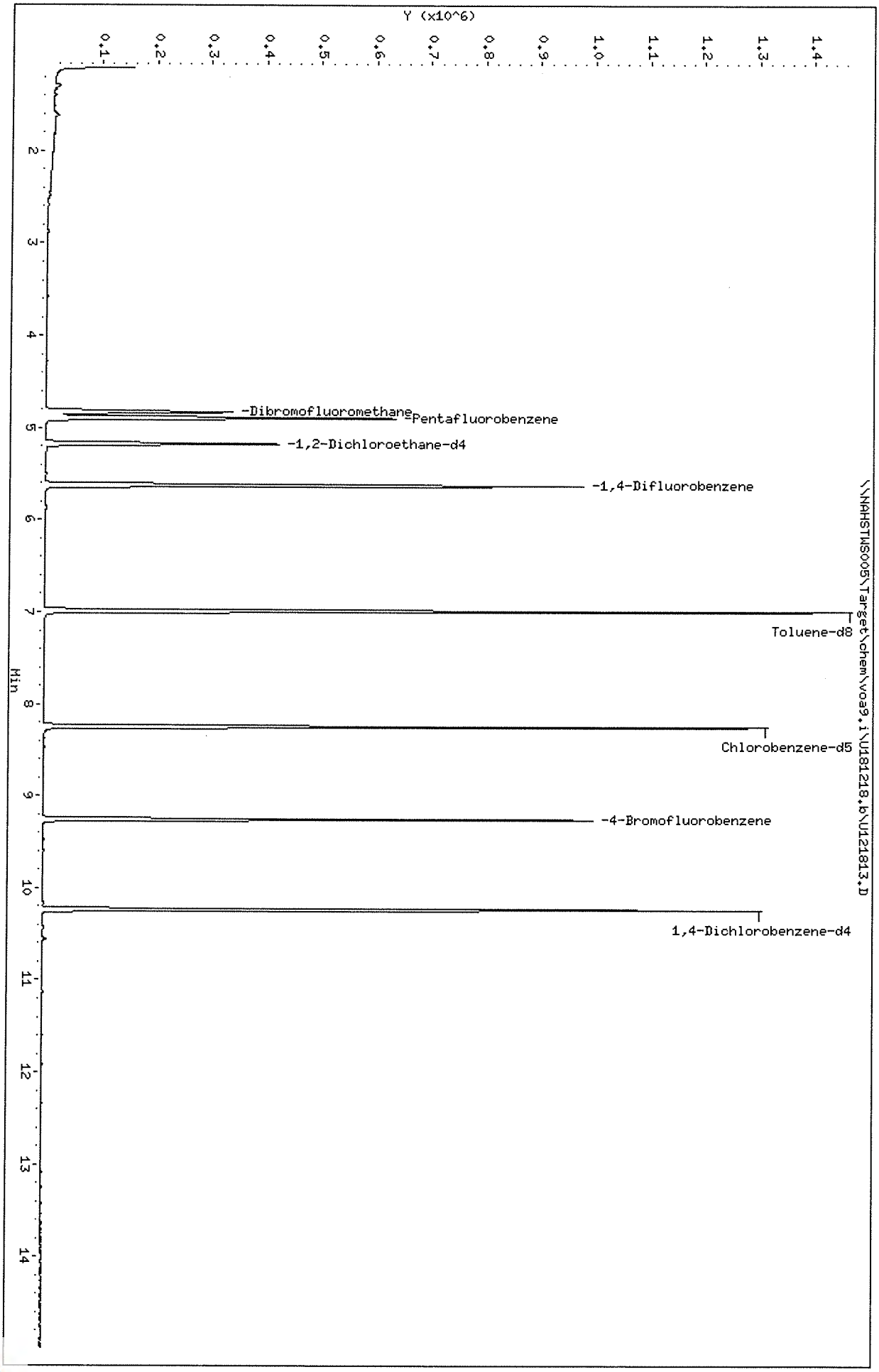
Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	389639	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	701381	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	634287	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	293976	50.0000	
$ 30 Dibromofluoromethane	113	4.826	4.827	(0.986)	196405	43.6958	43.69
$ 35 1,2-Dichloroethane-d4	65	5.175	5.171	(1.057)	270169	45.7202	45.72
$ 48 Toluene-d8	98	6.989	6.990	(0.847)	859210	53.1015	53.10
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	311170	49.6037	49.60

Data File: \\NAHSTWS005\Target\chem\voa9,i\U181218,b\U121813.D
Date : 18-DEC-2018 16:27
Client ID: HS18120278-01
Sample Info: HS18120278-01;HS18120278-01;;;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121816.D Page 1
Report Date: 25-Jan-2019 20:37

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121816.D
Lab Smp Id: HS18120278-03MS Client Smp ID: HS18120278-03MS
Inj Date : 18-DEC-2018 17:41
Operator : PC Inst ID: VOA9.i
Smp Info : HS18120278-03MS;HS18120278-03MS;3;;MS
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 16 QC Sample: MS
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

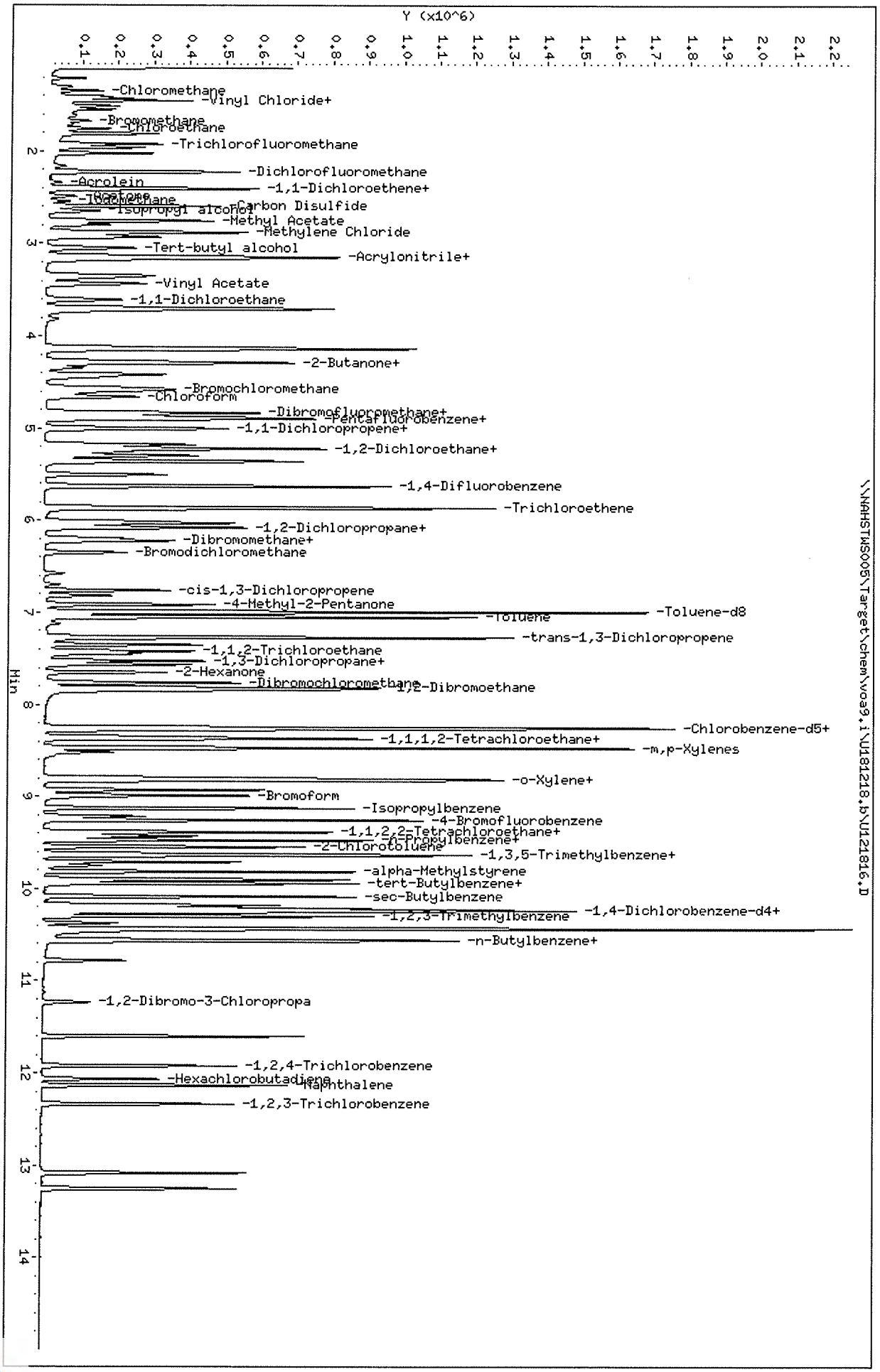
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.894	(1.000)	392642	50.0000	
* 36 1,4-Difluorobenzene	114	5.629	5.625	(1.000)	699438	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	641586	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	308103	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.827	(0.987)	203783	45.0276	45.02
$ 35 1,2-Dichloroethane-d4	65	5.179	5.171	(1.057)	263347	44.1668	44.16
$ 48 Toluene-d8	98	6.989	6.990	(0.847)	867952	53.0293	53.02
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	326216	51.4494	51.44
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	96623	23.8757	23.87
31 1,1,1-Trichloroethane	97	4.830	4.827	(0.986)	156457	22.6848	22.68
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	174691	23.9370	23.93
138 Freon TF	101	2.409	2.397	(0.492)	87323	22.2007	22.20
53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	98833	24.2304	24.23
22 1,1-Dichloroethane	63	3.608	3.601	(0.737)	209461	23.2795	23.27
11 1,1-Dichloroethene	96	2.405	2.397	(0.491)	102742	23.1819	23.18
32 1,1-Dichloropropene	75	5.006	5.003	(0.889)	166686	25.8035	25.80
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	142561	24.5082	24.50
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	177052	23.2487	23.24
90 1,2,4-Trichlorobenzene	180	11.923	11.923	(1.165)	144320	23.8195	23.81
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	439382	25.6752	25.67
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	23803	21.7951	21.79
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	114145	24.1666	24.16

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121816.D Page 2
Report Date: 25-Jan-2019 20:37

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
88	1,2-Dichlorobenzene	146	10.569	10.570	(1.033)	228735	23.2475	23.24
33	1,2-Dichloroethane	62	5.254	5.250	(0.933)	165741	22.6451	22.64
42	1,2-Dichloropropane	63	6.082	6.079	(1.081)	126016	25.3052	25.30
75	1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	426833	25.7843	25.78
83	1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	228183	23.5228	23.52
54	1,3-Dichloropropane	76	7.563	7.563	(0.917)	213709	24.4008	24.40
84	1,4-Dichlorobenzene	146	10.255	10.255	(1.002)	244511	25.7484	25.74
26	2,2-Dichloropropane	77	4.279	4.272	(0.874)	122187	21.9285	21.92
24	2-Butanone	43	4.343	4.335	(0.887)	125547	45.4874	45.48
76	2-Chlorotoluene	91	9.546	9.546	(0.933)	373050	24.7265	24.72
52	2-Hexanone	43	7.653	7.649	(0.928)	190474	51.0714	51.07
77	4-Chlorotoluene	91	9.640	9.640	(0.942)	437841	25.1507	25.15
82	p-Isopropyltoluene	119	10.210	10.210	(0.997)	453828	26.8976	26.89
45	4-Methyl-2-Pentanone	43	6.915	6.915	(0.838)	269990	50.4444	50.44
10	Acetone	43	2.487	2.476	(0.508)	87042	46.0022	46.00
37	Benzene	78	5.220	5.216	(0.927)	489084	25.2966	25.29
74	Bromobenzene	156	9.381	9.381	(0.917)	120200	23.7826	23.78
29	Bromochloromethane	128	4.557	4.553	(0.930)	56796	24.5366	24.53
39	Bromodichloromethane	83	6.348	6.348	(1.128)	133158	22.9123	22.91
66	Bromoform	173	8.984	8.984	(1.089)	58291	20.7885	20.78
6	Bromomethane	94	1.674	1.663	(0.342)	34511	12.0926	12.09
19	Carbon Disulfide	76	2.596	2.585	(0.530)	613362	44.8136	44.81
34	Carbon Tetrachloride	117	4.999	4.991	(0.888)	121349	24.0463	24.04
59	Chlorobenzene	112	8.275	8.275	(1.003)	339216	25.6170	25.61
7	Chloroethane	64	1.756	1.745	(0.359)	101272	24.7197	24.71(M)
28	Chloroform	83	4.662	4.654	(0.952)	199507	22.0691	22.06
3	Chloromethane	50	1.344	1.336	(0.274)	81391	15.6848	15.68
27	cis-1,2-Dichloroethene	96	4.290	4.283	(0.876)	249819	44.9018	44.90
46	cis-1,3-Dichloropropene	75	6.761	6.757	(1.201)	177823	24.2977	24.29
55	Dibromochloromethane	129	7.758	7.758	(0.940)	96375	23.7390	23.73
44	Dibromomethane	93	6.191	6.187	(1.100)	71390	22.8745	22.87
2	Dichlorodifluoromethane	85	1.209	1.202	(0.247)	55770	10.4181	10.41
61	Ethylbenzene	106	8.373	8.369	(1.015)	168348	25.1477	25.14
91	Hexachlorobutadiene	225	12.065	12.065	(1.179)	52202	28.1493	28.14
67	Isopropylbenzene	105	9.126	9.126	(1.106)	507707	26.0387	26.03
62	m,p-Xylenes	106	8.474	8.474	(1.027)	420565	50.9716	50.97
17	Methylene Chloride	84	2.877	2.866	(0.587)	123918	24.3803	24.38
87	n-Butylbenzene	91	10.558	10.558	(1.031)	426638	26.8733	26.87
73	n-Propylbenzene	91	9.475	9.475	(0.926)	640382	26.3397	26.33
92	Naphthalene	128	12.133	12.133	(1.185)	462810	25.3671	25.36
63	o-Xylene	106	8.811	8.811	(1.068)	210076	25.4439	25.44
81	sec-Butylbenzene	105	10.086	10.086	(0.985)	541706	26.7590	26.75
64	Styrene	104	8.826	8.826	(1.070)	358679	25.7295	25.72
78	tert-Butylbenzene	119	9.902	9.902	(0.967)	367701	26.0629	26.06
56	Tetrachloroethene	164	7.526	7.522	(0.912)	85796	25.5278	25.52
50	Toluene	91	7.049	7.046	(0.855)	512572	25.1638	25.16
20	trans-1,2-Dichloroethene	96	3.147	3.136	(0.643)	114024	23.4748	23.47
51	trans-1,3-Dichloropropene	75	7.263	7.259	(1.290)	148464	21.3745	21.37
38	Trichloroethene	130	5.865	5.861	(1.042)	345285	72.4482	72.44
8	Trichlorofluoromethane	101	1.959	1.948	(0.400)	164233	20.9219	20.92
5	Vinyl Chloride	62	1.423	1.415	(0.291)	127229	20.1831	20.18

QC Flag Legend

M - Compound response manually integrated.

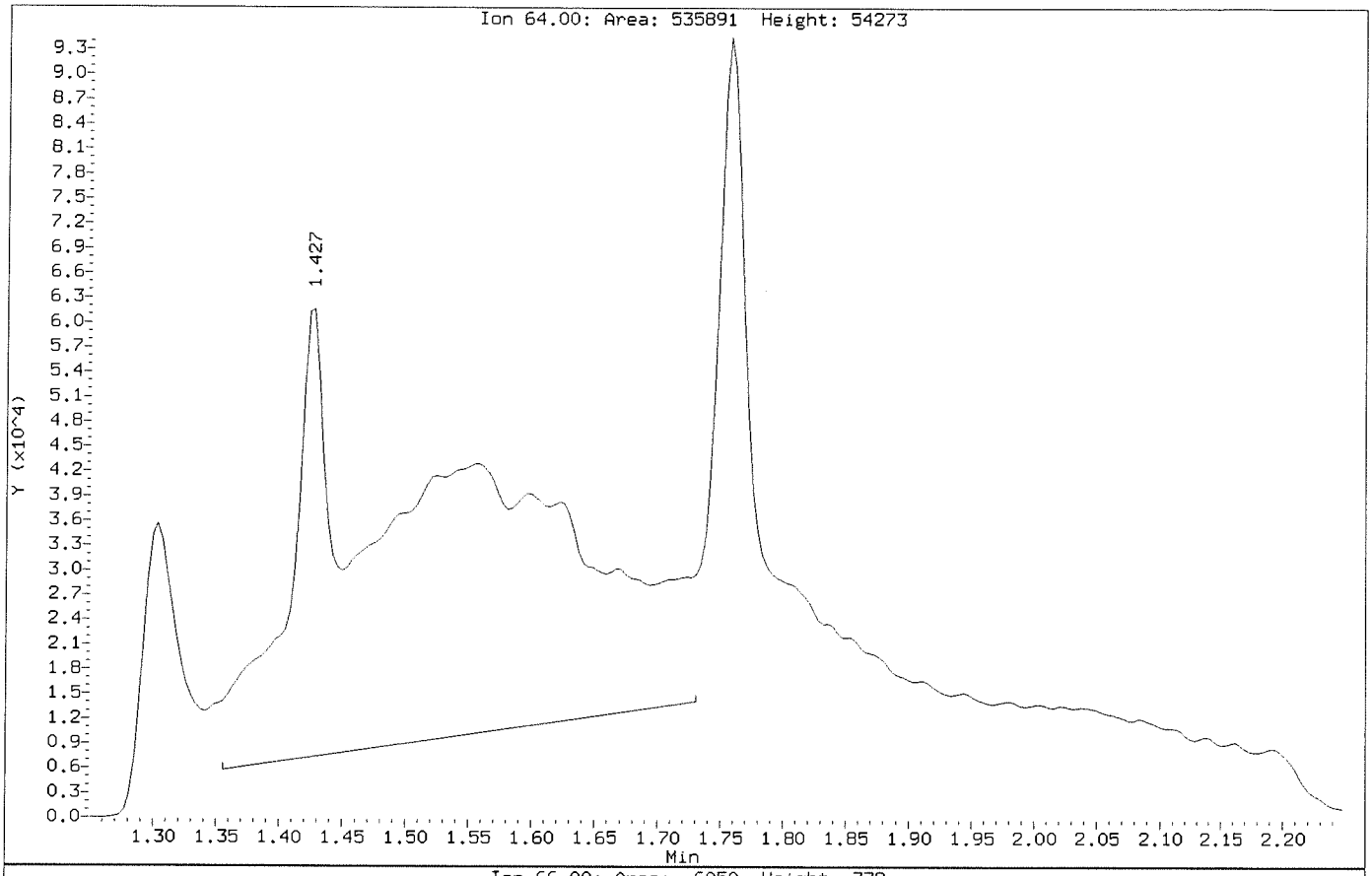


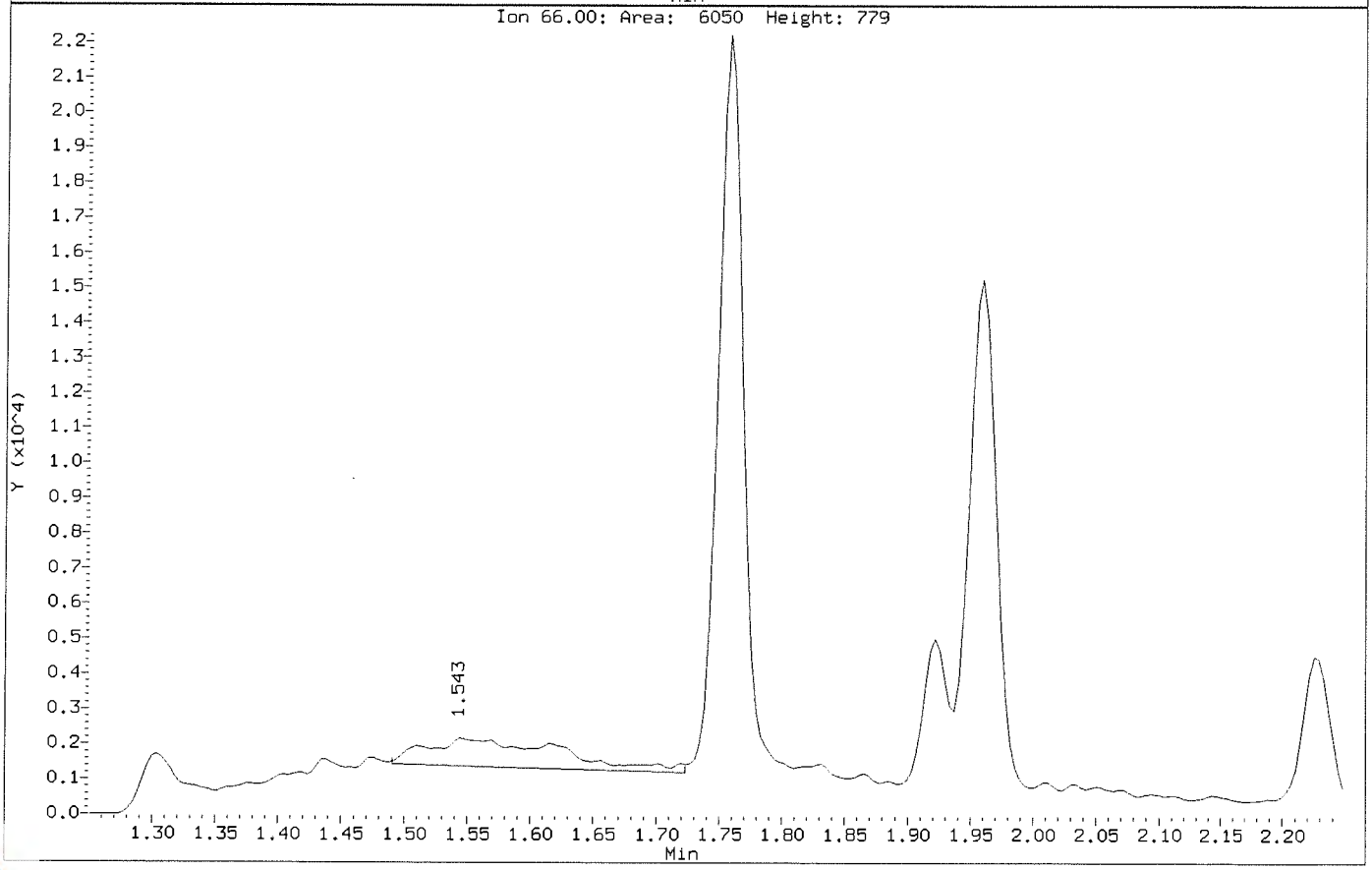
Data File: \\NAHSTWS005\Target\chem\voa9,i\U181218,b\U121816,D
Date : 18-DEC-2018 17:41
Client ID: HS18120278-03HS
Sample Info: HS18120278-03HS;HS18120278-03HS;3;;HS
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\Before\U121816.D
Injection Date: 18-DEC-2018 17:41
Instrument: VOA9.i
Client Sample ID: HS18120278-03MS

Compound: Chloroethane
CAS Number: 75-00-3





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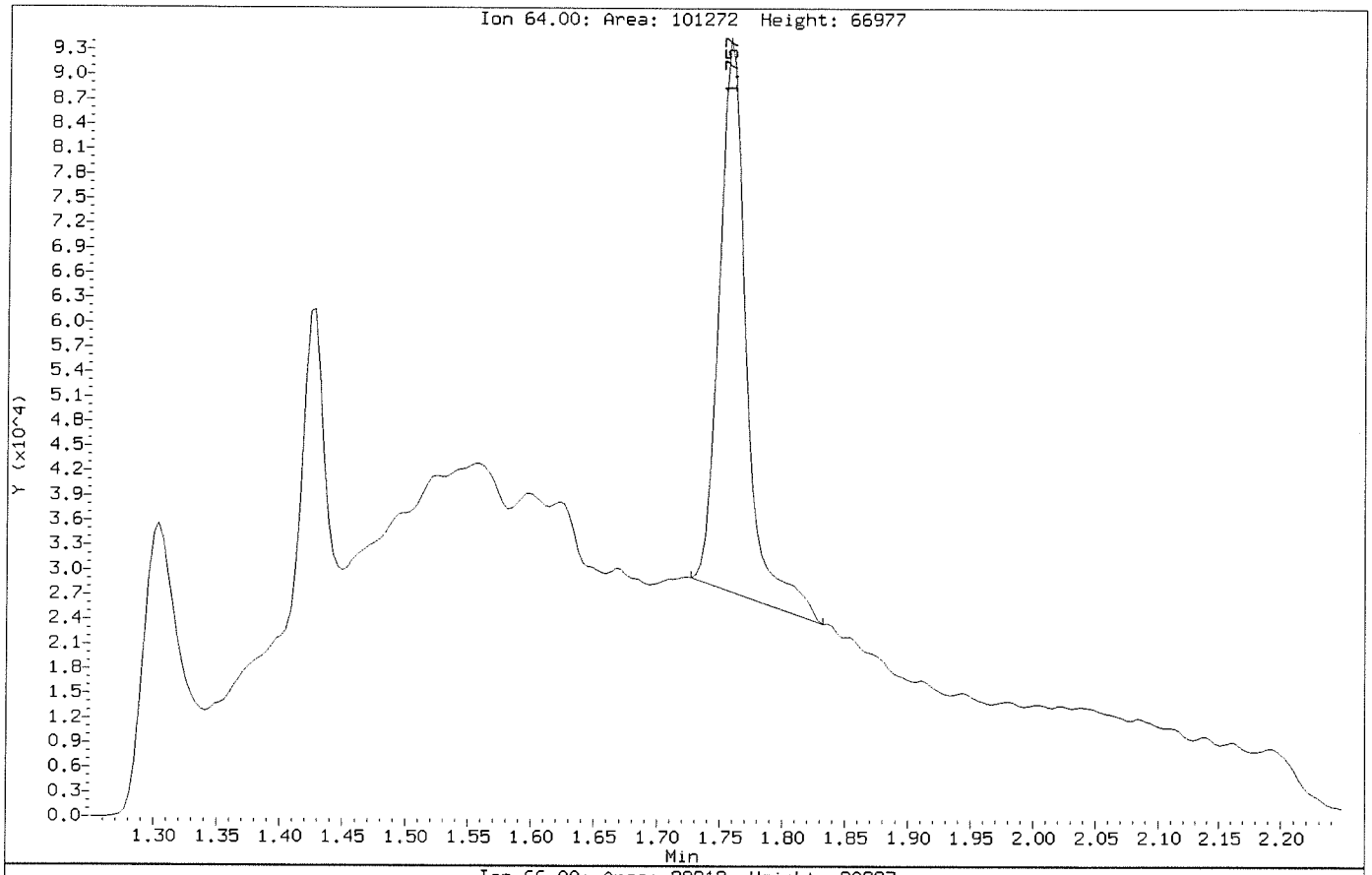
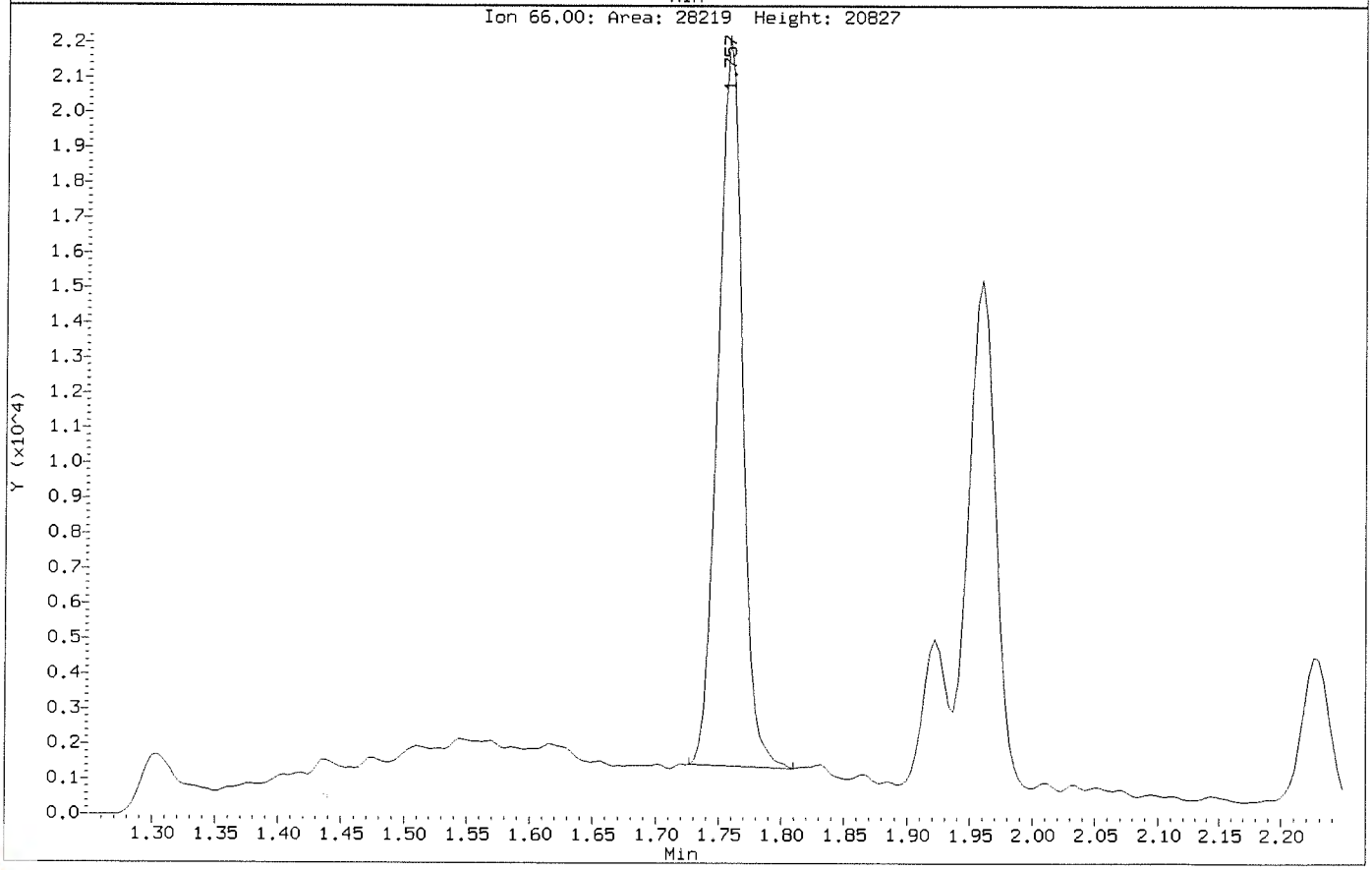
Injection Date: 18-DEC-2018 17:41
Instrument: VOA9.i
Client Sample ID: HS18120278-03MS

Compound: Chloroethane
CAS Number: 75-00-3





Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121817.D Page 1
Report Date: 25-Jan-2019 20:37

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121817.D
Lab Smp Id: HS18120278-03MSD Client Smp ID: HS18120278-03MSD
Inj Date : 18-DEC-2018 18:06
Operator : PC Inst ID: VOA9.i
Smp Info : HS18120278-03MSD;HS18120278-03MSD;3;;MSD
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 16 QC Sample: MSD
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

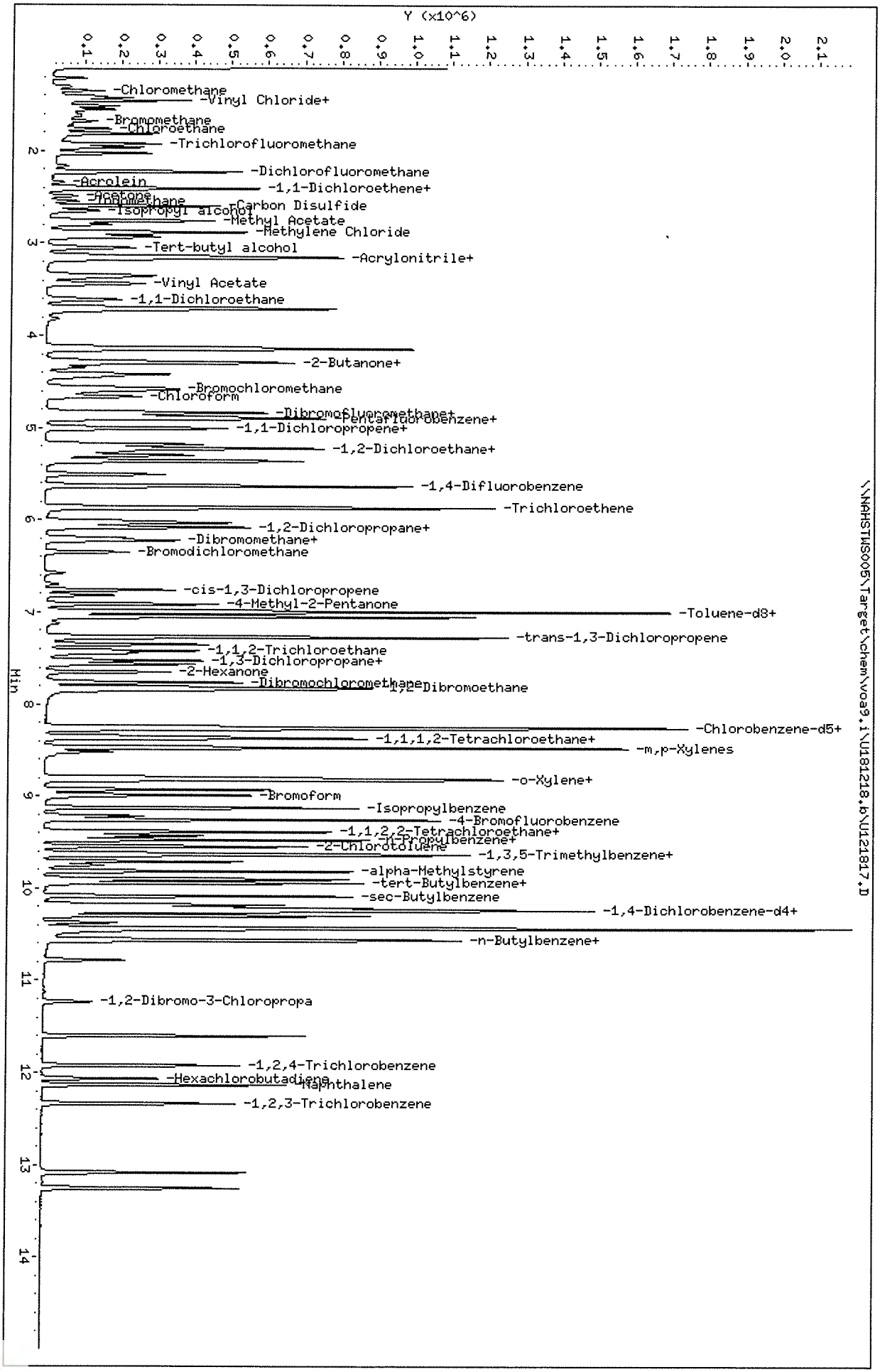
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.898	4.894	(1.000)	400954	50.0000	
* 36 1,4-Difluorobenzene	114	5.629	5.625	(1.000)	706692	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	656441	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	315859	50.0000	
$ 30 Dibromofluoromethane	113	4.834	4.827	(0.987)	207657	44.9298	44.92
$ 35 1,2-Dichloroethane-d4	65	5.179	5.171	(1.057)	265380	43.5617	43.56
$ 48 Toluene-d8	98	6.989	6.990	(0.847)	881002	52.5949	52.59
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	331476	51.0886	51.08
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	94992	22.9415	22.94
31 1,1,1-Trichloroethane	97	4.834	4.827	(0.987)	151124	21.4573	21.45
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	172184	23.0141	23.01
138 Freon TF	101	2.412	2.397	(0.493)	83980	20.9082	20.90
53 1,1,2-Trichloroethane	83	7.421	7.421	(0.900)	96652	23.1594	23.15
22 1,1-Dichloroethane	63	3.612	3.601	(0.737)	203872	22.1886	22.18
11 1,1-Dichloroethene	96	2.409	2.397	(0.492)	97491	21.5411	21.54
32 1,1-Dichloropropene	75	5.010	5.003	(0.890)	158542	24.2908	24.29
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	137085	22.9881	22.98
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	171588	21.9780	21.97
90 1,2,4-Trichlorobenzene	180	11.923	11.923	(1.165)	142107	22.8783	22.87
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	427765	24.3825	24.38
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	22869	20.4946	20.49
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	112372	23.2529	23.25

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121817.D Page 2
Report Date: 25-Jan-2019 20:37

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
88	1,2-Dichlorobenzene	146	10.569	10.570	(1.033)	222695	22.0779	22.07
33	1,2-Dichloroethane	62	5.258	5.250	(0.934)	162518	21.9768	21.97
42	1,2-Dichloropropane	63	6.082	6.079	(1.081)	124559	24.7558	24.75
75	1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	414054	24.3981	24.39
83	1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	223718	22.4962	22.49
54	1,3-Dichloropropane	76	7.563	7.563	(0.917)	209267	23.3529	23.35
84	1,4-Dichlorobenzene	146	10.255	10.255	(1.002)	239174	24.5660	24.56
26	2,2-Dichloropropane	77	4.279	4.272	(0.874)	117836	20.7093	20.70
24	2-Butanone	43	4.343	4.335	(0.887)	127361	45.1880	45.18
76	2-Chlorotoluene	91	9.546	9.546	(0.933)	365721	23.6455	23.64
52	2-Hexanone	43	7.649	7.649	(0.927)	188514	49.4020	49.40
77	4-Chlorotoluene	91	9.640	9.640	(0.942)	427325	23.9439	23.94
82	p-Isopropyltoluene	119	10.210	10.210	(0.997)	436533	25.2372	25.23
45	4-Methyl-2-Pentanone	43	6.914	6.915	(0.838)	266360	48.6400	48.63
10	Acetone	43	2.487	2.476	(0.508)	84551	43.5433	43.54
37	Benzene	78	5.224	5.216	(0.928)	477730	24.4557	24.45
74	Bromobenzene	156	9.381	9.381	(0.917)	115891	22.3670	22.36
29	Bromochloromethane	128	4.560	4.553	(0.931)	55899	23.6485	23.64
39	Bromodichloromethane	83	6.348	6.348	(1.128)	131031	22.3149	22.31
66	Bromoform	173	8.984	8.984	(1.089)	57698	20.1518	20.15
6	Bromomethane	94	1.678	1.663	(0.343)	39508	13.3262	13.32
19	Carbon Disulfide	76	2.600	2.585	(0.531)	590001	42.2132	42.21
34	Carbon Tetrachloride	117	4.999	4.991	(0.888)	118878	23.3149	23.31
59	Chlorobenzene	112	8.275	8.275	(1.003)	329663	24.3322	24.33
7	Chloroethane	64	1.760	1.745	(0.359)	86486	20.6729	20.67(M)
28	Chloroform	83	4.662	4.654	(0.952)	195384	21.1649	21.16
3	Chloromethane	50	1.348	1.336	(0.275)	79127	14.9434	14.94
27	cis-1,2-Dichloroethene	96	4.290	4.283	(0.876)	243227	42.8107	42.81
46	cis-1,3-Dichloropropene	75	6.761	6.757	(1.201)	176358	23.8502	23.85
55	Dibromochloromethane	129	7.758	7.758	(0.940)	95950	23.0995	23.09
44	Dibromomethane	93	6.191	6.187	(1.100)	72191	22.8937	22.89
2	Dichlorodifluoromethane	85	1.213	1.202	(0.248)	53634	9.86969	9.86
61	Ethylbenzene	106	8.373	8.369	(1.015)	163448	23.8632	23.86
91	Hexachlorobutadiene	225	12.065	12.065	(1.179)	50484	26.6078	26.60
67	Isopropylbenzene	105	9.126	9.126	(1.106)	491242	24.6241	24.62
62	m,p-Xylenes	106	8.474	8.474	(1.027)	409050	48.4541	48.45
17	Methylene Chloride	84	2.881	2.866	(0.588)	119110	22.9073	22.90
87	n-Butylbenzene	91	10.558	10.558	(1.031)	415629	25.5691	25.56
73	n-Propylbenzene	91	9.475	9.475	(0.926)	617141	24.7604	24.76
92	Naphthalene	128	12.133	12.133	(1.185)	452641	24.2005	24.20
63	o-Xylene	106	8.811	8.811	(1.068)	202778	24.0042	24.00
81	sec-Butylbenzene	105	10.086	10.086	(0.985)	520853	25.0972	25.09
64	Styrene	104	8.826	8.826	(1.070)	348574	24.4387	24.43
78	tert-Butylbenzene	119	9.902	9.902	(0.967)	357619	24.7259	24.72
56	Tetrachloroethene	164	7.526	7.522	(0.912)	82749	24.0641	24.06
50	Toluene	91	7.049	7.046	(0.855)	495483	23.7744	23.77
20	trans-1,2-Dichloroethene	96	3.151	3.136	(0.643)	109083	21.9920	21.99
51	trans-1,3-Dichloropropene	75	7.263	7.259	(1.290)	146343	20.8889	20.88
38	Trichloroethene	130	5.865	5.861	(1.042)	332180	68.9831	68.98
8	Trichlorofluoromethane	101	1.962	1.948	(0.401)	154789	19.3100	19.31
5	Vinyl Chloride	62	1.426	1.415	(0.291)	120522	18.7596	18.75

QC Flag Legend

M - Compound response manually integrated.



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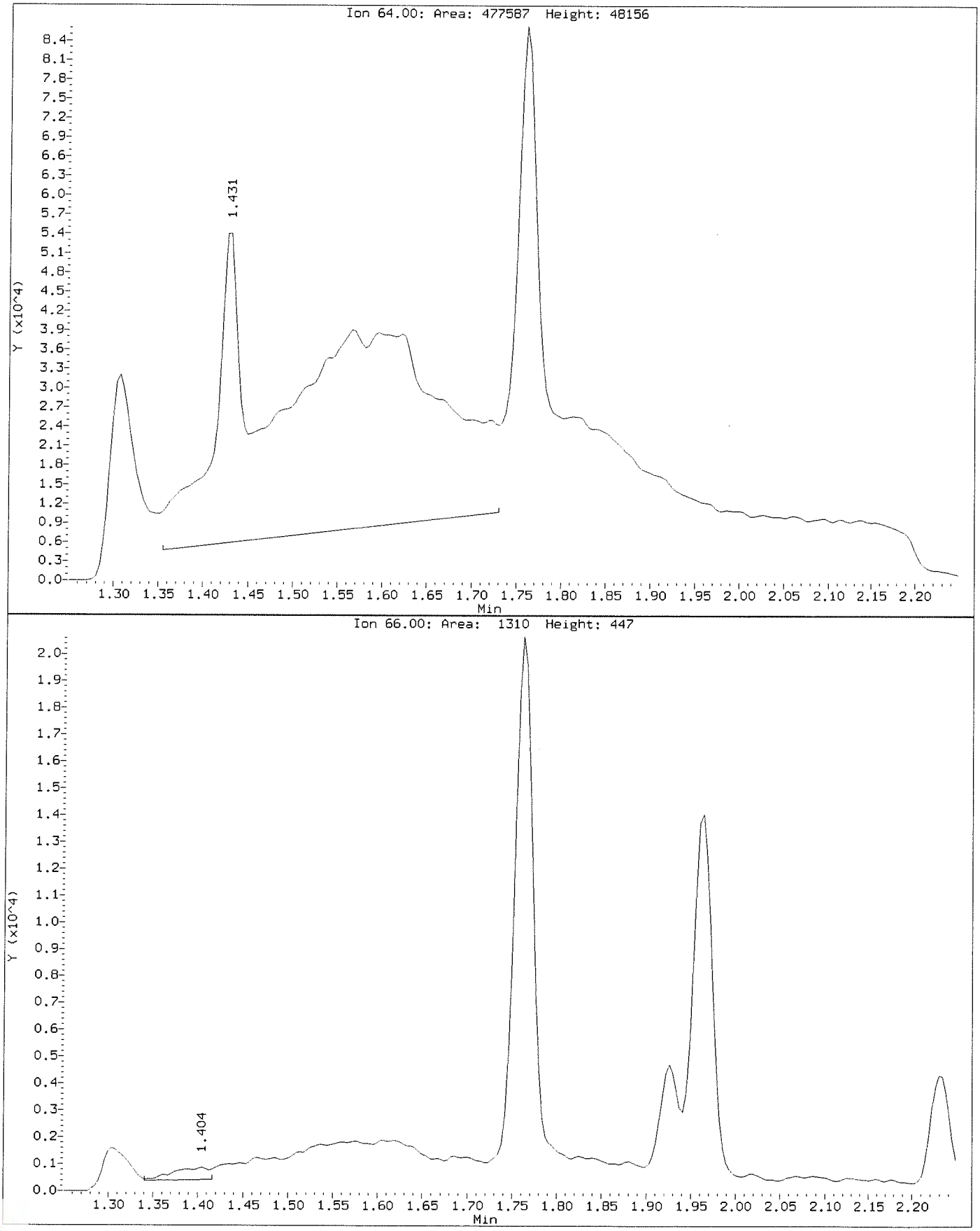
Client ID: HS18120278-03MSD
Sample Info: HS18120278-03MSD;HS18120278-03MSD;3;;MSD
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\Before\U121817.D
Injection Date: 18-DEC-2018 18:06
Instrument: VOA9.i
Client Sample ID: HS18120278-03MSD

Compound: Chloroethane
CAS Number: 75-00-3



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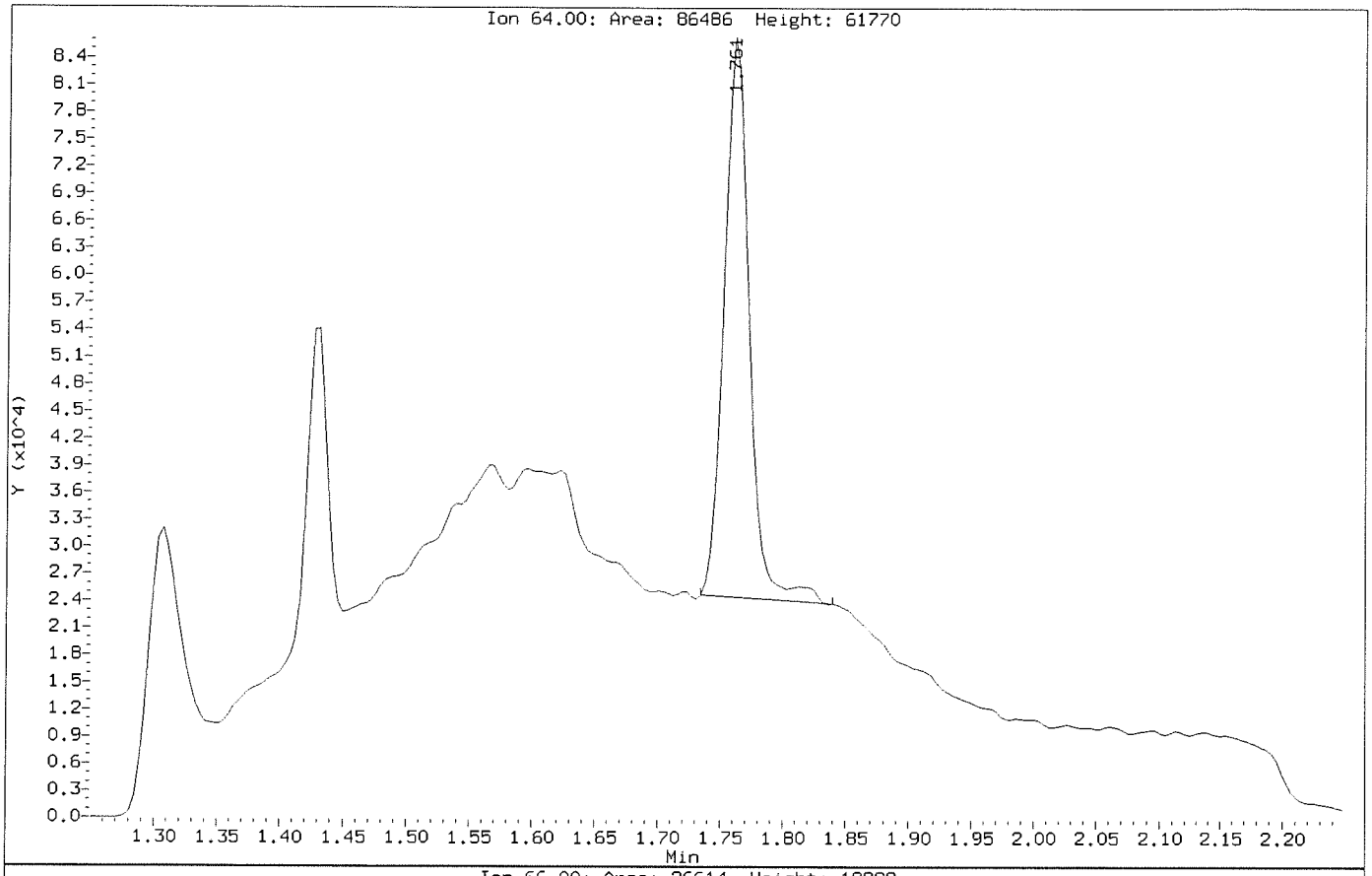
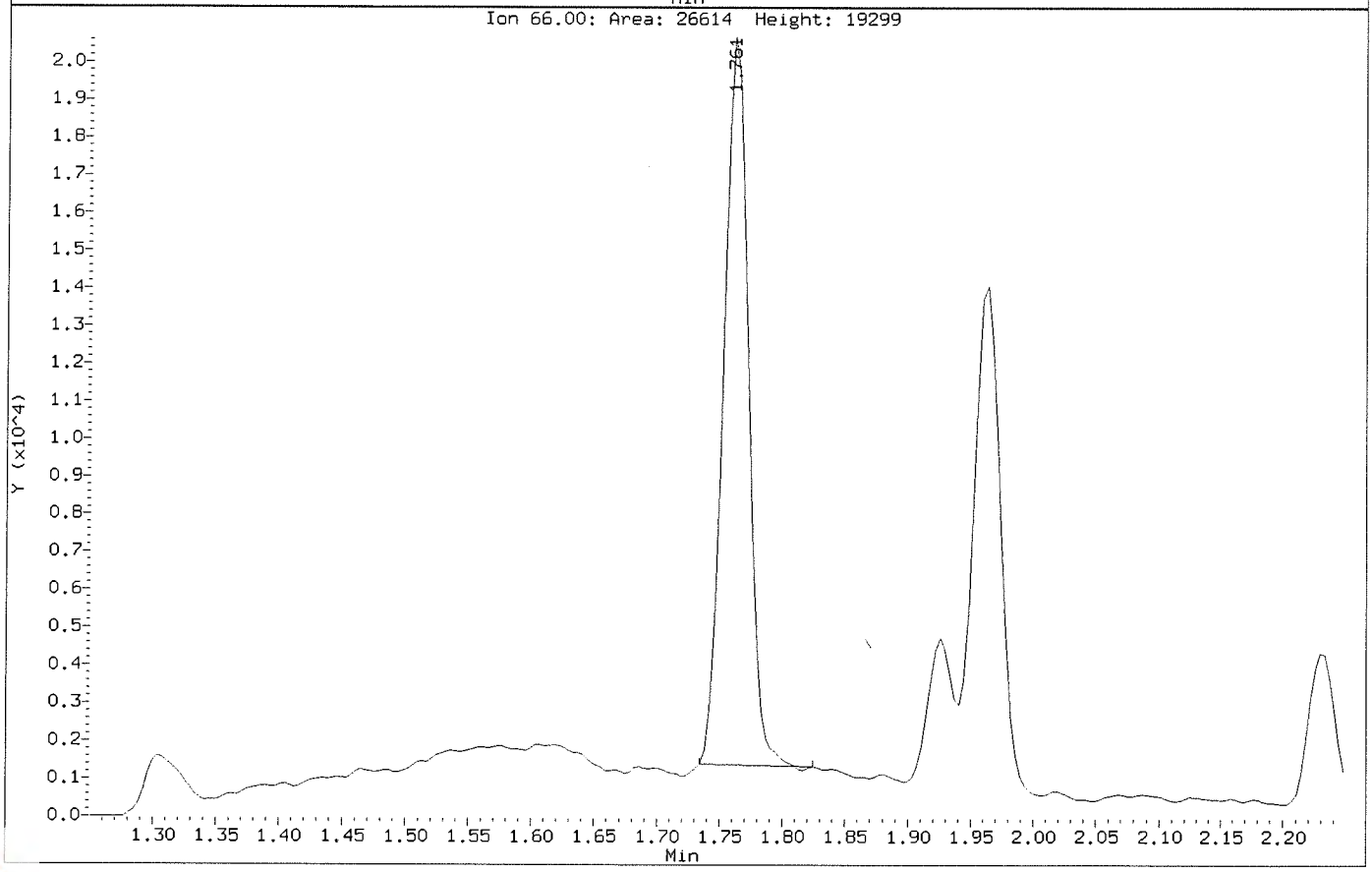
Injection Date: 18-DEC-2018 18:06
Instrument: VOA9.i
Client Sample ID: HS18120278-03MSD

Compound: Chloroethane
CAS Number: 75-00-3





Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121828.D Page 1
Report Date: 25-Jan-2019 20:37

ALS Laboratory Group

Data file : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121828.D
Lab Smp Id: VSTD050-END Client Smp ID: VSTD050-END
Inj Date : 18-DEC-2018 22:38
Operator : PC Inst ID: VOA9.i
Smp Info : VSTD050-END;VSTD050-END;2;;
Misc Info : 180315V9;WATER;0;1;
Comment :
Method : \\NAHSTWS005\Target\chem\voa9.i\U181218.b\8260C.m
Meth Date : 25-Jan-2019 20:37 VOA9.i Quant Type: ISTD
Cal Date : 13-NOV-2018 14:15 Cal File: U111308.D
Als bottle: 27 Continuing Calibration Sample
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: LHAAP.sub
Target Version: 4.14
Processing Host: NAHSTW7087

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

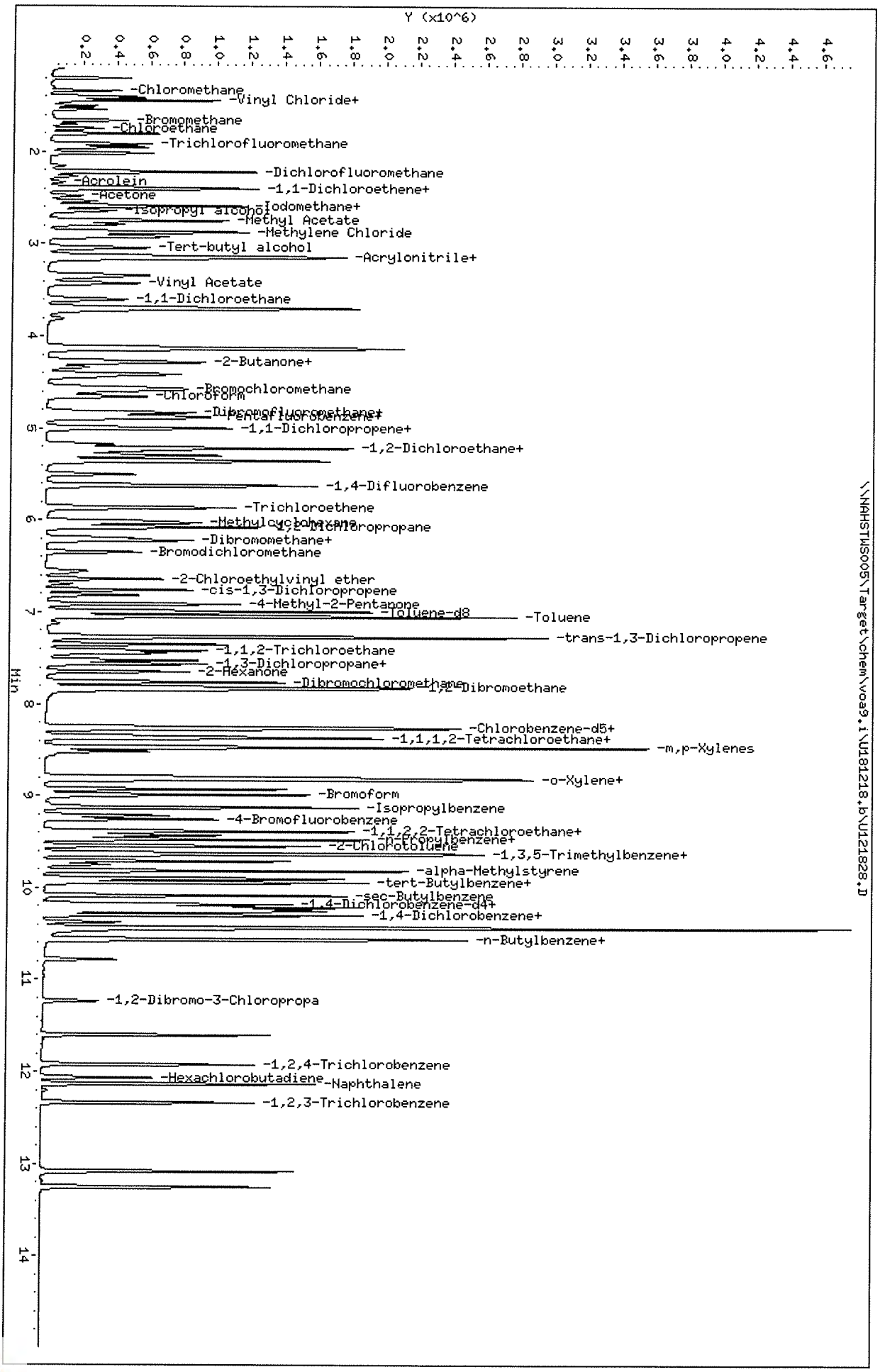
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.894	4.894	(1.000)	378180	50.0000	
* 36 1,4-Difluorobenzene	114	5.625	5.625	(1.000)	671815	50.0000	
* 47 Chlorobenzene-d5	117	8.249	8.249	(1.000)	626627	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	10.236	10.236	(1.000)	302976	50.0000	
$ 30 Dibromofluoromethane	113	4.830	4.830	(0.987)	196169	50.0000	45.00
$ 35 1,2-Dichloroethane-d4	65	5.175	5.175	(1.057)	250888	50.0000	43.66
$ 48 Toluene-d8	98	6.989	6.989	(0.847)	842680	50.0000	52.70
$ 69 4-Bromofluorobenzene	95	9.257	9.257	(1.122)	316879	50.0000	51.16
60 1,1,1,2-Tetrachloroethane	131	8.350	8.350	(1.012)	229533	50.0000	58.07
31 1,1,1-Trichloroethane	97	4.826	4.826	(0.986)	344273	50.0000	51.82
68 1,1,2,2-Tetrachloroethane	83	9.392	9.392	(0.918)	410071	50.0000	57.14
138 Freon TF	101	2.401	2.401	(0.491)	189722	50.0000	50.07
53 1,1,2-Trichloroethane	83	7.420	7.420	(0.900)	228744	50.0000	57.41
22 1,1-Dichloroethane	63	3.601	3.601	(0.736)	478009	50.0000	55.15
11 1,1-Dichloroethene	96	2.397	2.397	(0.490)	225962	50.0000	52.93
32 1,1-Dichloropropene	75	5.003	5.003	(0.889)	355153	50.0000	57.23
93 1,2,3-Trichlorobenzene	180	12.335	12.335	(1.205)	327297	50.0000	57.21
71 1,2,3-Trichloropropane	75	9.426	9.426	(0.921)	436775	50.0000	58.32
90 1,2,4-Trichlorobenzene	180	11.923	11.923	(1.165)	331419	50.0000	55.62
79 1,2,4-Trimethylbenzene	105	9.943	9.943	(0.971)	961099	50.0000	57.11
89 1,2-Dibromo-3-Chloropropane	155	11.233	11.233	(1.097)	59174	50.0000	53.27
57 1,2-Dibromoethane	107	7.852	7.852	(0.952)	266717	50.0000	57.81

Data File: \\NAHSTWS005\Target\chem\voa9.i\U181218.b\U121828.D Page 2
Report Date: 25-Jan-2019 20:37

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.569	10.569	(1.033)	520553	50.0000	53.80
33 1,2-Dichloroethane	62	5.254	5.254	(0.934)	379556	50.0000	53.99
42 1,2-Dichloropropane	63	6.078	6.078	(1.081)	293890	50.0000	61.44
75 1,3,5-Trimethylbenzene	105	9.625	9.625	(0.940)	925420	50.0000	56.84
83 1,3-Dichlorobenzene	146	10.180	10.180	(0.995)	518297	50.0000	54.33
54 1,3-Dichloropropane	76	7.563	7.563	(0.917)	492889	50.0000	57.62
84 1,4-Dichlorobenzene	146	10.255	10.255	(1.002)	531293	50.0000	56.94
26 2,2-Dichloropropane	77	4.272	4.272	(0.873)	242214	50.0000	45.13
24 2-Butanone	43	4.335	4.335	(0.886)	303521	100.000	114.17
76 2-Chlorotoluene	91	9.546	9.546	(0.933)	827082	50.0000	55.74
52 2-Hexanone	43	7.649	7.649	(0.927)	458733	100.000	125.93
77 4-Chlorotoluene	91	9.640	9.640	(0.942)	967226	50.0000	56.50
82 p-Isopropyltoluene	119	10.210	10.210	(0.997)	951272	50.0000	57.33
45 4-Methyl-2-Pentanone	43	6.914	6.914	(0.838)	653968	100.000	125.10
10 Acetone	43	2.480	2.480	(0.507)	210321	100.000	122.09
37 Benzene	78	5.216	5.216	(0.927)	1101084	50.0000	59.29
74 Bromobenzene	156	9.381	9.381	(0.917)	275484	50.0000	55.42
29 Bromochloromethane	128	4.553	4.553	(0.930)	129015	50.0000	57.86
39 Bromodichloromethane	83	6.348	6.348	(1.129)	320311	50.0000	57.38
66 Bromoform	173	8.984	8.984	(1.089)	150873	50.0000	52.87(T)
6 Bromomethane	94	1.663	1.663	(0.340)	139467	50.0000	44.65
19 Carbon Disulfide	76	2.588	2.588	(0.529)	1482971	100.000	112.49
34 Carbon Tetrachloride	117	4.995	4.995	(0.888)	264711	50.0000	54.61
59 Chlorobenzene	112	8.275	8.275	(1.003)	713991	50.0000	55.20
7 Chloroethane	64	1.749	1.749	(0.357)	250841	50.0000	63.56
28 Chloroform	83	4.658	4.658	(0.952)	458398	50.0000	52.64
3 Chloromethane	50	1.336	1.336	(0.273)	270537	50.0000	53.56
27 cis-1,2-Dichloroethene	96	4.287	4.287	(0.876)	292548	50.0000	54.59
46 cis-1,3-Dichloropropene	75	6.757	6.757	(1.201)	434455	50.0000	61.80
55 Dibromochloromethane	129	7.758	7.758	(0.940)	238967	50.0000	60.26
44 Dibromomethane	93	6.191	6.191	(1.101)	170582	50.0000	56.90
2 Dichlorodifluoromethane	85	1.201	1.201	(0.246)	293113	50.0000	52.38
61 Ethylbenzene	106	8.373	8.373	(1.015)	368594	50.0000	56.37
91 Hexachlorobutadiene	225	12.065	12.065	(1.179)	104892	50.0000	55.69
67 Isopropylbenzene	105	9.126	9.126	(1.106)	1075455	50.0000	56.47
62 m,p-Xylenes	106	8.474	8.474	(1.027)	915802	100.000	113.64
17 Methylene Chloride	84	2.870	2.870	(0.586)	284347	50.0000	59.05
87 n-Butylbenzene	91	10.558	10.558	(1.031)	879817	50.0000	55.28
73 n-Propylbenzene	91	9.475	9.475	(0.926)	1345509	50.0000	56.27
92 Naphthalene	128	12.133	12.133	(1.185)	1107615	50.0000	61.73
63 o-Xylene	106	8.811	8.811	(1.068)	466527	50.0000	57.85
81 sec-Butylbenzene	105	10.086	10.086	(0.985)	1112945	50.0000	55.90
64 Styrene	104	8.823	8.823	(1.070)	815131	50.0000	59.86
78 tert-Butylbenzene	119	9.902	9.902	(0.967)	771287	50.0000	55.59
56 Tetrachloroethene	164	7.525	7.525	(0.912)	177630	50.0000	54.11
50 Toluene	91	7.046	7.046	(0.854)	1133358	50.0000	56.96
20 trans-1,2-Dichloroethene	96	3.139	3.139	(0.642)	252130	50.0000	53.89
51 trans-1,3-Dichloropropene	75	7.259	7.259	(1.291)	370216	50.0000	53.13
38 Trichloroethene	130	5.861	5.861	(1.042)	251920	50.0000	55.03
8 Trichlorofluoromethane	101	1.951	1.951	(0.399)	382135	50.0000	50.54
5 Vinyl Chloride	62	1.419	1.419	(0.290)	365089	50.0000	59.12

QC Flag Legend

T - Target compound detected outside RT window.



Data File: \\NAHSTWS005\Target\chem\voa9,i\U181218,b\U121828,D
Date : 18-DEC-2018 22:38
Client ID: VSTD050-END
Sample Info: VSTD050-END;VSTD050-END;2;;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOA9,i
Operator: PC
Column diameter: 0.18

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
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December 19, 2018

Susan Huang
Aptim Environmental & Infrastucture, Inc.
2500 City West Blvd., Suite 1700
Houston, TX 77042

Work Order: **HS18120278**

Laboratory Results for: **LHAARP - 12**

Dear Susan,

ALS Environmental received 5 sample(s) on Dec 05, 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 Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Work Order: HS18120278

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120278-01	12WW21-181204	Groundwater		04-Dec-2018 10:05	05-Dec-2018 09:30	☐
HS18120278-02	12WW21-181204 FD	Groundwater		04-Dec-2018 10:05	05-Dec-2018 09:30	☐
HS18120278-03	12WW24-181204	Groundwater		04-Dec-2018 13:10	05-Dec-2018 09:30	☐
HS18120278-04	12WW20-181204	Groundwater		04-Dec-2018 12:05	05-Dec-2018 09:30	☐
HS18120278-05	Trip Blank ALS-071918-78	Water		04-Dec-2018 00:00	05-Dec-2018 09:30	☐

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Work Order: HS18120278

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R329535

Sample ID: VLCSW-1812018

- 1,4_Dichlorobenzene and Hexachlorobutadiene exceeded QC limits for LCS. CCV is OK.

Sample ID: VSTD050

- cis-1,3-Dichloropropene exceeded %D limits for CCV. Samples are ND for this compound.

Sample ID: 12WW24-181204 (HS18120278-03MS)

- MS/MSD recovered outside the control limits for multiple compounds

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc. **ANALYTICAL REPORT**
Project: LHAARP - 12 WorkOrder:HS18120278
Sample ID: 12WW21-181204 Lab ID:HS18120278-01
Collection Date: 04-Dec-2018 10:05 Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:27
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 16:27
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 16:27
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 16:27
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 16:27
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW21-181204
Collection Date: 04-Dec-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:27
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:27
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 16:27
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:27
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:27
Surr: 1,2-Dichloroethane-d4	*91.4*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 16:27*
Surr: 4-Bromofluorobenzene	*99.2*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 16:27*
Surr: Dibromofluoromethane	*87.4*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 16:27*
Surr: Toluene-d8	*106*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 16:27*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW21-181204 FD
Collection Date: 04-Dec-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:13
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 15:13
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 15:13
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 15:13
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 15:13
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW21-181204 FD
Collection Date: 04-Dec-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:13
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:13
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 15:13
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:13
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:13
Surr: 1,2-Dichloroethane-d4	*90.5*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 15:13*
Surr: 4-Bromofluorobenzene	*97.8*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 15:13*
Surr: Dibromofluoromethane	*88.4*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 15:13*
Surr: Toluene-d8	*105*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 15:13*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc. **ANALYTICAL REPORT**
Project: LHAARP - 12 WorkOrder:HS18120278
Sample ID: 12WW24-181204 Lab ID:HS18120278-03
Collection Date: 04-Dec-2018 13:10 Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,1-Dichloroethene	**0.71**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:02
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 16:02
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 16:02
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 16:02
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 16:02
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Chlorobenzene	**1.5**		**0.30**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: 12WW24-181204
Collection Date: 04-Dec-2018 13:10

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
cis-1,2-Dichloroethene	**22**		**0.20**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 16:02
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 16:02
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 16:02
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 16:02
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Trichloroethene	**48**		**0.20**	**0.50**	**1.0**	**ug/L**	1	18-Dec-2018 16:02
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 16:02
Surr: 1,2-Dichloroethane-d4	*91.4*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 16:02*
Surr: 4-Bromofluorobenzene	*97.6*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 16:02*
Surr: Dibromofluoromethane	*89.1*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 16:02*
Surr: Toluene-d8	*105*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 16:02*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc. **ANALYTICAL REPORT**
Project: LHAARP - 12 WorkOrder:HS18120278
Sample ID: 12WW20-181204 Lab ID:HS18120278-04
Collection Date: 04-Dec-2018 12:05 Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:37
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 15:37
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 15:37
Acetone	2.0	U	2.0	2.0	2.0	ug/L	1	18-Dec-2018 15:37
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 15:37
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc. **ANALYTICAL REPORT**
Project: LHAARP - 12 WorkOrder:HS18120278
Sample ID: 12WW20-181204 Lab ID:HS18120278-04
Collection Date: 04-Dec-2018 12:05 Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 15:37
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 15:37
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 15:37
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 15:37
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 15:37
Surr: 1,2-Dichloroethane-d4	*91.4*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 15:37*
Surr: 4-Bromofluorobenzene	*96.8*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 15:37*
Surr: Dibromofluoromethane	*88.0*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 15:37*
Surr: Toluene-d8	*105*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 15:37*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
Sample ID: Trip Blank ALS-071918-78
Collection Date: 04-Dec-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18120278
Lab ID:HS18120278-05
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,2-Trichlor-1,2,2-trifluoroethane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dibromo-3-chloropropane	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 14:48
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	18-Dec-2018 14:48
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	18-Dec-2018 14:48
Acetone	**2.7**		**2.0**	**2.0**	**2.0**	**ug/L**	1	18-Dec-2018 14:48
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	18-Dec-2018 14:48
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc. **ANALYTICAL REPORT**
Project: LHAARP - 12 WorkOrder:HS18120278
Sample ID: Trip Blank ALS-071918-78 Lab ID:HS18120278-05
Collection Date: 04-Dec-2018 00:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**							Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	ug/L	1	18-Dec-2018 14:48
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	18-Dec-2018 14:48
Methylene chloride	0.50	U	1.0	0.50	2.0	ug/L	1	18-Dec-2018 14:48
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	18-Dec-2018 14:48
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	18-Dec-2018 14:48
Surr: 1,2-Dichloroethane-d4	*89.5*			**0**	*70-126*	*%REC*	*1*	*18-Dec-2018 14:48*
Surr: 4-Bromofluorobenzene	*98.2*			**0**	*81-113*	*%REC*	*1*	*18-Dec-2018 14:48*
Surr: Dibromofluoromethane	*87.9*			**0**	*77-123*	*%REC*	*1*	*18-Dec-2018 14:48*
Surr: Toluene-d8	*106*			**0**	*82-127*	*%REC*	*1*	*18-Dec-2018 14:48*

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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R329535	**Test Name :** LOW LEVEL VOLATILES BY SW8260C			**Matrix:** Water		
HS18120278-05	Trip Blank ALS-071918-78	04 Dec 2018 00:00			18 Dec 2018 14:48	1
Batch ID R329535	**Test Name :** LOW LEVEL VOLATILES BY SW8260C			**Matrix:** Groundwater		
HS18120278-01	12WW21-181204	04 Dec 2018 10:05			18 Dec 2018 16:27	1
HS18120278-02	12WW21-181204 FD	04 Dec 2018 10:05			18 Dec 2018 15:13	1
HS18120278-03	12WW24-181204	04 Dec 2018 13:10			18 Dec 2018 16:02	1
HS18120278-04	12WW20-181204	04 Dec 2018 12:05			18 Dec 2018 15:37	1

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MBLK Sample ID: **VBLKW-181218** Units: **ug/L** Analysis Date: **18-Dec-2018 13:34**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872159** 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-Trichlor-1,2,2-trifluoroethane	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	1.0	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	2.0	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

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MBLK Sample ID: **VBLKW-181218** Units: **ug/L** Analysis Date: **18-Dec-2018 13:34**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872159** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Bromomethane	0.50	1.0								U
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	1.0	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	0.50	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	*45.19*	*1.0*	*50*	*0*	*90.4*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*48.92*	*1.0*	*50*	*0*	*97.8*	*82 - 115*				
Surr: Dibromofluoromethane	*43.69*	*1.0*	*50*	*0*	*87.4*	*73 - 126*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MBLK Sample ID: **VBLKW-181218** Units: **ug/L** Analysis Date: **18-Dec-2018 13:34**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872159** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*52.1*	*1.0*	*50*	*0*	*104*	*81 - 120*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

LCS Sample ID: **VLCSW-1812018** Units: **ug/L** Analysis Date: **18-Dec-2018 13:58**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872160** 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	21.7	1.0	20	0	109	77 - 118				
1,1,1-Trichloroethane	20.06	1.0	20	0	100	70 - 130				
1,1,2,2-Tetrachloroethane	21.61	1.0	20	0	108	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	21.66	1.0	20	0	108	70 - 130				
1,1,2-Trichloroethane	21.9	1.0	20	0	109	77 - 113				
1,1-Dichloroethane	20.96	1.0	20	0	105	71 - 122				
1,1-Dichloroethene	20.63	1.0	20	0	103	70 - 130				
1,1-Dichloropropene	22.62	1.0	20	0	113	78 - 118				
1,2,3-Trichlorobenzene	22.19	1.0	20	0	111	70 - 130				
1,2,3-Trichloropropane	21.99	1.0	20	0	110	70 - 127				
1,2,4-Trichlorobenzene	21.92	1.0	20	0	110	77 - 126				
1,2,4-Trimethylbenzene	23.08	1.0	20	0	115	73 - 121				
1,2-Dibromo-3-chloropropane	19.69	1.0	20	0	98.4	70 - 130				
1,2-Dibromoethane	22.19	1.0	20	0	111	76 - 123				
1,2-Dichlorobenzene	21.19	1.0	20	0	106	77 - 113				
1,2-Dichloroethane	20.79	1.0	20	0	104	70 - 124				
1,2-Dichloropropane	23.16	1.0	20	0	116	72 - 119				
1,3,5-Trimethylbenzene	23.2	1.0	20	0	116	75 - 118				
1,3-Dichlorobenzene	21.7	1.0	20	0	109	78 - 118				
1,3-Dichloropropane	22.28	1.0	20	0	111	75 - 116				
1,4-Dichlorobenzene	22.92	1.0	20	0	115	79 - 113				S
2,2-Dichloropropane	21.28	1.0	20	0	106	70 - 130				
2-Butanone	42.42	2.0	40	0	106	70 - 130				
2-Chlorotoluene	22.49	1.0	20	0	112	70 - 128				
2-Hexanone	46.58	2.0	40	0	116	70 - 130				
4-Chlorotoluene	22.67	1.0	20	0	113	74 - 126				
4-Isopropyltoluene	23.85	1.0	20	0	119	74 - 126				
4-Methyl-2-pentanone	46.52	2.0	40	0	116	70 - 130				
Acetone	42.82	2.0	40	0	107	70 - 130				
Benzene	22.64	1.0	20	0	113	74 - 120				
Bromobenzene	21.59	1.0	20	0	108	78 - 113				
Bromochloromethane	22.21	1.0	20	0	111	76 - 124				
Bromodichloromethane	20.86	1.0	20	0	104	74 - 122				
Bromoform	19.3	1.0	20	0	96.5	73 - 128				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

LCS Sample ID: **VLCSW-1812018** Units: **ug/L** Analysis Date: **18-Dec-2018 13:58**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872160** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Bromomethane	23.28	1.0	20	0	116	70 - 130				
Carbon disulfide	43.3	2.0	40	0	108	70 - 130				
Carbon tetrachloride	21.74	1.0	20	0	109	71 - 125				
Chlorobenzene	21.78	1.0	20	0	109	76 - 113				
Chloroethane	23.06	1.0	20	0	115	70 - 130				
Chloroform	20	1.0	20	0	100	71 - 121				
Chloromethane	24.03	1.0	20	0	120	70 - 129				
cis-1,2-Dichloroethene	20.82	1.0	20	0	104	75 - 122				
cis-1,3-Dichloropropene	22.79	1.0	20	0	114	73 - 127				
Dibromochloromethane	21.85	1.0	20	0	109	77 - 122				
Dibromomethane	21.43	1.0	20	0	107	78 - 121				
Dichlorodifluoromethane	21.72	1.0	20	0	109	70 - 130				
Ethylbenzene	22.49	1.0	20	0	112	77 - 117				
Hexachlorobutadiene	26.61	1.0	20	0	133	70 - 130				S
Isopropylbenzene	23.13	1.0	20	0	116	73 - 127				
m,p-Xylene	45.63	2.0	40	0	114	77 - 122				
Methylene chloride	22.57	2.0	20	0	113	70 - 127				
Naphthalene	22.83	1.0	20	0	114	70 - 130				
n-Butylbenzene	24.18	1.0	20	0	121	72 - 130				
n-Propylbenzene	23.41	1.0	20	0	117	73 - 124				
o-Xylene	22.9	1.0	20	0	114	75 - 119				
sec-Butylbenzene	23.6	1.0	20	0	118	73 - 128				
Styrene	23.39	1.0	20	0	117	72 - 126				
tert-Butylbenzene	23.13	1.0	20	0	116	73 - 124				
Tetrachloroethene	22.36	1.0	20	0	112	76 - 119				
Toluene	22.56	1.0	20	0	113	77 - 118				
trans-1,2-Dichloroethene	20.73	1.0	20	0	104	72 - 127				
trans-1,3-Dichloropropene	19.97	1.0	20	0	99.9	77 - 119				
Trichloroethene	21.82	1.0	20	0	109	77 - 121				
Trichlorofluoromethane	20.41	1.0	20	0	102	70 - 130				
Vinyl chloride	23.07	1.0	20	0	115	70 - 130				
Surr: 1,2-Dichloroethane-d4	*44.22*	*1.0*	*50*	*0*	*88.4*	*70 - 130*				
Surr: 4-Bromofluorobenzene	*51.18*	*1.0*	*50*	*0*	*102*	*82 - 115*				
Surr: Dibromofluoromethane	*44.56*	*1.0*	*50*	*0*	*89.1*	*73 - 126*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

LCS Sample ID: **VLCSW-1812018** Units: **ug/L** Analysis Date: **18-Dec-2018 13:58**
Client ID: Run ID: **VOA9_329535** SeqNo: **4872160** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*52.7*	*1.0*	*50*	*0*	*105*	*81 - 120*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MS Sample ID: **HS18120278-03MS** Units: **ug/L** Analysis Date: **18-Dec-2018 17:41**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872166** 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	23.88	1.0	20	0	119	70 - 120				
1,1,1-Trichloroethane	22.68	1.0	20	0	113	70 - 130				
1,1,2,2-Tetrachloroethane	23.94	1.0	20	0	120	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	22.2	1.0	20	0	111	70 - 130				
1,1,2-Trichloroethane	24.23	1.0	20	0	121	70 - 117				S
1,1-Dichloroethane	23.28	1.0	20	0	116	70 - 127				
1,1-Dichloroethene	23.18	1.0	20	0.7106	112	70 - 130				
1,1-Dichloropropene	25.8	1.0	20	0	129	70 - 129				S
1,2,3-Trichlorobenzene	24.51	1.0	20	0	123	70 - 130				
1,2,3-Trichloropropane	23.25	1.0	20	0	116	70 - 130				
1,2,4-Trichlorobenzene	23.82	1.0	20	0	119	70 - 125				
1,2,4-Trimethylbenzene	25.68	1.0	20	0	128	70 - 125				S
1,2-Dibromo-3-chloropropane	21.8	1.0	20	0	109	70 - 130				
1,2-Dibromoethane	24.17	1.0	20	0	121	70 - 124				
1,2-Dichlorobenzene	23.25	1.0	20	0	116	70 - 115				S
1,2-Dichloroethane	22.65	1.0	20	0	113	70 - 127				
1,2-Dichloropropane	25.31	1.0	20	0	127	70 - 122				S
1,3,5-Trimethylbenzene	25.78	1.0	20	0	129	70 - 126				S
1,3-Dichlorobenzene	23.52	1.0	20	0	118	70 - 119				
1,3-Dichloropropane	24.4	1.0	20	0	122	70 - 121				S
1,4-Dichlorobenzene	25.75	1.0	20	0	129	70 - 114				S
2,2-Dichloropropane	21.93	1.0	20	0	110	70 - 130				
2-Butanone	45.49	2.0	40	0	114	70 - 130				
2-Chlorotoluene	24.73	1.0	20	0	124	70 - 130				
2-Hexanone	51.07	2.0	40	0	128	70 - 130				
4-Chlorotoluene	25.15	1.0	20	0	126	70 - 130				
4-Isopropyltoluene	26.9	1.0	20	0	134	70 - 130				S
4-Methyl-2-pentanone	50.44	2.0	40	0	126	70 - 130				
Acetone	46	2.0	40	0	115	70 - 130				
Benzene	25.3	1.0	20	0	126	70 - 127				
Bromobenzene	23.78	1.0	20	0	119	70 - 115				S
Bromochloromethane	24.54	1.0	20	0	123	70 - 127				
Bromodichloromethane	22.91	1.0	20	0	115	70 - 124				
Bromoform	20.79	1.0	20	0	104	70 - 129				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MS Sample ID: **HS18120278-03MS** Units: **ug/L** Analysis Date: **18-Dec-2018 17:41**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872166** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Bromomethane	12.09	1.0	20	0	60.5	70 - 130				S
Carbon disulfide	44.81	2.0	40	0	112	70 - 130				
Carbon tetrachloride	24.05	1.0	20	0	120	70 - 130				
Chlorobenzene	25.62	1.0	20	1.542	120	70 - 114				S
Chloroethane	24.72	1.0	20	0	124	70 - 130				
Chloroform	22.07	1.0	20	0	110	70 - 125				
Chloromethane	15.68	1.0	20	0	78.4	70 - 130				
cis-1,2-Dichloroethene	44.9	1.0	20	21.65	116	70 - 128				
cis-1,3-Dichloropropene	24.3	1.0	20	0	121	70 - 125				
Dibromochloromethane	23.74	1.0	20	0	119	70 - 124				
Dibromomethane	22.87	1.0	20	0	114	70 - 124				
Dichlorodifluoromethane	10.42	1.0	20	0	52.1	70 - 130				S
Ethylbenzene	25.15	1.0	20	0	126	70 - 124				S
Hexachlorobutadiene	28.15	1.0	20	0	141	70 - 130				S
Isopropylbenzene	26.04	1.0	20	0	130	70 - 130				S
m,p-Xylene	50.97	2.0	40	0	127	70 - 130				
Methylene chloride	24.38	2.0	20	0	122	70 - 128				
Naphthalene	25.37	1.0	20	0	127	70 - 130				
n-Butylbenzene	26.87	1.0	20	0	134	70 - 130				S
n-Propylbenzene	26.34	1.0	20	0	132	70 - 130				S
o-Xylene	25.44	1.0	20	0	127	70 - 124				S
sec-Butylbenzene	26.76	1.0	20	0	134	70 - 130				S
Styrene	25.73	1.0	20	0	129	70 - 130				
tert-Butylbenzene	26.06	1.0	20	0	130	70 - 130				S
Tetrachloroethene	25.53	1.0	20	0	128	70 - 130				
Toluene	25.16	1.0	20	0	126	70 - 123				S
trans-1,2-Dichloroethene	23.47	1.0	20	0	117	70 - 130				
trans-1,3-Dichloropropene	21.37	1.0	20	0	107	70 - 121				
Trichloroethene	72.45	1.0	20	47.56	124	70 - 129				
Trichlorofluoromethane	20.92	1.0	20	0	105	70 - 130				
Vinyl chloride	20.18	1.0	20	0	101	70 - 130				
Surr: 1,2-Dichloroethane-d4	*44.17*	*1.0*	*50*	*0*	*88.3*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*51.45*	*1.0*	*50*	*0*	*103*	*81 - 113*				
Surr: Dibromofluoromethane	*45.03*	*1.0*	*50*	*0*	*90.1*	*77 - 123*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MS Sample ID: **HS18120278-03MS** Units: **ug/L** Analysis Date: **18-Dec-2018 17:41**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872166** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*53.03*	*1.0*	*50*	*0*	*106*	*82 - 127*				

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MSD Sample ID: **HS18120278-03MSD** Units: **ug/L** Analysis Date: **18-Dec-2018 18:06**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872167** 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	22.94	1.0	20	0	115	70 - 120	23.88	3.99	20	
1,1,1-Trichloroethane	21.46	1.0	20	0	107	70 - 130	22.68	5.56	20	
1,1,2,2-Tetrachloroethane	23.01	1.0	20	0	115	70 - 123	23.94	3.93	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	20.91	1.0	20	0	105	70 - 130	22.2	6	20	
1,1,2-Trichloroethane	23.16	1.0	20	0	116	70 - 117	24.23	4.52	20	
1,1-Dichloroethane	22.19	1.0	20	0	111	70 - 127	23.28	4.8	20	
1,1-Dichloroethene	21.54	1.0	20	0.7106	104	70 - 130	23.18	7.34	20	
1,1-Dichloropropene	24.29	1.0	20	0	121	70 - 129	25.8	6.04	20	
1,2,3-Trichlorobenzene	22.99	1.0	20	0	115	70 - 130	24.51	6.4	20	
1,2,3-Trichloropropane	21.98	1.0	20	0	110	70 - 130	23.25	5.62	20	
1,2,4-Trichlorobenzene	22.88	1.0	20	0	114	70 - 125	23.82	4.03	20	
1,2,4-Trimethylbenzene	24.38	1.0	20	0	122	70 - 125	25.68	5.16	20	
1,2-Dibromo-3-chloropropane	20.49	1.0	20	0	102	70 - 130	21.8	6.15	20	
1,2-Dibromoethane	23.25	1.0	20	0	116	70 - 124	24.17	3.85	20	
1,2-Dichlorobenzene	22.08	1.0	20	0	110	70 - 115	23.25	5.16	20	
1,2-Dichloroethane	21.98	1.0	20	0	110	70 - 127	22.65	3	20	
1,2-Dichloropropane	24.76	1.0	20	0	124	70 - 122	25.31	2.19	20	S
1,3,5-Trimethylbenzene	24.4	1.0	20	0	122	70 - 126	25.78	5.52	20	
1,3-Dichlorobenzene	22.5	1.0	20	0	112	70 - 119	23.52	4.46	20	
1,3-Dichloropropane	23.35	1.0	20	0	117	70 - 121	24.4	4.39	20	
1,4-Dichlorobenzene	24.57	1.0	20	0	123	70 - 114	25.75	4.7	20	S
2,2-Dichloropropane	20.71	1.0	20	0	104	70 - 130	21.93	5.72	20	
2-Butanone	45.19	2.0	40	0	113	70 - 130	45.49	0.66	20	
2-Chlorotoluene	23.65	1.0	20	0	118	70 - 130	24.73	4.47	20	
2-Hexanone	49.4	2.0	40	0	124	70 - 130	51.07	3.32	20	
4-Chlorotoluene	23.94	1.0	20	0	120	70 - 130	25.15	4.92	20	
4-Isopropyltoluene	25.24	1.0	20	0	126	70 - 130	26.9	6.37	20	
4-Methyl-2-pentanone	48.64	2.0	40	0	122	70 - 130	50.44	3.64	20	
Acetone	43.54	2.0	40	0	109	70 - 130	46	5.49	20	
Benzene	24.46	1.0	20	0	122	70 - 127	25.3	3.38	20	
Bromobenzene	22.37	1.0	20	0	112	70 - 115	23.78	6.13	20	
Bromochloromethane	23.65	1.0	20	0	118	70 - 127	24.54	3.69	20	
Bromodichloromethane	22.31	1.0	20	0	112	70 - 124	22.91	2.64	20	
Bromoform	20.15	1.0	20	0	101	70 - 129	20.79	3.11	20	

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MSD Sample ID: **HS18120278-03MSD** Units: **ug/L** Analysis Date: **18-Dec-2018 18:06**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872167** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Bromomethane	13.33	1.0	20	0	66.6	70 - 130	12.09	9.71	20	S
Carbon disulfide	42.21	2.0	40	0	106	70 - 130	44.81	5.98	20	
Carbon tetrachloride	23.31	1.0	20	0	117	70 - 130	24.05	3.09	20	
Chlorobenzene	24.33	1.0	20	1.542	114	70 - 114	25.62	5.14	20	
Chloroethane	20.67	1.0	20	0	103	70 - 130	24.72	17.8	20	
Chloroform	21.16	1.0	20	0	106	70 - 125	22.07	4.18	20	
Chloromethane	14.94	1.0	20	0	74.7	70 - 130	15.68	4.84	20	
cis-1,2-Dichloroethene	42.81	1.0	20	21.65	106	70 - 128	44.9	4.77	20	
cis-1,3-Dichloropropene	23.85	1.0	20	0	119	70 - 125	24.3	1.86	20	
Dibromochloromethane	23.1	1.0	20	0	115	70 - 124	23.74	2.73	20	
Dibromomethane	22.89	1.0	20	0	114	70 - 124	22.87	0.084	20	
Dichlorodifluoromethane	9.87	1.0	20	0	49.3	70 - 130	10.42	5.41	20	S
Ethylbenzene	23.86	1.0	20	0	119	70 - 124	25.15	5.24	20	
Hexachlorobutadiene	26.61	1.0	20	0	133	70 - 130	28.15	5.63	20	S
Isopropylbenzene	24.62	1.0	20	0	123	70 - 130	26.04	5.58	20	
m,p-Xylene	48.45	2.0	40	0	121	70 - 130	50.97	5.06	20	
Methylene chloride	22.91	2.0	20	0	115	70 - 128	24.38	6.23	20	
Naphthalene	24.2	1.0	20	0	121	70 - 130	25.37	4.71	20	
n-Butylbenzene	25.57	1.0	20	0	128	70 - 130	26.87	4.97	20	
n-Propylbenzene	24.76	1.0	20	0	124	70 - 130	26.34	6.18	20	
o-Xylene	24	1.0	20	0	120	70 - 124	25.44	5.82	20	
sec-Butylbenzene	25.1	1.0	20	0	125	70 - 130	26.76	6.41	20	
Styrene	24.44	1.0	20	0	122	70 - 130	25.73	5.15	20	
tert-Butylbenzene	24.73	1.0	20	0	124	70 - 130	26.06	5.27	20	
Tetrachloroethene	24.06	1.0	20	0	120	70 - 130	25.53	5.9	20	
Toluene	23.77	1.0	20	0	119	70 - 123	25.16	5.68	20	
trans-1,2-Dichloroethene	21.99	1.0	20	0	110	70 - 130	23.47	6.52	20	
trans-1,3-Dichloropropene	20.89	1.0	20	0	104	70 - 121	21.37	2.3	20	
Trichloroethene	68.98	1.0	20	47.56	107	70 - 129	72.45	4.9	20	
Trichlorofluoromethane	19.31	1.0	20	0	96.6	70 - 130	20.92	8.01	20	
Vinyl chloride	18.76	1.0	20	0	93.8	70 - 130	20.18	7.31	20	
Surr: 1,2-Dichloroethane-d4	*43.56*	*1.0*	*50*	*0*	*87.1*	*70 - 126*	*44.17*	*1.38*	*20*	
Surr: 4-Bromofluorobenzene	*51.09*	*1.0*	*50*	*0*	*102*	*81 - 113*	*51.45*	*0.704*	*20*	
Surr: Dibromofluoromethane	*44.93*	*1.0*	*50*	*0*	*89.9*	*77 - 123*	*45.03*	*0.218*	*20*	

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: HS18120278

QC BATCH REPORT

Batch ID: R329535 **Instrument: VOA9** **Method: SW8260**

MSD Sample ID: **HS18120278-03MSD** Units: **ug/L** Analysis Date: **18-Dec-2018 18:06**
Client ID: **12WW24-181204** Run ID: **VOA9_329535** SeqNo: **4872167** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Surr: Toluene-d8	*52.59*	*1.0*	*50*	*0*	*105*	*82 - 127*	*53.03*	*0.822*	*20*	

The following samples were analyzed in this batch: HS18120278-01 HS18120278-02 HS18120278-03 HS18120278-04 HS18120278-05

ALS Houston, US Date: 19-Dec-18

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAARP - 12
WorkOrder: **HS18120278**

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

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
North Carolina	624-2018	31-Dec-2018
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	22-Dec-2018
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019

ALS Houston, US Date: 19-Dec-18

Sample Receipt Checklist

Client Name: CBI-Houston
Work Order: HS18120278
Date/Time Received: **05-Dec-2018 09:30**
Received by: **RPG**

Checklist completed by: *Raegen Giga* eSignature 6-Dec-2018 Date
Reviewed by: *Sonia West* eSignature 10-Dec-2018 Date

Matrices: **GW**
Carrier name: **ALS.HS**

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):	1.8c/2.1c uc/c	IR 25	
Cooler(s)/Kit(s):	25741		
Date/Time sample(s) sent to storage:	12/05/2018 19:55		
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:

APTIM

COC ID: LHAAP12-DEC2018-ALSHT-1812-

TURNAROUND TIME: normal

RUSH:

Page 1 of

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-12			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stanchiff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company			

HS18120278

Aptim Environmental & Infrastucture, Inc.

LHAARP - 12

SAMPLE DETAILS									ANALYSIS REQUESTED
Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Vocs by 8260B (3-40ml Voa Vials w/HCL)
12WW21-181204	LHAAP12	22.20	22.43		WG	12/4/18	1005	3	X
12WW21-181204-FD	LHAAP12	22.20	22.43		WG	12/4/18	1005	3	X
12WW24-181204	LHAAP12	22.87	23.12		WG	12/4/18	1110	3	X
12WW24-181204-MS	LHAAP12	22.87	23.12		WG	12/4/18	1110	3	X
12WW24-181204-MSD	LHAAP12	22.87	23.12		WG	12/4/18	1110	3	X
12WW20-181204	LHAAP12	18.35	18.58		WG	12/4/18	1205	3	X
TRIP BLANK					W	12/4/18		2	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	[illegible] BHHE	12/4/18 1400	R Ciga	12/5/18 09.30 m
				cooler # 25741
				TEMP - 1.8c
				IR 25 CF +0.3c

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

25741

CUSTODY SEAL

Date: 12/4/18 Time: 1400
Name: Scott Beesinger
Company: BHATE

Seal Broken By: SM
Date: 12/05/18

25741 DEC 0 5 2018

Must Deliver Next Business Day
Time and Tempature Sensitive!

25741

ORIGIN ID:SGRA (903) 930-8193
ATT: SCOTT BEESINGER
APTIM ENVIRONMENTAL & INFRAST. INC
1203-B EAST GRAND AVE PMB202

MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 28NOV18
ACTWGT: 1.00 LB MAN
CAD: 3001307CAFE3211
DIMS: 19x16x13 IN

TO **CLIENT SERVICES**
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: LHAAP-BO 62490-RJ

RMA:

FedEx Express

FedEx
TRK# 0221 4380 9535 0865

WED - 05 DEC 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH

FID 162705 04DEC18 GGGA 553C1/FFFE/8C6A

Chemical Analytical Data Review/Validation Form

Report Type: { } Preliminary {X} Final

Project Number: 501032 Project Name: LHAAP-12, Dec 2018 event

Analysis/Method: VOCs/SW8260 Laboratory: ALS SDG # HS18120278

Evaluated By: Shuang Date Evaluated: 1/7/2019

Sample Number(s): 12MW21-181204, 12MW21-181204FD, 12MW24-181204, 12MW20-181204, AND trip blank

REVIEW QUESTIONS	YES	NO	COMMENTS
1. Were holding times met?	X		Sampled on 12/4/2018, analyzed on 12/18/2018
2. Were sample preservation requirements met? (Sample condition, preservation, containers, temperature, etc.)	X		1.8 deg C, preserved with HCL
3. Were QAPP specified PQLs achieved?	X		LOQ>LOD>DL, ND at LOD
4. Were measurement results for all QAPP-specific target analytes reported?	X		
5. Was a method blank prepared and analyzed with each batch?	X		
6. Were target analytes reported in the method blank above the PQL?		X	VOCs ND in the blank
7. Was an equipment blank collected and analyzed at the required frequency stated in the site-specific FSP?		X	
8. Were target analytes reported in field blank analyses (trip or equipment) above the PQL?		X	Acetone was detected at 2.7 ppb>LOQ (2 ppb). Acetone was ND in all samples, no impact
9. Was a field duplicate analyzed? Were RPDs within QAPP specifications?	X		12MW21/FD, VOCS ND in the pair
10. Surrogate Recoveries – Were all samples spiked prior to purging or preparation?	X		
11. Were surrogate recoveries within QAPP specifications?	X		
12. Was an LCD/LCSD pair prepared and analyzed with each batch?	X		
13. Were LCS/LCSD RPDs within recoveries within QAPP specifications?		X	1,4-dicholobenzene 115% (79-113% lab, 79-118% DoD), hexachlorobutadiene at 133% (73-127% lab, 66-134% DoD), both are within the DoD limits. anlaytes ND, no impact
14. Was a MS/MSD pair prepared with each batch?	X		

REVIEW QUESTIONS	YES	NO	COMMENTS
15. Is the MS/MSD parent sample a project sample?		X	12MW24, chlorobenzene 120/114% (DoD 82-118%, lab 70-114%), J/8A in all detected sample The lab report indicated high bias MS/MSD recoveries for other VOCs, however these analytes were ND and were not affected by high biased MS/MSD. Bromomethane and dichlorofluoromethane in MS/MSD were within the DoD LCS control limits but below lab in house limits. no impact since the DoD requirements were met.
16. Were initial calibration standards analyzed at the QAPP-specific frequency for each instrument?	X		
17. Were these results within project specifications?	X		
18. Were continuing calibration standards analyzed at the QAPP-specific frequency for each instrument?	X		
19. Were these results within project specifications?	X		
20. Were laboratory-generated Quality Control Exception Reports (i.e., QCERs) issued? If yes, summarize contents.			
21. Were lab comments included in the report? If yes, summarize contents			

12MW24:
1,1-dichloroethane: 0.71 ppb
Chlorobenzene: 1.5 ppb
Cis-1,2dichloroethene: 22 ppb
Trichloroethene: 48 ppb
All other VOCs ND in this sample.

VOCs ND all other samples

1/7/2019: reviewed EDD. Results in EDD matched the hardcopy

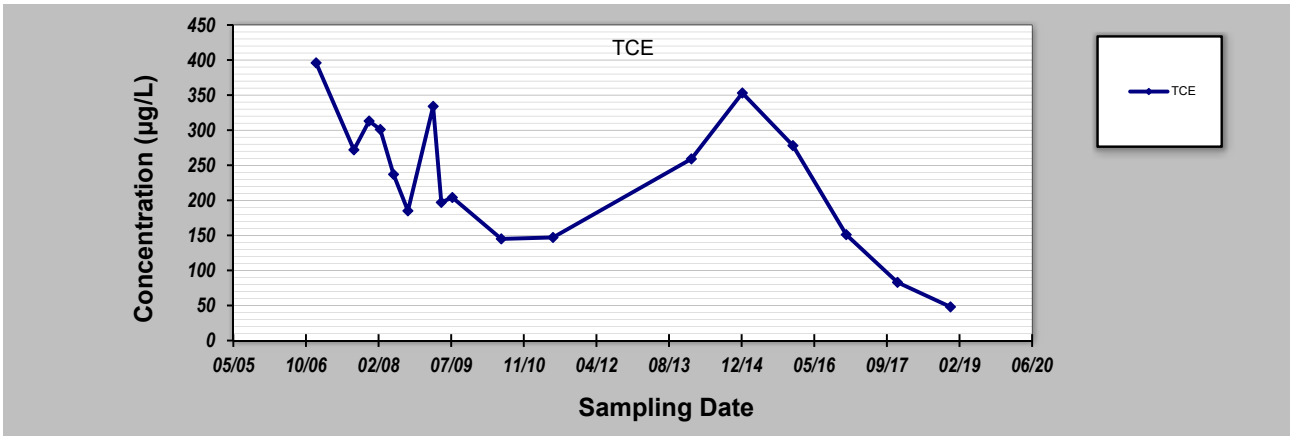
Appendix E

Mann-Kendall Trend Test Results

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-19	Job ID:	501032
Facility Name:	LHAAP-12	Constituent:	12WW24
Conducted By:	Robert Mayer	Concentration Units:	µg/L
Sampling Point ID:	TCE		

Sampling Event	Sampling Date	12WW24 CONCENTRATION (µg/L)
1	19-Dec-06	396
2	5-Sep-07	272
3	19-Dec-07	313
4	5-Mar-08	301
5	4-Jun-08	237
6	11-Sep-08	185
7	4-Mar-09	334
8	29-Apr-09	197
9	14-Jul-09	204
10	16-Jun-10	145
11	7-Jun-11	147
12	15-Jan-14	259
13	1-Jan-15	353
14	15-Dec-15	278
15	16-Dec-16	151
16	4-Dec-17	83
17	4-Dec-18	48
18		
19		
20		
Coefficient of Variation:		0.42
Mann-Kendall Statistic (S):		-60
Confidence Factor:		99.3%
Concentration Trend:		Decreasing



Notes:

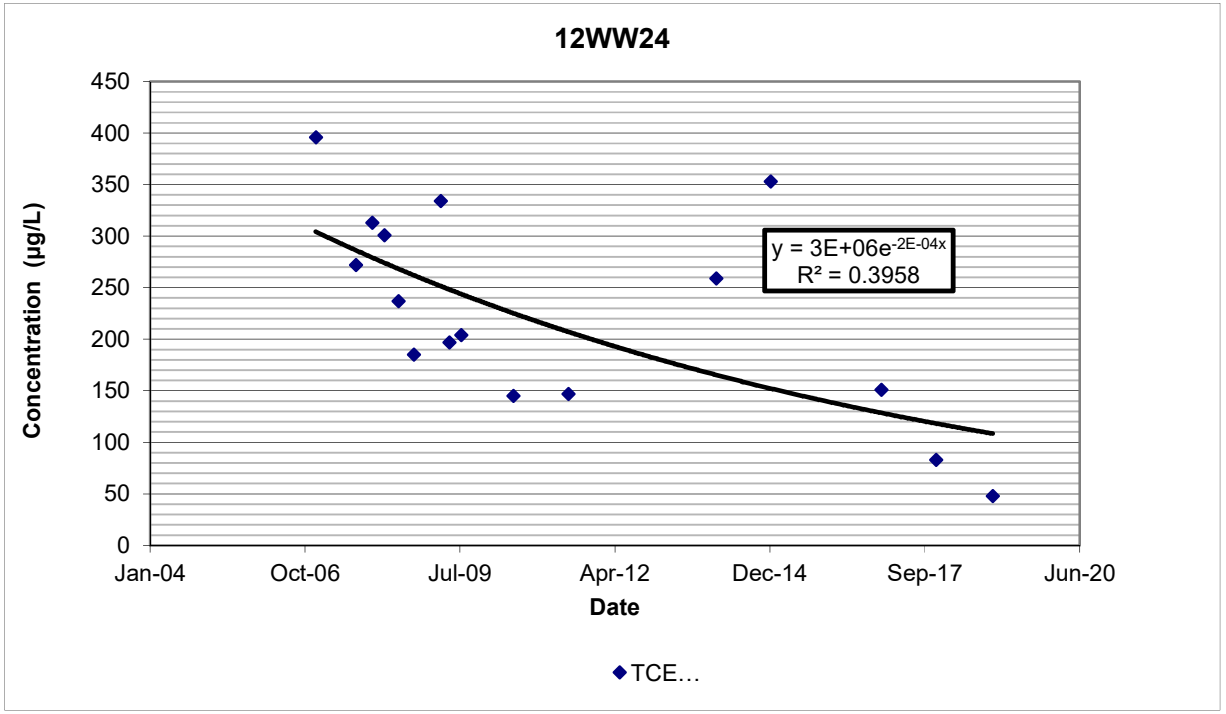
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Appendix F

Degradation Rates

Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
12WW24

Date	TCE (µg/L)
19-Dec-06	396
5-Sep-07	272
19-Dec-07	313
5-Mar-08	301
4-Jun-08	237
11-Sep-08	185
4-Mar-09	334
29-Apr-09	197
14-Jul-09	204
16-Jun-10	145
7-Jun-11	147
15-Jan-14	259
1-Jan-15	353
15-Dec-15	278
16-Dec-16	151
4-Dec-17	83
4-Dec-18	48



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
12WW24	0.0002	2937.1	8.0	48	5	26.3

Notes:

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
DCA - dichloroethane
DCE - dichloroethene
MCL - maximum contaminant level
TCE - trichloroethene

Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
12WW24

Date	TCE (µg/L)
19-Dec-06	396
5-Sep-07	272
19-Dec-07	313
5-Mar-08	301
4-Jun-08	237
11-Sep-08	185
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16-Jun-10	145
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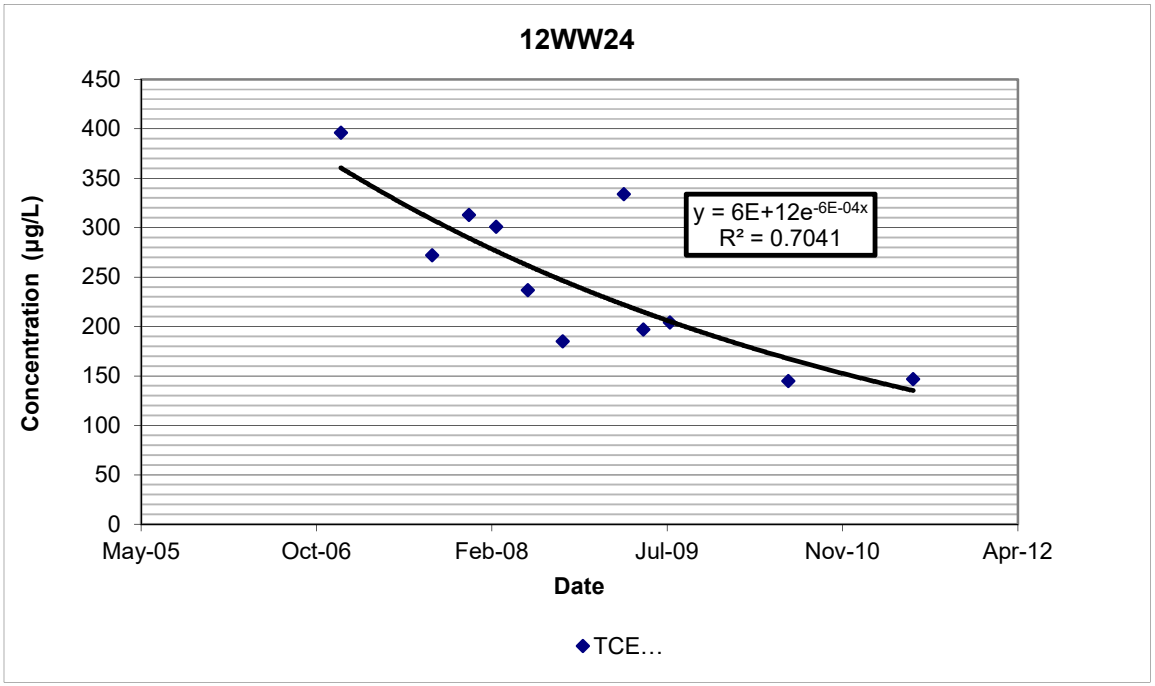
15-Jan-14	259
1-Jan-15	353
15-Dec-15	278
16-Dec-16	151
4-Dec-17	83
4-Dec-18	48



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
12WW24	0.0006	1155.2	3.2	147	5	15.4

Notes:

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

DCA - dichloroethane

DCE - dichloroethene

MCL - maximum contaminant level

TCE - trichloroethene

Subject:	**Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**
Location of Meeting:	**Teleconference**
Date of Meeting:	**20 June 2019– 10:00 AM Central Standard Time (CDT)**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
EPA:	Dorelle Harrison
TCEQ:	April Palmie (AP)
USACE:	Aaron Williams (AW)
AEC:	Andrew Maly and Amanda Sherman
USGS:	Kent Becher
Bhate:	Kim Nemmers (KN)
APTIM:	Bill Foss (BF) and Susan Watson (SW)

Action Items

Bhate/APTIM: BF stated that a round of groundwater elevation readings at LHAAP-16 was collected at the end of May, and potentiometric maps were prepared to compare the May 2019 readings to the October 2018 readings. Bill stated that the flow direction does not appear to differ much from the October maps, but that the ground water elevation is about 3 to 4 feet higher. BF stated that a list of wells for the baseline event is also being developed and will be sent with the potentiometric maps for discussion.

For the Oil and Gas Water Well Drilling Impact Update, United States Fish and Wildlife (USFWS) was not on the call. RMZ stated that she thought it can be as simple as a protocol for new developments.

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

KN stated that the leak at LHAAP-18/24 had been repaired but that the line out to 18WW17 was capped. When the 2-inch well was repaired, then water was entering from the line that runs to extraction well 18WW17. The entire line to the wood will need to be excavated to find the leak but the soil is too wet to complete this work at this time. KN stated that the water line for the ICTs is online and working but the repair to the line out to 18WW17 will not be done until July sometime. RMZ asked that the repairing of the line to extraction well 18WW17 be included as an action item that is tracked.

KN explained that the groundwater treatment plant (GWTP) was not operating currently due to the pump for the air stripper feed seizing up. KN stated that bearings and seals needed to be replaced and that the same repairs occurred about 1.5 years ago. So, KN stated that the reason for the repairs is being evaluated to determine if it can be avoided or if regular proactive management of the pump is needed in the future.

AW stated that the award for the transformer replacement will be this week or early next week, and then the installation will be about a month out. So the transformer is about one month out and should be installed the end of July and or beginning of August 2019. AW explained that the transformer was being improved with increased impedance, bayonet fusing and current limiting fusing to protect the transformer from a storm current surge.

RMZ asked if the revised schedule will work. BF stated that the sequencing of the work is flexible, and the excavation at LHAAP-17 can start ahead of the injections, and well installation at LHAAP-16. BF said that the site conditions are being evaluated, and then the transformer installation plans will be considered.

BF stated that the field work includes excavation at LHAAP-17 and LHAAP-03, baseline sampling at LHAAP-16, and injections at LHAAP-04, LHAAP-16, and eventually LHAAP-50. BF stated that the same field personnel are planned for most of the work. BF stated that the priority is the well installation at LHAAP-16. BF stated that well installation is needed at LHAAP- -12, -16, -50 and -67. BF said that a bulldozer will be obtained for Scott Beesinger (onsite GWTP operator) to create access for the installation of the new wells. BF plans to be onsite with Rob Mayer (bioremediation expert) July 1 and 2, 2019 to look over the site conditions. BF said that the planned well installations will be completed the week of July 15th if site conditions allow. BF said that the excavation at LHAAP-03 is planned to piggy-back on the LHAAP-17 excavation given how small of a dig it is. RMZ asked if things look good, how long will the field work last. BF said that the schedule calls for two months with a week and a half of float time.

AP asked when the UIC injection information will be submitted for LHAAP-04 and LHAAP-50 BF said that the information has not been put together, but would be shortly. RMZ pointed out that it is a 30 day out notification. AP said that what was done for LHAAP-16 was a good example.

RMZ asked about the potential well installation at LHAAP-03. AP asked about LHAAP-03 and excavating around the well versus abandonment of the well. BF said that the well is still being used for performance monitoring for LHAAP-58. AP said that her concern is that material will be left around the well could still be detected in the well if everything isn't removed. RMZ stated that she has similar concerns and had the depth of the well evaluated. BF said that 8 feet of the annular seal (grout) will be left in the ground above the top of the filter pack below the excavation, which will include hand-digging around the well. AP stated that it seems like a lot of effort hand digging to save a well. BF said that if the well gets damaged during the excavation, then the well will be replaced.

KN asked everyone to refer to the Document and Issues Tracking Table dated June 20, 2019.

- **Task 1** (Project Management) -
  - KN stated that the May 2019 MMM Minutes were final.
  - KN stated that the Restoration Advisory Board (RAB) Meeting was being held the following month.
- **Task 3** (LHAAP-03) – BF stated that response to comments (RTCs) from the Regulators on the Remedial Design (RD)/Remedial Action Work Plan (RAWP) for LHAAP-03 are prepared and will be going to the Army for review. The RTCs will then be issued to the Regulators.
- **Task 4** (LHAAP-04) – BF stated that there are no current documents.
- **Task 5** (LHAAP-12) – BF stated that the Regulators had no comments on the Draft 2018 Annual Remedial Action Operation (RA-O) Report. BF stated that a final cover will be provided along with a transmittal letter that indicates no comments were received on the draft report. BF asked if new pages need to be issued because the footers say "Draft" or if a letter say that the document is final with no comments would be sufficient. BF said that the version going into the administrative record (AR) will have the word "final" on the cover and will include the letter. New compact discs (CDs) will be send out with the word Final but the hard copy will have only a new cover sheet and letter. RMZ said that the Federal Facility Agreement needs to be followed. AP also said that a CD is not necessary if it can

be downloaded. AP wants to move away from CDs because they just get thrown away. AP said she would provide something in writing regarding elimination of CDs.

- **Task 6** (LHAAP-16) – BF stated that May 2019 potentiometric maps will be provided along with the October 2018 maps plus the proposed baseline sampling event wells.
- **Task 7** (LHAAP-17) – BF stated that no documents are currently in process for LHAAP-17.
- **Task 9** (LHAAP-37) – BF stated that LHAAP-37 Year 2, Quarter 3 was completed in May. BF stated that the validated data will be provided at the July 2019 MMM.
- **Task 10** (LHAAP-46) – BF stated that the 2nd Semi-Annual event is planned for August 2019.
- **Task 11** (LHAAP-50) – BF stated that sampling was completed in May and the validated data would be available for the July 2019 meeting. BF stated that the Regulatory comments on the Explanation of Significant Difference (ESD) for a contingency remedy were received and that responses to the ESD comments are in Army review; due to the Regulators by July 8, 2019. BF also stated that the RD/RAWP is under Army review.
- **Task 12** (LHAAP-58) – KN stated that the LHAAP-58 sampling was completed and that validated data will be provided at the July 2019 MMM. KN stated that the Year 5 RA-O Report will be prepared once the data is received and validated.
- **Task 13** (LHAAP-67) – BF stated that the 2nd semi-annual Year 5 sampling was completed in May. BF stated that validated data from the May 2019 event will be available for the July 2019 MMM.
- **Task 14** (LHAAP-001-R and –003-R) - KN stated that no documents are in process.
- **Task 16** (GWTP) **–** KN stated that the 4th Quarter GWTP Report is being delivered on June 20, 2019 via Federal Express. AP asked if an email was being sent to which KN stated that an email would be provided after the meeting. KN stated that the 1st Quarter 2019 GWTP Report is under internal review.
- **Task 17** (LHAAP-18/24) – KN stated that the LHAAP-18/24 analytical data from December 2018 is presented within the 4th Quarter GWTP Report.
- **Task 18** (Surface Water) – KN stated that surface water would be collected in June or early July 2019.
- **AR –** SW said that the December 2018 AR should be sent out next week. SW said that the list of documents for the AR is being completed for the 1st quarter.

Update on other DERP Sites

- **LHAAP 18/24** – AW explained that the Final Proposed Plan (PP) for LHAAP-18/24 will be placed into the AR. AW stated that the Record of Decision (ROD) is being prepared for submittal to the Regulators on September 6, 2019.
- **LHAAP-29** – AW stated that the LHAAP-29 PP is ready for AR. Regulator comments on the ROD have been addressed and are under Army legal review. RTCs will be released by July 15, 2019.
- **LHAAP-47** – AW stated that the Post-Screening Investigation (PSI) Report is ready for the AR. AW explained that the Addendum to the PSI Report has been through a few, internal iterations but should be submitted next week. The draft ROD should be submitted by August 17, 2019.
- **Five Year Review (FYR)** – RMZ said that the FYR has an errata sheet, and the Army is determining if figures can be revised. AP said that she doesn't think the FYR should go into the AR until the changes are made. RMZ concurred with AP.

Schedule Next Managers' Meeting

The next MMM will be held on 25 July 2019 at 10:30 am CDT at the Karnack Community Center if power is not restored to the trailer at the LHAAP GWTP.

Call concluded at 10:47 am CDT.

ACRONYM LIST

AP	April Palmie
APTIM	APTIM Federal Services, LLC
AR	Administrative Record
AW	Aaron Williams
BF	Bill Foss
Bhate	Bhate Environmental Associates, Inc.
BRAC	Base Realignment and Closure
CD	Compact Disc
CDT	Central Daylight Time
DERP	Defense Environmental Restoration Program
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five Year Review
GWTP	Ground Water Treatment Plant
ICT	Interception-Collection Trench
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
MMM	Monthly Managers' Meeting
PBR	Performance-Based Remediation
PP	Proposed Plan
PSI	Post-Screening Investigation
RAB	Restoration Advisory Board
RA-O	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
RMZ	Rose M. Zeiler
ROD	Record of Decision
RTC	Response to Comment
SW	Susan Watson
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

LHAAP Data Validated
May 2019

GWTP Effluent	*Weekly Perchlorate Sampling – May 2019* Perchlorate (6850)
GWTP Effluent	*Weekly, Bi-Weekly, and Monthly Sampling – May 2019* Ammonia (350.3) Ortho-Phosphate (365.3) Organic Carbon (415.1) VOC (8260C) Metals (6020A) Hexavalent Chromium (7196A) 1,4-Dioxane (8270D-SIM) Anions (9056)
GWTP Influent	*Monthly Sampling – May 2019* Metals (6020A) Perchlorate (6850) Hexavalent Chromium (7196A)
GWTP Quarterly	*Influent and Effluent – May 2019* Oil and Grease (1664A) Perchlorate (6850) Metals (6020A) 1,4-Dioxane (8270D-SIM) Chemical Oxygen Demand (410.4) VOC (8260C) Anions (9056)

GWTP Weekly/Effluent Perchlorate Sampling - May 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_050119_BIX 5/1/19	LH18/24-SP650_050719_BIX 5/7/19	LH18/24-SP650_050719_BIX 5/7/19	LH18/24-SP650_051419_BIX 5/14/19	LH18/24-SP650_052119_BIX 5/21/19	LH18/24-SP650_052919_BIX 5/29/19	LH18/24-SP650_052919_BIX 5/29/19
Location Description			**Collected from a spigot on the discharge of effluent TK-650.**						
			Weekly	Weekly	Monthly EFF	Weekly	Weekly	Weekly	Quarterly EFF
Perchlorate (6850)									
Perchlorate	µg/L	589	**1.1 J**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

BIX - before ion exchange

GWTP Weekly Sampling - May 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_050119 5/1/19	LH18/24-SP650_050719 5/7/19	LH18/24-SP650_051419 5/14/19	LH18/24-SP650_052119 5/21/19	LH18/24-SP650_052919 5/29/19
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.**				
Ammonia as N (350.3)							
Ammonia as N	mg/L	NV	**24**	**21**	**14**	**11**	**10**
Ortho-Phosphate (365.3)							
Ortho-Phosphate	mg/L	NV	**6.2**	**4.95**	**4.22**	**2.47**	**2.21**
Organic Carbon (415.1)							
Total Organic Carbon (TOC)	mg/L	NV	**1.51**	**1.46**	**1.64**	**1.65**	**2.12**

mg/L - milligrams per liter

NV - No Value

GWTP Bi-Weekly Sampling - May 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_050119 5/1/19	LH 18/24-SP650_051419 5/14/19	LH18/24-SP650_052919 5/29/19
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Biweekly.**		
Volatile Organic Compounds (8260C)					
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U	< 0.5 U	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	181	**0.51 J**	< 0.5 U	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U	< 1.0 U	< 1.0 U
Benzene	µg/L	181	< 0.5 U	< 0.5 U	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U	< 0.5 U	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U	< 1.0 U	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U	< 0.5 U	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U	< 0.5 U	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	181	**0.65 J**	**0.56 J**	**0.85 J**
Vinyl chloride	µg/L	72	< 0.5 U	< 0.5 U	< 0.5 U
Anions (9056)					
Chloride	mg/L	NV	**302**	**231**	**252**
Sulfate	mg/L	NV	**15**	**24.1**	**34**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

NV - No Value

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Monthly Effluent Sampling - May 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_050719 5/7/19
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled monthly
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	**0.51 J**
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**0.65 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Barium	mg/L	2	**0.136**
Lead	mg/L	0.0046	< 0.00100 U
Selenium	mg/L	0.012	< 0.00250 U
Silver	mg/L	0.003	< 0.000500 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	< 0.0100 U
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**21**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Monthly Influent Sampling - May 2019

Location ID: Sample Date:	Units	LH18/24-SP140_050719 5/7/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.000500 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**4,200**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

GWTP Quarterly Effluent Sampling - May 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_052919 5/29/19
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Quarterly.
Oil and Grease (1664A)			
Oil & Grease	mg/L	15	**1.46 J**
Chemical Oxygen Demand (410.4)			
Chemical Oxygen Demand	mg/L	200	**16**
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 2.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 0.5 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**0.92 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Aluminum	mg/L	1.644	**0.0422**
Antimony	mg/L	NV	< 0.000500 U
Arsenic	mg/L	0.722	**0.000699 J**
Barium	mg/L	2	**0.114**
Beryllium	mg/L	NV	< 0.000500 U
Cadmium	mg/L	0.0034	< 0.000500 U
Calcium	mg/L	NV	**8.42**
Chromium	mg/L	0.752	**0.00105 J**
Cobalt	mg/L	11.495	**0.00105 J**
Iron	mg/L	2.395	**0.195 J**
Lead	mg/L	0.0046	< 0.00100 U
Magnesium	mg/L	NV	**10.7**

Manganese	mg/L	15.494	**0.0833**
Nickel	mg/L	0.184	**0.00257**
Potassium	mg/L	NV	**1.46**
Selenium	mg/L	0.012	< 0.00250 U
Silver	mg/L	0.003	< 0.000500 U
Sodium	mg/L	NV	**280**
Thallium	mg/L	NV	< 0.000500 U
Vanadium	mg/L	3.592	**0.000969 J**
Zinc	mg/L	0.31	**0.0228**
Mercury	mg/L	NV	**0.0000900 J**
Anions (9056)			
Chloride	mg/L	NV	**253**
Sulfate	mg/L	NV	**33**
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**5.1**

µg/L - micrograms per liter

mg/L - milligrams per liter

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

NV - No Value

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

GWTP Quarterly Influent Sampling - May 2019

Location ID: / Sample Date:	Units	LH18/24-SP140_052919 5/29/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Quarterly.**
Oil and Grease (1664A)		
Oil & Grease	mg/L	**6.56**
Chemical Oxygen Demand (410.4)		
Chemical Oxygen Demand	mg/L	**15**
Perchlorate (6850)		
Perchlorate	µg/L	**4,900**
Volatile Organic Compounds (8260C)		
1,1,1,2-Tetrachloroethane	µg/L	< 50 U
1,1,1-Trichloroethane	µg/L	< 50 U
1,1,2,2-Tetrachloroethane	µg/L	< 50 U
1,1,2-Trichloroethane	µg/L	< 50 U
1,1-Dichloroethane	µg/L	< 50 U
1,1-Dichloroethene	µg/L	< 50 U
1,1-Dichloropropene	µg/L	< 50 U
1,2,3-Trichlorobenzene	µg/L	< 50 U
1,2,3-Trichloropropane	µg/L	< 50 U
1,2,4-Trichlorobenzene	µg/L	< 50 U
1,2,4-Trimethylbenzene	µg/L	< 50 U
1,2-Dibromo-3-chloropropane	µg/L	< 50 U
1,2-Dibromoethane	µg/L	< 50 U
1,2-Dichlorobenzene	µg/L	< 50 U
1,2-Dichloroethane	µg/L	**53 J**
1,2-Dichloropropane	µg/L	< 50 U
1,3,5-Trimethylbenzene	µg/L	< 50 U
1,3-Dichlorobenzene	µg/L	< 50 U
1,3-Dichloropropane	µg/L	< 50 U
1,4-Dichlorobenzene	µg/L	< 50 U
2,2-Dichloropropane	µg/L	< 50 U
2-Butanone	µg/L	< 100 U
2-Chlorotoluene	µg/L	< 50 U
2-Hexanone	µg/L	< 100 U
4-Chlorotoluene	µg/L	< 50 U
4-Isopropyltoluene	µg/L	< 50 U
4-Methyl-2-pentanone	µg/L	< 100 U
Acetone	µg/L	< 100 U
Benzene	µg/L	< 50 U
Bromobenzene	µg/L	< 50 U
Bromochloromethane	µg/L	< 50 U
Bromodichloromethane	µg/L	< 50 U

Bromoform	µg/L	< 50 U
Bromomethane	µg/L	< 50 U
Carbon disulfide	µg/L	< 100 U
Carbon tetrachloride	µg/L	< 50 U
Chlorobenzene	µg/L	< 50 U
Chloroethane	µg/L	< 50 U
Chloroform	µg/L	< 50 U
Chloromethane	µg/L	< 50 U
cis-1,2-Dichloroethene	µg/L	**2,400**
cis-1,3-Dichloropropene	µg/L	< 50 U
Dibromochloromethane	µg/L	< 50 U
Dibromomethane	µg/L	< 50 U
Dichlorodifluoromethane	µg/L	< 50 U
Ethylbenzene	µg/L	< 50 U
Hexachlorobutadiene	µg/L	< 100 U
Isopropylbenzene	µg/L	< 50 U
m,p-Xylene	µg/L	< 100 U
Methylene chloride	µg/L	**3,900**
Naphthalene	µg/L	< 50 U
n-Butylbenzene	µg/L	< 50 U
n-Propylbenzene	µg/L	< 50 U
o-Xylene	µg/L	< 50 U
sec-Butylbenzene	µg/L	< 50 U
Styrene	µg/L	< 50 U
tert-Butylbenzene	µg/L	< 50 U
Tetrachloroethene	µg/L	**62 J**
Toluene	µg/L	< 50 U
trans-1,2-Dichloroethene	µg/L	< 50 U
trans-1,3-Dichloropropene	µg/L	< 50 U
Trichloroethene	µg/L	**5,600**
Trichlorofluoromethane	µg/L	< 50 U
Vinyl chloride	µg/L	< 50 U
Metals (6020A)		
Aluminum	mg/L	**0.165**
Antimony	mg/L	< 0.000500 U
Arsenic	mg/L	**0.00138 J**
Barium	mg/L	**0.448**
Beryllium	mg/L	< 0.000500 U
Cadmium	mg/L	< 0.000500 U
Calcium	mg/L	**22.2**
Chromium	mg/L	**0.00112 J**
Cobalt	mg/L	**0.00904**
Iron	mg/L	**1.04**
Lead	mg/L	< 0.00100 U
Magnesium	mg/L	**20.1**
Manganese	mg/L	**0.428**

Nickel	mg/L	**0.00947**
Potassium	mg/L	**1.41**
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.000500 U
Sodium	mg/L	**140**
Thallium	mg/L	< 0.000500 U
Vanadium	mg/L	**0.00202 J**
Zinc	mg/L	**0.0260**
Mercury	mg/L	< 0.000100 U
Anions (9056)		
Chloride	mg/L	**240**
Sulfate	mg/L	**37.4**
Semi-Volatile Organic Compounds (8270D SIM)		
1,4-Dioxane	µg/L	**8.6**

µg/L - micrograms per liter

mg/L - milligrams per liter

J -estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

QUARTERLY EVALUATION REPORT
1ST QUARTER (JANUARY - MARCH) 2019
GROUNDWATER TREATMENT PLANT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

JULY 2019

Prepared For:

U.S. Army Corps of Engineers
Tulsa District

Contract No. W9128F-13-D-0012
Task Order No. W912BV17F0150
Bhate Project No. NWO1312.0150.016.0001.03

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ACRONYMS AND ABBREVIATIONS

AMCV	Air Monitoring Comparison Value
amsl	Above mean sea level
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
CD	Compact disc
COD	Chemical oxygen demand
DCE	Dichloroethene
ESD	Explanation of Significant Difference
ESL	Effects Screening Level
FBR	Fluidized bed reactor
ft	Feet or foot
gpd	Gallons per day
gph	Gallons per hour
gpm	Gallons per minute
GWTP	Groundwater Treatment Plant
HCl	Hydrochloric acid
HDPE	High density polyethylene
ICT	Interception-collection trench
IRA	Interim Remedial Action
J	Estimated concentration
lbs/hr	Pounds per hour
LHAAP	Longhorn Army Ammunition Plant
MCL	Maximum Contaminant Level
µg/L	Micrograms per liter
$Mg(OH)_2$	Magnesium hydroxide
MSC	Medium Specific Concentration
mV	Millivolts
NA	Not applicable
NaOH	Sodium hydroxide
No.	Number

ORP	Oxidation-reduction potential
PCL	Protective Concentration Level
PID	Photoionization detector
ppmv	Parts per million by volume
psi	Pounds per square inch
ROD	Record of Decision
TAC	Texas Administrative Code
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
tpy	Tons per year
TRRP	Texas Risk Reduction Program
UEP	Unlined Evaporation Pond
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The operation of the Groundwater Treatment Plant (GWTP) is part of the Interim Remedial Action (IRA) at Burning Ground Number (No.) 3, also referred to as Longhorn Army Ammunition Plant (LHAAP)-18/24. A historical pilot test for nearby landfill LHAAP-16 resulted in the installation of eight extraction wells which also contribute groundwater to the GWTP. Groundwater extraction, treatment, and monitoring activities consist of:

- Continuous extraction of groundwater from multiple interception-collection trenches (ICTs) and extraction wells at both LHAAP-18/24 and LHAAP-16;
- Treatment of extracted groundwater for heavy metals, chlorinated compounds, and perchlorate using precipitation, air stripping, and biological methods, respectively;
- Evaluation of the hydraulic effectiveness of the extraction system by groundwater monitoring;
- Monitoring of treated groundwater to ensure compliance with the discharge limits; and
- Discharge of treated water to Harrison Bayou, or to a holding pond (INF Pond), or the treated water may be released as irrigation water on LHAAP-18/24.

The location of the extraction wells and ICTs are shown on **Figure A-1** in **Appendix A**. The process flow diagram of the GWTP is shown on **Figure A-2** in **Appendix A**.

Figure ES-1 depicts the monthly total volume of groundwater that was extracted from the ICTs and extraction wells at LHAAP-18/24 and LHAAP-16 between September 2012 and March 2019.

The GWTP was not operational during June, July, and August 2012. This was related to meltdown of the scrubber system, associated with the catalytic oxidizer, due to system overheating. Overheating occurred when the blower became inoperable after the bearing on the scrubber blower unit was shattered and damaged the blower. This occurred around 1:00 PM on May 21, 2012.

After developing an interim air monitoring plan and obtaining concurrence from the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA) to operate the GWTP without use of air abatement equipment, a pilot run of the GWTP was conducted on September 6, 2012. In that first pilot run, 85,170 gallons of water that had been stored in the influent equalization tank (TK-140) were treated. The treated water was re-circulated through the fluidized bed reactor (FBR) to revive the FBR after 3 months of dormancy. Treated groundwater and air samples were collected and analyzed respectively for perchlorate, metals, and Volatile Organic Compounds (VOCs); and VOCs only. On September 19, 2012, a second pilot run was performed at the GWTP and 107,264 gallons of water were treated. Based on the successful re-start of the GWTP, continuous groundwater extraction began again on September 24, 2012. While groundwater extraction occurs on a continuous basis, operation of the GWTP occurs intermittently due to the low volume of water available for treatment with respect to the design capacity of the GWTP. During the 3rd quarter of 2012, groundwater extraction occurred only from LHAAP-18/24. Groundwater extraction from LHAAP-16 was not

performed due to equipment failure. However, extraction from LHAAP-16 began in October 2012 and the extraction volumes increased steadily throughout the 4th quarter of 2012, as pumping equipment was gradually repaired/replaced. The GWTP operated under normal conditions until September 2015.

On September 14, 2015, at 11:15 AM, the blower on the air stripper (BL-340) malfunctioned during routine operation. The wiring on the blower was repaired and the blower operated for less than 2 hours on September 17, 2015, when the blower malfunctioned again. It was determined that the blower needed to be replaced, and groundwater extraction and operation of the GWTP ceased beginning September 18, 2015, as the influent equalization tank (TK-140) became full. Beginning on October 2, 2015, it was determined that the GWTP could operate without the blower at a reduced extraction rate. The operation of the GWTP allowed extraction of groundwater from ICTs 12E, 13A, 13B, and 13C (13C was changed to ICT 13E on October 12, 2015), which were considered critical ICTs to prevent migration of contaminants to Harrison Bayou. Groundwater extraction was switched frequently between ICTs 12E, 13A, 13B, and 13E to ICTs 14B, 14C, and 14D beginning on December 14, 2015.

On December 12, 2016, flange bolts at TK-380 failed and allowed hydrochloric acid (HCl) to drain into the sump. The containment area was washed down and the sump contents were transferred into the equalization tank (TK-140). Because of the acid release, extraction of groundwater from the ICTs was halted, and the GWTP was put into recycle mode (effluent sent back as influent) until the acid was neutralized and perchlorate, metals, and VOCs were below discharge criteria on March 17, 2017.

On August 12, 2017, severe storms caused a power outage at LHAAP-18/24. When electrical service was restored, the main transformer failed due to a manufacturing defect. A portable emergency generator was brought on-site on August 21, 2017, to allow the FBR to operate in full recycle mode. After a replacement transformer was installed on September 12, 2017, extraction began from ICT-13B, 13C, 13D, 13E, 13F, 7, and EW01 and the FBR was put into normal operation. Beginning on September 21, 2017, groundwater was extracted from all of the ICTs.

On December 27, 2018, severe storms caused a power outage in Karnack, Texas including LHAAP. When electrical service was restored, the main transformer failed due to a manufacturing defect. A portable emergency generator was brought on-site on December 28, 2018, to allow the FBR to operate in full recycle mode. After a replacement transformer was connected to the well field on February 11, 2019, extraction began from LHAAP-18/24, and the GWTP was put into normal operation. No extraction from LHAAP-16 occurred during the 1st Quarter 2019 due to the main transformer being down.

As shown on **Figure ES-1**, the total extracted groundwater volume from LHAAP-18/24 during the 1st quarter of 2019 was less than normal due to the main transformer being down. No groundwater was extracted in January 2019. In February and March 2019, repairs to the ICT and extraction well pumps and motor increased flow at LHAAP-18/24 but no groundwater was extracted during this quarter from LHAAP-16. The extracted groundwater volume was measured on a monthly basis as the sum of the difference between the flow meter totalizer reading at each

ICT between the beginning and end of each month. Extraction quantities in LHAAP-18/24 were 515,618 gallons in February 2019 and 1,063,734 gallons in March 2019.

No groundwater was extraction from LHAAP-16 in 1st Quarter 2019. Approximately 1,579,352 gallons of groundwater were extracted from LHAAP-18/24 during the 1st quarter of 2019 compared to approximately 1,672,185 gallons extracted during the 1st quarter 2018 (year prior).

No treated water was returned to ICTs 6 and 9 during the 1st quarter of 2019 because this practice was discontinued after system restart in September 2012.

The typical discharged flowrate from the GWTP was calculated as 11 gallons per minute (gpm) during the 1st quarter of 2019. Water discharge from the INF Pond varied from a flow rate of 18 gpm to 184 gpm. Approximately 588,518 gallons of groundwater was discharged from the GWTP to the Harrison Bayou, and 1,779,495 gallons was discharged from the INF Pond to the Harrison Bayou (see **Figure ES-2** below).

Grab perchlorate samples from the GWTP influent were collected monthly on February 28 and March 14, 2019, and the following concentrations were reported: 3,700 micrograms per liter (µg/L) and 8,300 µg/L, respectively. In addition, a quarterly influent sample was collected and analyzed for perchlorate with a result of 6,500 µg/L. The average perchlorate concentration using these three values from the GWTP influent during the quarter was 6,167 µg/L. With the exception of low detections in effluent samples collected on March 27, 2019, no perchlorate was detected in the effluent (TK-650) samples during the 1st quarter of 2019.

As shown in **Table ES-1**, all treated water was discharged directly from the GWTP to Harrison Bayou in 1st Quarter 2019. In addition, 1,779,495 gallons of treated water was discharged from the INF Pond to Harrison Bayou.

Groundwater was not extracted from LHAAP-18/24 in the 1st quarter of 2019 until February 11, 2019. After the GWTP resumed operation, the groundwater volume extracted for treatment at the LHAAP-18/24 increased from 515,618 gallons in February 2019 to 1,063,734 in March 2019. No groundwater was extracted from LHAAP-16 during the 1st quarter of 2019. The total water extracted for treatment by the GWTP for the 1st quarter of 2019 was approximately 1,579,352 gallons. The water quantities treated each month since June 2012 are shown on **Figure ES-2**. The total volume of water extracted from LHAAP-18/24 in the 1st quarter of 2019 (1,579,352 gallons) is higher than the volume of water discharged to the Harrison Bayou from the GWTP (588,518 gallons). The reason for the difference is the change in volume stored in the GWTP, the amount of water lost with the removed metals precipitation sludge, and the amount of evaporative water lost in the air stripper (which is included in the volume processed, but not in the volume discharged).

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Figure ES-1: Groundwater Recovery Between September 2012 & March 2019
LHAAP-18/24 & LHAAP-16

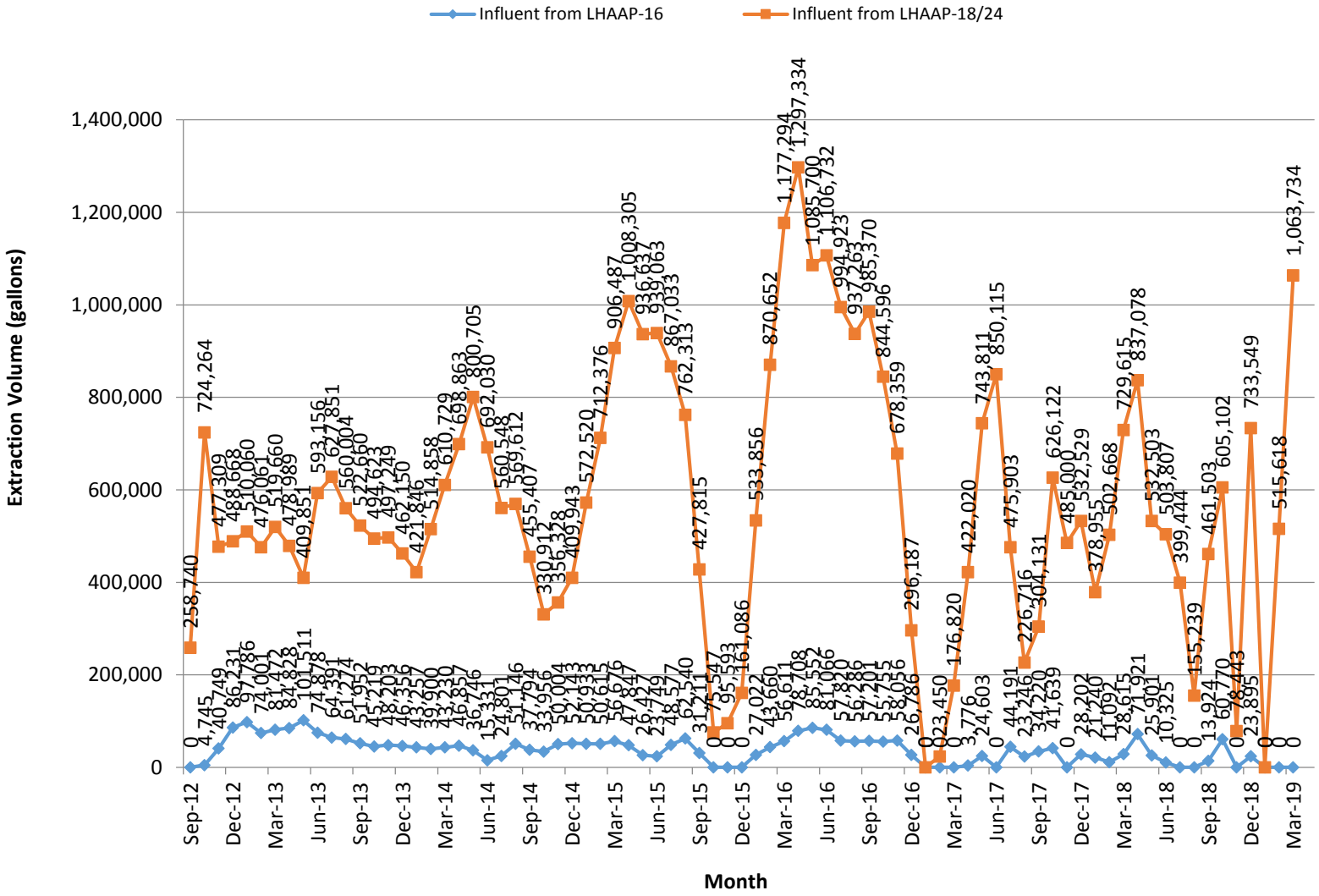


Figure ES-2
Treated Groundwater Discharged Monthly from June 2012 through March 2019

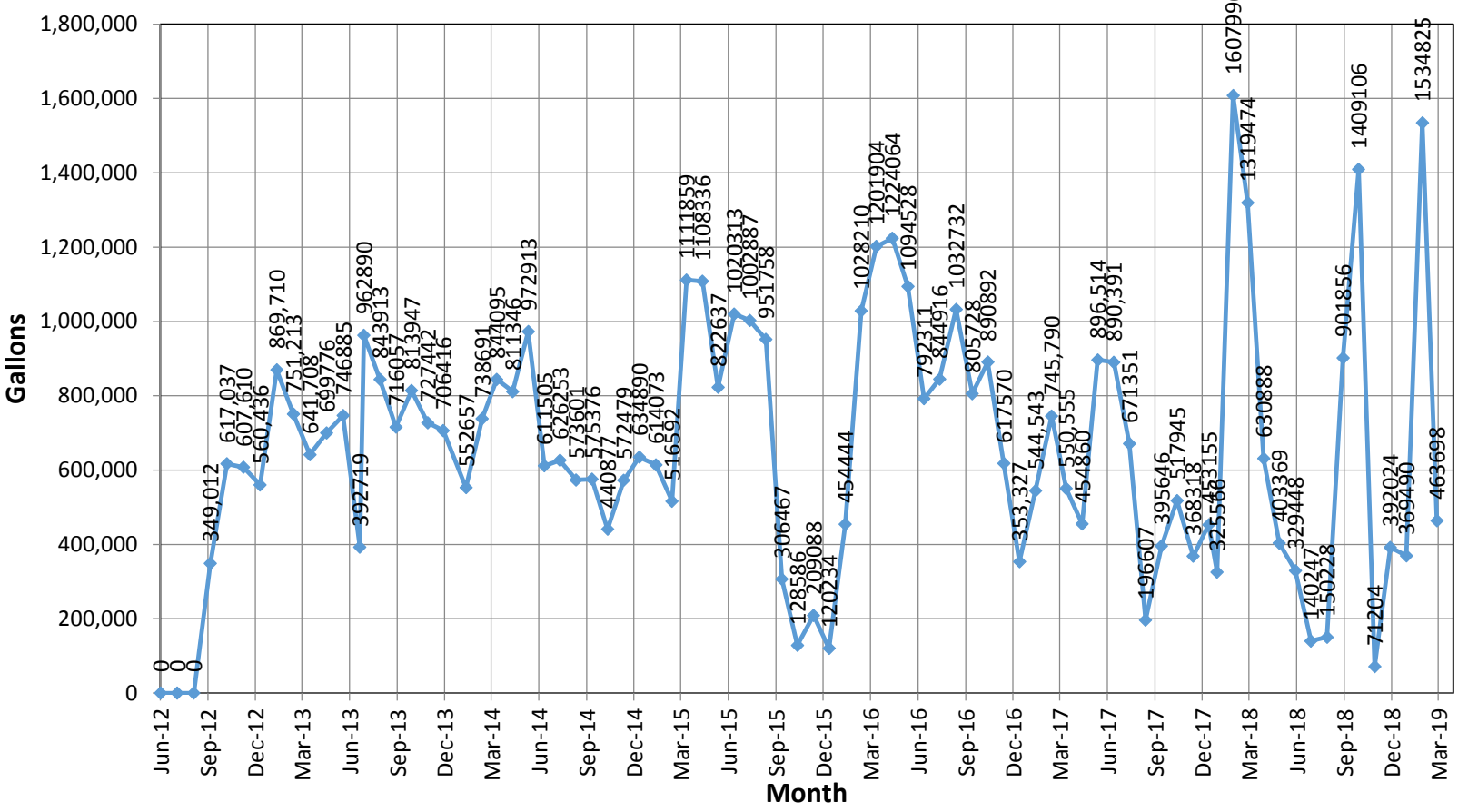


Table ES-1: Discharge Information to Harrison Bayou During 1st Quarter 2019

DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
01/01/2019	Not Measured	Not Calculated	0	0	0	0	0	6.25
01/02/2019	Not Measured	Not Calculated	0	0	0	0	0	6.46
01/03/2019	Not Measured	Not Calculated	0	0	0	0	0	6.50
01/04/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/05/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/06/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/07/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/08/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/09/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/10/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/11/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/12/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/13/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/14/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/15/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/16/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/17/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/18/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/19/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/20/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/21/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/22/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/23/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89
01/24/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89
01/25/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89
01/26/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89

DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
01/27/2019	Not Measured	Not Calculated	0	0	0	0	0	6.88
01/28/2019	Not Measured	Not Calculated	0	0	0	0	0	6.88
01/29/2019	16,975	305,560	0	176,319	0	0	176,319	6.45
01/30/2019	12,277	220,995	0	127,696	0	0	127,696	6.10
01/31/2019	8,224	148,042	0	65,475	0	0	65,475	5.92
02/01/2019	5,898	106,179	0	57,960	0	0	57,960	5.75
02/02/2019	Not Measured	Not Calculated	0	0	0	0	0	5.75
02/03/2019	Not Measured	Not Calculated	0	0	0	0	0	5.75
02/04/2019	Not Measured	Not Calculated	0	0	0	0	0	5.75
02/05/2019	Not Measured	Not Calculated	0	0	0	0	0	5.74
02/06/2019	Not Measured	Not Calculated	0	0	0	0	0	5.74
02/07/2019	Not Measured	Not Calculated	0	0	0	0	0	5.81
02/08/2019	Not Measured	Not Calculated	0	0	0	0	0	5.81
02/09/2019	Not Measured	Not Calculated	0	0	0	0	0	5.81
02/10/2019	Not Measured	Not Calculated	0	0	0	0	0	5.80
02/11/2019	11,579	3,383	893	0	0	893	893	5.83
02/12/2019	20,399	5,960	25,279	252,560	0	25,279	277,839	5.34
02/13/2019	13,411	3,918	15,361	221,340	0	15,361	236,701	4.78
02/14/2019	16,395	4,790	12,590	174,600	0	12,590	187,190	4.24
02/15/2019	15,454	4,515	9,109	174,240	0	9,109	183,349	3.69
02/16/2019	12,913	3,773	0	0	0	0	0	3.69
02/17/2019	10,373	3,031	21,479	0	0	21,479	21,479	3.69
02/18/2019	9,369	2,737	0	0	0	0	0	3.68
02/19/2019	8,366	2,444	17,960	0	0	17,960	17,960	3.68
02/20/2019	13,181	3,155	11,528	96,600	0	11,528	108,128	3.55
02/21/2019	20,096	4,810	11,444	28,025	0	11,444	39,469	3.50
02/22/2019	Flood Stage	Maximum	9,709	0	0	9,709	9,709	3.53
02/23/2019	Flood Stage	Maximum	0	0	0	0	0	3.60

DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
02/24/2019	Flood Stage	Maximum	0	0	0	0	0	3.70
02/25/2019	Flood Stage	Maximum	38,835	0	0	38,835	38,835	3.70
02/26/2019	21,127	5,057	10,568	132,480	0	10,568	143,048	3.35
02/27/2019	19,533	4,675	11,891	97,680	0	11,891	109,571	3.15
02/28/2019	16,620	4,856	11,694	91,000	0	11,694	102,694	2.85
03/01/2019	16,125	4,711	11,607	83,520	0	11,607	95,127	2.47
03/02/2019	16,806	4,911	0	0	0	0	0	2.50
03/03/2019	Flood Stage	Maximum	0	0	0	0	0	2.50
03/04/2019	32,976	9,636	35,970	0	0	35,970	35,970	2.50
03/05/2019	23,207	6,781	10,521	0	0	10,521	10,521	2.50
03/06/2019	16,822	4,915	7,756	0	0	7,756	7,756	2.50
03/07/2019	10,652	3,564	4,826	0	0	4,826	4,826	2.50
03/08/2019	10,204	3,414	11,008	0	0	11,008	11,008	2.50
03/09/2019	18,255	5,464	0	0	0	0	0	2.50
03/10/2019	15,231	5,026	0	0	0	0	0	2.50
03/11/2019	14,601	4,885	34,669	0	0	34,669	34,669	2.49
03/12/2019	19,104	6,391	12,730	0	0	12,730	12,730	2.49
03/13/2019	16,809	5,624	12,255	0	0	12,255	12,255	2.58
03/14/2019	Flood Stage	Maximum	12,733	0	0	12,733	12,733	2.66
03/15/2019	Flood Stage	Maximum	10,626	0	0	10,626	10,626	2.66
03/16/2019	Flood Stage	Maximum	0	0	0	0	0	2.65
03/17/2019	20,598	5,723	0	0	0	0	0	2.65
03/18/2019	17,339	5,066	33,160	0	0	33,160	33,160	2.65
03/19/2019	7,625	2,228	14,714	0	0	14,714	14,714	2.64
03/20/2019	5,599	1,636	15,654	0	0	15,654	15,654	2.64
03/21/2019	6,950	2,031	8,703	0	0	8,703	8,703	2.64
03/22/2019	5,977	1,746	9,406	0	0	9,406	9,406	2.63
03/23/2019	5,326	1,544	0	0	0	0	0	2.63

DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
03/24/2019	4,856	1,408	0	0	0	0	0	2.63
03/25/2019	4,431	1,295	18,556	0	0	18,556	18,556	2.66
03/26/2019	5,221	1,525	16,413	0	0	16,413	16,413	2.66
03/27/2019	5,592	1,634	16,818	0	0	16,818	16,818	2.66
03/28/2019	9,196	2,687	18,192	0	0	18,192	18,192	2.65
03/29/2019	7,977	2,331	15,769	0	0	15,769	15,769	2.65
03/30/2019	6,231	1,806	0	0	0	0	0	2.65
03/31/2019	5,426	1,573	48,092	0	0	48,092	48,092	2.65
Totals			**588,518**	**1,779,495**	**0**	**588,518**	**2,368,013**	

Notes: 1) Bayou flow is not measured on days when no release to the Bayou occurs from the GWTP or INF Pond.
2) When the bayou is in flood stage (over the banks), the flow is not measured and the maximum release is allowed.

1 EVALUATION OF GROUNDWATER TREATMENT PLANT

The Groundwater Treatment Plant (GWTP) was constructed as part of the Interim Remedial Action (IRA) at Burning Ground Number (No.) 3, also referred to as Longhorn Army Ammunition Plant (LHAAP)-18/24, to treat groundwater extracted from interception-collection trenches (ICTs) and extraction wells. **Figure A-1** located in **Appendix A** presents the layout of the ICTs and extraction wells at LHAAP-18/24. The groundwater contamination at LHAAP-18/24 likely resulted from infiltration from an Unlined Evaporation Pond (UEP) that was used to store manufacturing wastewater, and from burning trenches and other industrial processes used to flash pyrotechnic, propellant, and explosive waste streams. The groundwater at LHAAP-18/24 is contaminated mainly with chlorinated ethenes and perchlorate, with lesser concentrations of 1,4-dioxane.

The GWTP also receives flow from eight extraction wells installed at LHAAP-16 as part of a historical treatability study. The extraction wells were installed in 1996 and 1997. The wells are located between the landfill at LHAAP-16 and Harrison Bayou. The groundwater at LHAAP-16 is also contaminated mainly with chlorinated ethenes and perchlorate.

1.1 Treatment Configuration

The process flow diagram for the GWTP is presented in **Appendix A, Figure A-2**. The GWTP was not operational between May 24, 2012, and September 6, 2012, due to malfunction of the scrubber unit associated with the catalytic oxidizer. Since September 6, 2012, the GWTP has operated without air abatement equipment. Although major repairs were conducted on the GWTP (e.g., replacement of level alarms, repair of the hydrochloric acid [HCl] tank, replacement of TK-650, replacement of malfunctioning valves and flow meters, replacement of metering pumps, repair or replacement of various system pumps, rust removal and repainting of various tanks, and replacement and repair of various extraction pumps, motors, and level switches), the GWTP treatment configuration has remained unchanged.

Malfunction of the blower on the air stripper (BL-340) on September 14, 2015, and on September 17, 2015, disrupted continuous extraction and routine operations of the GWTP, which lasted through January 7, 2016. Prior to this occurrence, the GWTP performed as designed and the GWTP was operated on an as needed basis (i.e., semi-continuous operational basis). During the 4th quarter of 2015, groundwater was extracted from a limited number of ICTs (ICTs 12E, 13A, 13B, 13C, and/or 13E, or ICTs 14B, 14C, and 14D). Operation of the GWTP occurred on a batch basis through the fluidized bed reactor (FBR). After replacement of the blower, attempts were made to restore continuous operations to the FBR but remained predominantly on a batch basis throughout January 2016.

In December 2016, a HCl spill caused plant operations to shut down until the issue could be properly addressed. The FBR performance was challenged by the increased chlorides in the neutralized wastewater, but performance gradually returned to normal in the 1st quarter of 2017. Groundwater extraction was gradually increased to full rates during the 2nd quarter of 2017.

On August 12, 2017, severe storms caused a power outage at LHAAP-18/24. When electrical service was restored, the main transformer failed due to a manufacturing defect. A portable emergency generator was brought on-site on August 21, 2017, to allow the FBR to operate in full recycle mode. After a replacement transformer was installed on September 12, 2017, extraction began from ICT-13B, 13C, 13D, 13E, 13F, 7, and EW01 and the FBR was put into normal operation. Beginning on September 21, 2017, groundwater was extracted from all of the ICTs.

On December 27, 2018, severe storms caused a power out in Karnack, Texas. When electrical service was restored, the main was determined to have failed. A portable emergency generator was brought on-site on December 28, 2018, to allow the FBR to operate in full recycle mode. On February 5, 2019, the smaller generator mobilized in December 2018 was replaced with a larger generator capable of powering the LHAAP-18/24 well field as well as the entire GWTP. On February 8, 2019, the transformer at the GWTP was tested to ensure that it could handle backfeeding necessary to power the LHAAP-18/24 well field due to the necessary step-down in power from the generator. Following additional system modifications based upon the testing, the well field at LHAAP-18/24 had power restored on February 11, 2019, using the generator and transformer at the GWTP.

Flow rates for the treatment processes for metals and Volatile Organic Compounds (VOCs) ranged between 170 and 210 gallons per minute (gpm) with an average of approximately 185 gpm for the operating hours (i.e., this flow rate does not represent continuous flows). The GWTP operated for 64.75 hours during the quarter, with no operation of the GWTP in January and most of February 2019. The treatment configuration of the plant at these rates (with minor variations) is as follows:

GWTP Metals Precipitation Operating Parameters

Pretreatment Settings	Tank 200-A $Mg(OH)_2$ Mixing	Tank 200-B NaOH Mixing	Tank 200-C Polymer Mixing	Tank 300 feed line to Air Stripper
pH Adjustment	9.0	10.5	NA	5.0 to meet ≤ 8.0 release from stripper
Feed Pump Settings	Speed 100% Stroke 100% 10 gph $Mg(OH)_2$	Speed 100% Stroke 100% 9.0 gph NaOH	Speed 90% Stroke 100% 40 gph water	Speed 80% Stroke 80% 10 gph HCl
Notes: gph - gallons per hour, NaOH - sodium hydroxide, $Mg(OH)_2$ - magnesium hydroxide, NA - not applicable				

GWTP Air Compressors Operating Parameters

Air Compressors	K-700A	K-700B	K-701
Air Pressure Settings	88 psi	88 psi	105 psi
Note: psi - pounds per square inch			

GWTP Stripper Operating Parameters

pH Setting	7.4
Inlet Pressure Gauge	Not operational
Stripper Pressure Gauge	Not operational
Air Flow Rate	Not operational

GWTP Fluidized Bed Reactor Operating Parameters

Carbon Bed Height	12 feet & 8 to 11 inches
Recycle Flow Rate	200 gpm
pH	7.1 to 7.4
Recycle oxidation-reduction potential (ORP)	<-430 mV
Note: mV - millivolts	

1.2 Work Performed at the GWTP

Work performed at the GWTP during the 1st quarter of 2019 is described in the following subsections.

1.2.1 Major Maintenance

The major maintenance items that were completed at the GWTP during this quarterly reporting period are:

- January 15 and 16, 2019: Caddo Well Service was on site to install new bladder tank, pump, and piping in potable water well #1. This restored potable water pressure to the GWTP.
- February 5, 2019: Ark-La-Tex Electric was on site to connect wiring to 800 kilowatt generator.
- February 8, 2019: Transformer Testing Company was on site to check out pad mounted transformer at GWTP.
- February 11, 2019: Ark-La-Tex Electric was on site to connect wiring to allow back feed through the pad mounted transformer to the ICT wells.
- March 25, 2019: Bloc Design was on site to troubleshoot electrical problem with well EW01.
- March 25, 2019: The 800 kilowatt generator was repaired.
- March 28, 2019: Bloc Design was onsite to repair wiring problem with EW01 and repair MX-250 mixer.

1.2.2 Routine Maintenance

The following routine maintenance items were completed at the GWTP during this quarterly reporting period:

- Performed housekeeping in GWTP office

- Performed housekeeping in Army trailer
- Performed housekeeping around GWTP and containment area
- Performed housekeeping in GWTP Shop
- Rebuilt grundfos pumps to be used in ICT wells
- Installed new weather station at GWTP
- Repaired 3-inch piping and 3-inch flange on discharge side of P-320
- Mowed grass around GWTP, Army trailer, decontamination pad, and storage connexes
- Replaced ¼-inch tubing on suction side of P-104
- Collected quarterly surface water samples

1.2.2.1 Safety

The GWTP Operators, Mr. Scott Beesinger and Mr. Kennie Moore, did not have any safety incidents. No safety training was completed.

1.2.2.2 Lubrication

No lubrication maintenance was conducted during the reporting period.

1.2.2.3 Air Compressors

During the 1st quarter of 2019, air compressor K-700A had routine maintenance completed that included replacement of the drive belt as well as the addition of oil.

1.2.2.4 Belt Press and Waste Disposal

No belt press or waste disposal was conducted during the reporting period.

1.2.2.5 Sand Filter

No maintenance or repairs were conducted on the sand filter during the reporting period.

1.2.2.6 Well Field at LHAAP-18/24

- Collected monthly flow meter readings
- Collected monthly water levels
- Freeze protected ICT wells
- Installed new flow meters on ICTs 2 and 13A
- Replaced a pump and motor in ICT 12D
- Replaced pump in ICT 13C
- Replaced pump in ICT 2
- Replaced pump and motor in ICT 14C
- Replaced pump in ICT 14D
- Replaced a leaking 1-inch union on ICT 2

- Replaced pump, seal plate, and level probes in ICT 14E
- Replaced pump and motor in ICT 14A
- Repaired leaking 1-inch pipe on ICT 14A
- Replaced pump in EW01
- Replaced probe wire and level probes in 18WW17
- Lowered high level probes in ICTs 14A and 13C
- Cleaned level probes on ICT 13E and 18WW17

1.2.2.7 Miscellaneous Activities

- None

1.2.3 Routine Maintenance at LHAAP-16

- Checked site daily
- Collected monthly water levels
- Collected annual extraction well samples

1.2.4 Routine Maintenance (Potable Water Wells)

- Insulated the new piping at the potable water pump #1.
- Flushed potable water lines.

1.3 Filter Cake Operations and Management

No filter cake operations took place during this reporting period.

1.4 Fluidized Bed Reactor Operations

The FBR was operational during all of 1st Quarter 2019 though in recycle for the first half of the quarter. On February 10, 2019, the system sent a call out that the FBR feed was shut down. Upon arrival, it was discovered that P-641 or P-642 did not come on which allowed TK-650 to fill to capacity. The GWTP operator completed troubleshooting and then repaired the issue by resetting the electrical breaker. The FBR feed was then restarted.

The operating parameters for the GWTP FBR are presented in **Table 1.** With the exception of ORP on February 13, 2019, none of the operating parameters were outside of the optimal ranges in the 1st quarter of 2019. The ORP ranged between -403 mV and -516 mV, and the pH ranged between 7.1 and 7.4 standard units.

Table 1. Enhanced Fluidized Bed Reactor Operating Parameters – 1st Quarter 2019

Date	pH (7.1-7.4)	ORP (<-430mV)	Temperature (Degrees Fahrenheit)
1/1/2019	7.4	-492	55
1/2/2019	7.4	-493	55

Date	pH (7.1-7.4)	ORP (<-430mV)	Temperature (Degrees Fahrenheit)
1/3/2019	7.4	-494	53
1/4/2019	7.4	-495	53
1/5/2019	7.4	-496	54
1/6/2019	7.4	-496	55
1/7/2019	7.3	-494	57
1/8/2019	7.2	-480	58
1/9/2019	7.2	-489	57
1/10/2019	7.3	-502	56
1/11/2019	7.3	-510	56
1/12/2019	7.2	-504	57
1/13/2019	7.2	-499	55
1/14/2019	7.2	-496	54
1/15/2019	7.2	-495	54
1/16/2019	7.2	-495	55
1/17/2019	7.2	-495	56
1/18/2019	7.2	-495	56
1/19/2019	7.3	-493	55
1/20/2019	7.3	-493	55
1/21/2019	7.3	-493	53
1/22/2019	7.2	-495	55
1/23/2019	7.3	-493	52
1/24/2019	7.3	-494	52
1/25/2019	7.2	-494	52
1/26/2019	7.2	-493	53
1/27/2019	7.2	-493	53
1/28/2019	7.2	-492	54
1/29/2019	7.2	-485	53
1/30/2019	7.2	-484	51
1/31/2019	7.2	-488	52
2/1/2019	7.2	-489	54
2/2/2019	7.2	-491	54
2/3/2019	7.2	-493	56
2/4/2019	7.2	-496	59
2/5/2019	7.2	-499	61
2/6/2019	7.1	-499	63
2/7/2019	7.1	-500	62
2/8/2019	7.2	-497	59
2/9/2019	7.3	-495	56
2/10/2019	7.3	-494	55

Date	pH (7.1-7.4)	ORP (<-430mV)	Temperature (Degrees Fahrenheit)
2/11/2019	7.2	-498	58
2/12/2019	7.2	-499	58
2/13/2019	7.2	-403	57
2/14/2019	7.2	-482	58
2/15/2019	7.2	-485	58
2/16/2019	7.1	-486	57
2/17/2019	7.1	-487	56
2/18/2019	7.2	-486	56
2/19/2019	7.2	-486	53
2/20/2019	7.2	-445	54
2/21/2019	7.2	-470	52
2/22/2019	7.2	-475	52
2/23/2019	7.1	-475	55
2/24/2019	7.1	-474	53
2/25/2019	7.1	-471	55
2/26/2019	7.1	-468	55
2/27/2019	7.1	-466	57
2/28/2019	7.1	-470	55
3/1/2019	7.2	-476	54
3/2/2019	7.2	-482	55
3/3/2019	7.2	-483	53
3/4/2019	7.3	-484	52
3/5/2019	7.4	-473	51
3/6/2019	7.3	-474	51
3/7/2019	7.3	-445	52
3/8/2019	7.3	-454	56
3/9/2019	7.3	-483	58
3/10/2019	7.3	-482	58
3/11/2019	7.2	-494	59
3/12/2019	7.2	-500	60
3/13/2019	7.2	-489	61
3/14/2019	7.2	-493	63
3/15/2019	7.2	-493	62
3/16/2019	7.2	-494	62
3/17/2019	7.2	-495	61
3/18/2019	7.2	-500	62
3/19/2019	7.3	-497	63
3/20/2019	7.3	-500	63

Date	pH (7.1-7.4)	ORP (<-430mV)	Temperature (Degrees Fahrenheit)
3/21/2019	7.3	-506	63
3/22/2019	7.3	-520	63
3/23/2019	7.3	-514	63
3/24/2019	7.3	-510	63
3/25/2019	7.4	-467	67
3/26/2019	7.4	-499	65
3/27/2019	7.4	-510	66
3/28/2019	7.4	-510	65
3/29/2019	7.4	-504	65
3/30/2019	7.3	-513	65
3/31/2019	7.3	-516	63
Note: Shaded value is outside of optimal operating range.			

1.5 Process Chemical Usage at GWTP

Approximate chemical consumption and the quantity delivered during the 1st quarter of 2019 are shown in **Table 2**.

Table 2. Process Chemicals Delivered and Used

Chemical	Usage 1st Quarter 2019	Quantity Delivered 1st Quarter 2019
Hydrochloric acid	245 gallons	0
Sodium hydroxide (35%)	400 gallons	44,900 pounds (3,750 gallons)
Acetic acid (50%)	8 drums = 440 gallons	1,100 gallons
Phosphoric acid (75%)	30.1 liters	0
Magnesium hydroxide	105 gallons	0
Urea	223.3 pounds	500 pounds
Polymer (magnafloc 110-L)	4.1 liters	0

2 EVALUATION OF LHAAP-18/24 ICT EFFECTIVENESS

The ICT system at Burning Ground No. 3 is composed of 14 sections ranging in length from 100 feet (ft) to 1,300 ft. A total of approximately 5,000 linear ft of trench was installed within and around three sides of Burning Ground No. 3. The trench sections extend approximately 22 ft to 45 ft below ground surface (bgs). Most, but not all of the trenches are as deep as the confining clay layer of the shallow groundwater zone. High density polyethylene (HDPE) liners were installed in ICTs 12 and 13, located on the western and northern boundaries of LHAAP-18/24, respectively. The locations of the liners are shown on **Figure A-1** in **Appendix A**. **Table A-1** in **Appendix A** presents the depths of the ICTs.

2.1 Groundwater Elevation

Water levels from 95 monitoring wells and 11 piezometers (piezometer 12 was damaged and plugged and abandoned in May 2013) are measured monthly to generate potentiometric surface maps that assist in monitoring the effectiveness of the groundwater extraction system on plume containment. The groundwater contours are generated using the water levels from the shallow zone and Wilcox Formation wells. The water level data are presented in **Table 3**. No reinjection of treated groundwater or reapplication to LHAAP-18/24 grounds via the existing irrigation system occurred during the 1st quarter of 2019. Potentiometric surface maps are presented in **Appendix B** and groundwater elevations from the 1st quarter of 2019 are discussed in Section 2.2. No groundwater sampling was completed at LHAAP-18/24 in the 1st quarter of 2019.

2.2 Performance of Plume Capture

The intent of the ICTs is to control groundwater gradients, prevent off-site migration of contaminated groundwater, extract the most highly contaminated groundwater, and reduce the mass of contaminants in groundwater. Liners were installed in the ICTs on the northern (ICT 13) and western (ICT 12) site boundaries to limit migration of contaminated water from the site towards Harrison Bayou. At the same time, the liners reduce or prevent removal of contaminated groundwater that is outside the containment zone, between the site and Harrison Bayou. The ICTs are installed within the shallow subsurface at the site and capture primarily shallow groundwater (e.g., < 40 ft bgs).

In 2007 and 2008, in consultation with the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA), the Army ceased operations of ICTs 1, 3, 5, 10, and 12A for groundwater extraction (note that extraction from ICT 12A was resumed after pump replacement in December 2012). Two other ICTs (ICT 6 and ICT 9) were changed from extraction ICTs to re-injection ICTs. Groundwater extraction from well EW-1 located in the northeast central portion of the site began in October 2008 and well 18WW17 located to the northeast of the ICT containment area began in January 2008. **Table B-1** in **Appendix B** presents a summary of extraction equipment replacement since 2011, as dictated by poor extraction performance (malfunctioning pumps, poor pump positioning with respect to groundwater, non-operational level probes, scale build up, etc.). Further discussion of extraction performance of various ICTs and extraction wells is presented in Section 2.3.

Potentiometric surface maps of the shallow zone groundwater in the vicinity of LHAAP-18/24, based on groundwater elevations measured on January 31, February 28, and March 26-27, 2019, are shown on **Figures B-1, B-2, and B-3 in Appendix B**, respectively. The potentiometric surface maps of the shallow zone were contoured using the Kriging geostatistical interpolation method included in the Golden Software Surfer® data analysis software.

The HDPE liners in the ICTs, where present, were interpreted as groundwater flow barriers. The potentiometric surface maps for January through March 2019 continue to reflect high groundwater elevations in the northern/northwestern portion of the site with groundwater flow occurring radially from groundwater highs at monitoring well AWD-2 (174.19 ft above mean sea level [amsl] in January 2019, 174.53 ft amsl in February 2019, and 174.66 ft amsl in March 2019) inside the ICT containment area.

The elevated potentiometric surface contours within the ICTs compared to the lower potentiometric surface contours on the outside of the ICTs is likely due to a no flow boundary condition caused by the ICT liners and groundwater extraction along the ICTs. From the groundwater high at monitoring well AWD-2, groundwater flows radially towards the surrounding ICTs which include ICT 13 to the north and northwest, and ICT 12 to the west and southwest.

Groundwater extraction rates from the ICTs were 515,618 gallons in February 2019 and 1,063,734 gallons in March 2019. Rainfall amounts recorded at the GWTP were 5.4 inches in January 2019, 3.58 inches in February 2019, and 2.75 inches in March 2019. This amount of rainfall resulted in almost 88,000 gallons of additional water treated and discharged but not metered with the influent totals.

During the reporting period, approximately 2.4-million gallons of treated groundwater was discharged to Harrison Bayou from either the GWTP or the INF Pond. No treated groundwater from the GWTP was returned to LHAAP-18/24 via the sprinkler system. Overall groundwater levels increased throughout the 1st quarter of 2019 with an average shallow zone groundwater elevation rise of 0.63 ft.

Groundwater levels in Wilcox Formation wells (generally > 40 to 50 ft bgs) were measured during the 1st quarter of 2019 groundwater gauging events. Wilcox Formation wells correspond generally to those wells previously identified as “Intermediate” and “Deep” wells. “Intermediate” wells are designated as Upper Wilcox Formation wells and “Deep” wells are designated as Lower Wilcox Formation wells. Generally, groundwater in the Upper and Lower Wilcox Formation wells are in hydraulic communication and so can be treated as a single hydrogeologic unit. Therefore, the groundwater elevations in Upper Wilcox wells were used to construct the potentiometric surface maps for the Wilcox Formation. **Figures B-4, B-5, and B-6** in **Appendix B** show the locations of the Wilcox Formation monitoring wells and the potentiometric surface of the Wilcox Formation, based on static water levels measured during the January, February, and March 2019 gauging events, respectively. Groundwater in the Wilcox Formation generally flows in a northerly direction, towards Caddo Lake and there is a downward

vertical gradient between the overlying shallow zone and the Wilcox Formation. However, a groundwater high in the Wilcox Formation occurs in the area of MW-14.

2.3 Quantity of Water Extracted from LHAAP-18/24

The average daily extraction rates from the ICTs were 18,415 gallons per day (gpd) in February 2019 and approximately 34,314 gpd in March 2019. In February 2019, the plant operated about half of the month whereas the system operated fully in March 2019.

The volume of groundwater removed from LHAAP-18/24 during the 1st Quarter 2019 measured approximately 1,579,352 gallons, based on total flow measured from the extraction wells and ICT wells. However, the influent totalizer (FIT-140) readings, as presented on **Figure 2-1,** only indicate 475,429 gallons were extracted. No groundwater was extracted from LHAAP-16 during the 1st quarter of 2019 due to the main transformer not being operational. **Figure 2-1** shows the historical trends of extracted volumes by quarter based upon the influent totalizer (FIT-140). It is noted that there is a significant difference between the totalizer readings at FIT-140 and the total obtained from the individual units observed this quarter, which will be further evaluated in the 2nd Quarter 2019.

In contrast to the approximate total extracted volume based on total flow measured at the GWTP, the total estimated volume discharged to Harrison Bayou following treatment by the GWTP (FIT-686) was 208,340 in February 2019 and 380,178 gallons in March 2019 for a total of 588,518 gallons discharged in 1st Quarter 2019 (**Table 4**). However, this volume does not account for water present in the decant tank at the end of March or the influent that was not treated after the GWTP last ran on March 28, 2019. The difference between the influent volume determined from the individual meters on the ICTs and extraction wells and effluent volume determined from FIT 686 is approximately 81%. However, considering the over 200,000 gallons of water within the treatment plant as of March 31, 2019, this percent difference is closer to 66% variation, which is contributable to variations in the flow meter recordings. However, this variation is larger than typically noted and should be further evaluate to determine if the issue is the flow meters or if there is a potential leak.

As indicated by **Table 5**, 23 of 27 ICTs and wells produced water during the 1st quarter of 2019. The table illustrates the power loss to LHAAP-18/24 as well as increase in flow in the ICTs and wells following repairs made throughout March 2019, which was completed on March 18, 2019.

2.4 Groundwater Treatment Plant Sampling and Analysis

As part of the GWTP operations, samples from various water streams are required to be collected and analyzed for the parameters cited in the Interim Record of Decision (ROD) and the TCEQ letter dated January 8, 2002 (see Administrate Record Volume 1 of 4 in 2002, Document A). Besides the ROD sampling requirement, additional sample analyses are typically performed on the influent and effluent samples to monitor the effectiveness of the perchlorate treatment (FBR and/or ion exchange vessels) process. Sections 2.4.1 through 2.4.4 present the results of analyses conducted during the 1st quarter of 2019. The complete laboratory results are provided on a compact disc (CD) (**Appendix C**).

2.4.1 Perchlorate Sampling

Table 6 presents the weekly effluent perchlorate results for the 1st quarter of 2019. In January 2019, no effluent samples were collected due to the main transformer being non-operational. The generator placed at the GWTP was able to power the lights in the building and the FBR but not power the wells and ICTs at LHAAP-18/24. On February 5, 2019, a larger generator was brought onsite and the pumps for the ICTs and wells were backfed to the transformer located at the GWTP which then was powered by the larger generator. Power was officially resorted to LHAAP-18/24 on February 11, 2019. Therefore, the first effluent samples collected as part of the 1st Quarter 2019 for perchlorate occurred on February 21, 2019. The biweekly effluent results were non-detect for perchlorate in the 1st Quarter 2019. However, perchlorate was detected in the quarterly effluent sample on March 27, 2019, but the detection was just above the level of detection with a value of 2.3 micrograms per liter (µg/L). Based upon continued discharge to the Harrison Bayou, the ion exchange vessels were bypassed in the 1st quarter of 2019, per the discharge protocol. A total of three grab samples from the influent to the GWTP (TK-140) were collected, which included the quarterly sample. The perchlorate concentrations in these samples ranged from 3,700 µg/L to 8,300 µg/L.

2.4.2 VOC Sampling

Tables 7 and **8** present the effluent VOC results for February and March 2019. Due to the power loss that occurred at the end of December 2018, no effluent was discharged in January 2019 such that no samples were collected. Sampling of the effluent for VOCs was conducted on a biweekly basis when GWTP was operational. The results, where applicable, were below the discharge limits. The tables also provide monthly influent concentrations for VOCs and perchlorate.

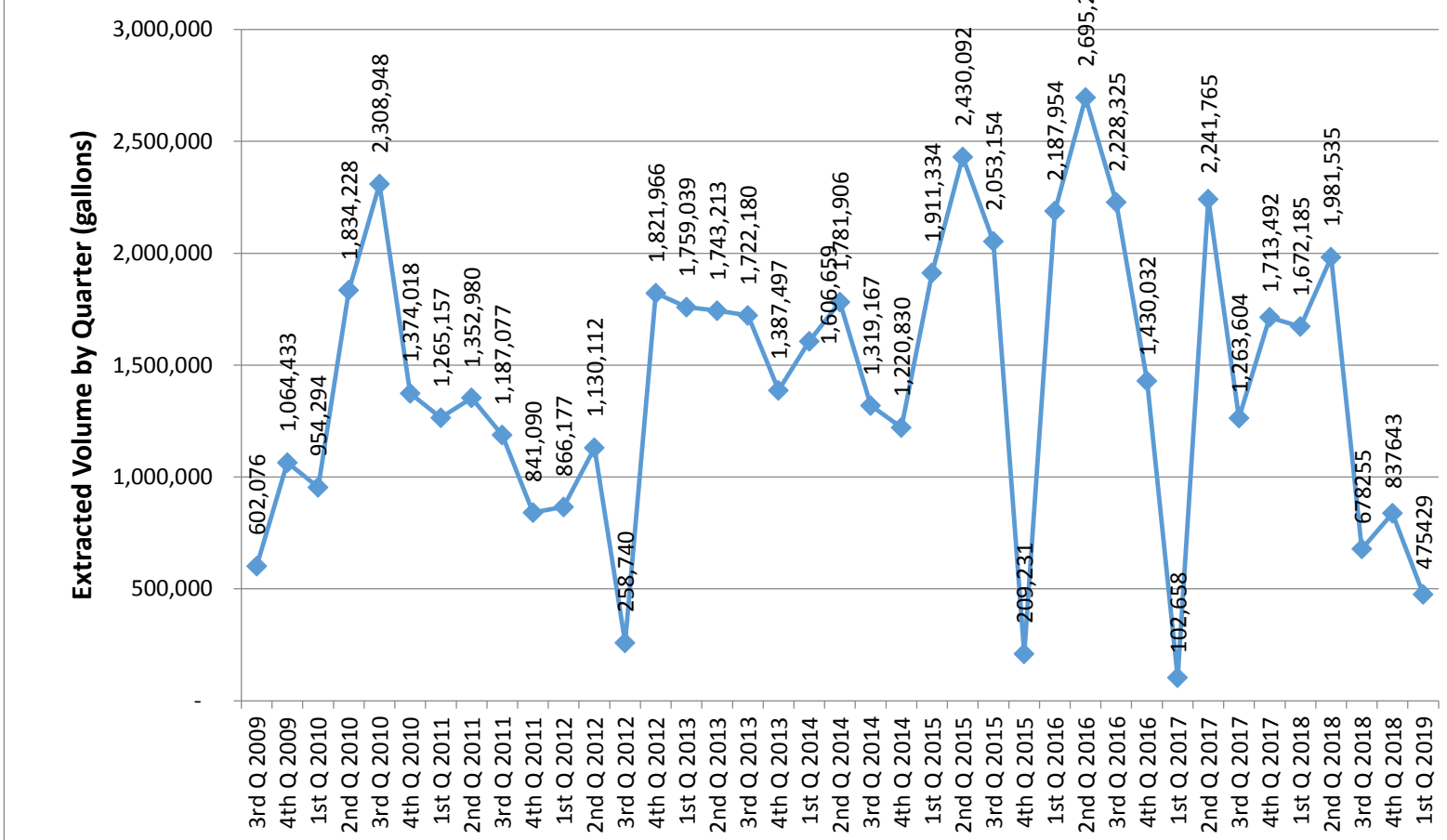
2.4.3 Monthly Metals Sampling

As per the Final Installation-Wide Work Plan (Bhate Environmental Associates, Inc. [Bhate], May 2018), the monthly metals sampling is reported in **Tables 7** and **8**. None of the metals exceeded the effluent discharge limits.

2.4.4 Quarterly Sampling

Sampling of the effluent for VOCs, anions, chemical oxygen demand (COD), oil and grease, perchlorate, and metals was conducted during this quarter and the results were below the discharge limits. **Table 9** presents the analytical results for the 1st quarter of 2019.

Figure 2-1
Quarterly Extraction Rate



Extraction rate beginning at 3rd Q 2013 is based in FIT-140 (influent totalizer)

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Table 3: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells, and Surface Water

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 1/31/19	Groundwater Elevation (feet amsl) 1/31/19	Depth to Water (feet) 2/28/19	Groundwater Elevation (feet amsl) 2/28/19	Depth to Water (feet) 3/26/19-3/27/19	Groundwater Elevation (feet amsl) 3/26/16-3/27/19
BGPZ-1	Piezometer	184.99	6.12	178.87	5.91	179.08	5.57	179.42
BGPZ-2	Piezometer	184.39	13.57	170.82	13.45	170.94	13.02	171.37
BGPZ-3	Piezometer	180.35	7.96	172.39	7.79	172.56	6.91	173.44
BGPZ-4	Piezometer	177.77	7.89	169.88	7.70	170.07	6.84	170.93
BGPZ-5	Piezometer	180.76	12.05	168.71	11.89	168.87	10.95	169.81
BGPZ-6	Piezometer	197.82	25.77	172.05	25.85	171.97	27.05	170.77
BGPZ-7	Piezometer	195.96	28.15	167.81	28.02	167.94	26.86	169.10
BGPZ-8	Piezometer	197.08	29.93	167.15	29.80	167.28	28.93	168.15
BGPZ-9	Piezometer	196.45	28.69	167.76	28.55	167.90	27.44	169.01
BGPZ-10	Piezometer	197.00	27.95	169.05	27.80	169.20	27.53	169.47
BGPZ-11	Piezometer	196.99	27.83	169.16	27.91	169.08	27.64	169.35
BGPZ-12	Piezometer	188.17	NA	Plugged	NA	Plugged	NA	Plugged
AWD-1	Monitoring Well	182.27	9.16	173.11	9.25	173.02	9.13	173.14
AWD-2	Monitoring Well	186.78	12.59	174.19	12.25	174.53	12.12	174.66
AWD-3	Monitoring Well	200.13	27.90	172.23	27.78	172.35	27.59	172.54
AWD-4	Monitoring Well	193.89	24.29	169.60	24.35	169.54	24.11	169.78
MW-1	Monitoring Well	199.22	27.08	172.14	26.95	172.27	26.72	172.50
MW-2	Monitoring Well	196.73	25.49	171.24	26.36	170.37	26.12	170.61
MW-3	Monitoring Well	196.54	26.51	170.03	26.40	170.14	26.05	170.49
MW-4	Monitoring Well	197.27	26.73	170.54	26.65	170.62	26.33	170.94
MW-5	Monitoring Well	194.97	25.22	169.75	25.10	169.87	24.86	170.11
MW-6	Monitoring Well	192.18	23.45	168.73	23.31	168.87	23.09	169.09
MW-7	Monitoring Well	188.47	18.62	169.85	18.52	169.95	18.15	170.32
MW-8	Monitoring Well	187.13	17.43	169.70	17.29	169.84	16.88	170.25
MW-9	Monitoring Well	184.73	14.05	170.68	14.15	170.58	13.87	170.86
MW-10	Monitoring Well	178.12	8.10	170.02	7.97	170.15	7.31	170.81
MW-11	Monitoring Well	184.65	13.67	170.98	13.55	171.10	13.17	171.48

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 1/31/19	Groundwater Elevation (feet amsl) 1/31/19	Depth to Water (feet) 2/28/19	Groundwater Elevation (feet amsl) 2/28/19	Depth to Water (feet) 3/26/19-3/27/19	Groundwater Elevation (feet amsl) 3/26/16-3/27/19
MW-12	Monitoring Well	178.33	8.03	170.30	7.79	170.54	7.47	170.86
MW-13	Monitoring Well	176.72	7.67	169.05	7.57	169.15	6.92	169.80
MW-14	Monitoring Well	186.19	13.08	173.11	13.00	173.19	12.88	173.31
MW-16	Monitoring Well	178.59	7.91	170.68	7.71	170.88	7.45	171.14
MW-17	Monitoring Well	179.03	9.21	169.82	9.10	169.93	8.85	170.18
MW-18	Monitoring Well	178.58	8.71	169.87	8.60	169.98	8.38	170.20
MW-19	Monitoring Well	178.60	8.89	169.71	8.73	169.87	8.40	170.20
MW-20	Monitoring Well	186.64	9.59	177.05	9.47	177.17	9.11	177.53
MW-21	Monitoring Well	198.70	29.64	169.06	29.77	168.93	29.55	169.15
MW-22	Monitoring Well	197.51	27.65	169.86	27.53	169.98	27.28	170.23
MW-23	Monitoring Well	198.79	27.27	171.52	27.15	171.64	26.92	171.87
101	Monitoring Well	197.53	6.77	190.76	6.59	190.94	6.39	191.14
102	Monitoring Well	193.94	21.27	172.67	18.84	175.10	19.32	174.62
109	Monitoring Well	197.02	27.44	169.58	27.30	169.72	27.02	170.00
120	Monitoring Well	184.19	12.05	172.14	11.91	172.28	11.75	172.44
123	Monitoring Well	186.21	12.29	173.92	12.05	174.16	11.82	174.39
125	Monitoring Well	196.28	25.39	170.89	25.20	171.08	24.95	171.33
126	Monitoring Well	199.37	29.69	169.68	29.54	169.83	29.10	170.27
129	Monitoring Well	197.24	26.43	170.81	26.22	171.02	25.85	171.39
130	Monitoring Well	177.73	6.55	171.18	6.27	171.46	5.89	171.84
C-01	Monitoring Well	193.89	24.62	169.27	24.49	169.40	23.36	170.53
C-02	Monitoring Well	175.95	6.19	169.76	5.94	170.01	5.59	170.36
C-03	Monitoring Well	196.34	26.73	169.61	26.59	169.75	26.00	170.34
C-04	Monitoring Well	194.64	25.48	169.16	25.29	169.35	24.42	170.22
C-04A	Monitoring Well	194.61	25.17	169.44	25.01	169.60	24.19	170.42
C-05	Monitoring Well	180.74	12.47	168.27	11.97	168.77	11.53	169.21
C-06	Monitoring Well	192.22	25.62	166.60	25.50	166.72	23.33	168.89
C-07	Monitoring Well	196.80	28.57	168.23	28.67	168.13	26.71	170.09
C-08	Monitoring Well	193.10	24.11	168.99	24.00	169.10	23.90	169.20
C-09	Monitoring Well	202.35	33.03	169.32	32.90	169.45	32.65	169.70

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 1/31/19	Groundwater Elevation (feet amsl) 1/31/19	Depth to Water (feet) 2/28/19	Groundwater Elevation (feet amsl) 2/28/19	Depth to Water (feet) 3/26/19-3/27/19	Groundwater Elevation (feet amsl) 3/26/16-3/27/19
C-10	Monitoring Well	201.86	32.65	169.21	32.53	169.33	31.92	169.94
17WW08	Monitoring Well	179.72	9.25	170.47	8.95	170.77	8.27	171.45
18WW01	Monitoring Well	201.31	31.91	169.40	31.80	169.51	31.06	170.25
18WW02	Monitoring Well	179.30	9.02	170.28	8.85	170.45	8.29	171.01
18WW03	Monitoring Well	195.59	26.73	168.86	26.61	168.98	25.77	169.82
18WW04	Monitoring Well	183.74	15.62	168.12	15.22	168.52	14.89	168.85
18WW05	Monitoring Well	189.59	21.77	167.82	21.90	167.69	19.80	169.79
18WW06	Monitoring Well	179.70	9.49	170.21	9.30	170.40	8.71	170.99
18WW07	Monitoring Well	183.67	N/A	NM	N/A	NM	N/A	NM
18WW08	Monitoring Well	177.77	6.95	170.82	6.81	170.96	6.40	171.37
18WW09	Monitoring Well	177.51	7.13	170.38	7.02	170.49	6.79	170.72
18WW10	Monitoring Well	182.26	11.07	171.19	10.92	171.34	10.33	171.93
18WW11	Monitoring Well	182.29	12.52	169.77	12.39	169.90	11.81	170.48
18WW14	Monitoring Well	186.47	18.00	168.47	17.83	168.64	16.05	170.42
18WW15	Monitoring Well	186.24	17.39	168.85	17.24	169.00	15.46	170.78
18WW16	Monitoring Well	201.88	32.71	169.17	32.60	169.28	32.00	169.88
18WW18	Monitoring Well	196.82	26.53	170.29	26.84	169.98	26.80	170.02
18WW19	Monitoring Well	179.56	11.70	167.86	11.49	168.07	11.02	168.54
18WW20	Monitoring Well	180.42	12.45	167.97	12.29	168.13	11.86	168.56
18WW21	Monitoring Well	195.20	26.41	168.79	26.49	168.71	25.66	169.54
18WW22	Monitoring Well	195.37	25.94	169.43	25.78	169.59	25.24	170.13
18WW24	Monitoring Well	176.40	4.95	171.45	4.81	171.59	4.61	171.79
18WW25	Monitoring Well	175.15	4.55	170.60	4.48	170.67	4.29	170.86
18CPTMW01SW	Monitoring Well	198.20	27.35	170.85	27.44	170.76	27.21	170.99
18CPTMW01DW	Monitoring Well	197.92	27.29	170.63	27.39	170.53	27.20	170.72
18CPTMW03SW	Monitoring Well	198.53	28.43	170.10	28.31	170.22	28.10	170.43
18CPTMW04	Monitoring Well	196.60	24.15	172.45	24.03	172.57	23.79	172.81
18CPTMW04SW	Monitoring Well	196.42	26.84	169.58	26.70	169.72	26.51	169.91
18CPTMW06	Monitoring Well	198.12	27.61	170.51	27.49	170.63	27.24	170.88

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 1/31/19	Groundwater Elevation (feet amsl) 1/31/19	Depth to Water (feet) 2/28/19	Groundwater Elevation (feet amsl) 2/28/19	Depth to Water (feet) 3/26/19-3/27/19	Groundwater Elevation (feet amsl) 3/26/16-3/27/19
18CPTMW07	Monitoring Well	197.32	27.33	169.99	27.19	170.13	26.64	170.68
18CPTMW08SW	Monitoring Well	196.38	26.92	169.46	26.75	169.63	26.51	169.87
18CPTMW08DW	Monitoring Well	196.59	27.31	169.28	27.12	169.47	26.89	169.70
18CPTMW10SW	Monitoring Well	186.98	17.29	169.69	17.08	169.90	16.73	170.25
18CPTMW10DW	Monitoring Well	187.38	18.13	169.25	17.95	169.43	17.62	169.76
18CPTMW12SW	Monitoring Well	190.90	20.79	170.11	20.60	170.30	20.25	170.65
18CPTMW12DW	Monitoring Well	190.25	20.55	169.70	20.43	169.82	20.04	170.21
18CPTMW14	Monitoring Well	196.69	26.74	169.95	26.62	170.07	26.19	170.50
18CPTMW15	Monitoring Well	179.79	8.63	171.16	8.50	171.29	7.91	171.88
18CPTMW16	Monitoring Well	175.37	5.12	170.25	5.00	170.37	4.69	170.68
18CPTMW18	Monitoring Well	194.53	27.61	166.92	27.70	166.83	27.10	167.43
18CPTMW19	Monitoring Well	193.59	24.97	168.62	24.83	168.76	24.33	169.26
18CPTMW19SW	Monitoring Well	193.29	25.44	167.85	25.29	168.00	24.78	168.51
18CPTMW22SW	Monitoring Well	187.79	18.96	168.83	18.85	168.94	17.77	170.02
18CPTMW22R	Monitoring Well	187.23	5.77	181.46	5.70	181.53	5.60	181.63
18CPTMW22DW	Monitoring Well	188.00	19.21	168.79	19.07	168.93	17.65	170.35
18CPTMW23	Monitoring Well	177.47	6.92	170.55	6.77	170.70	6.49	170.98
18CPTMW23SW	Monitoring Well	177.43	6.74	170.69	6.59	170.84	6.30	171.13
18CPTMW24	Monitoring Well	194.89	26.79	168.10	26.60	168.29	25.95	168.94
18CPTMW26	Monitoring Well	182.60	17.13	165.47	17.00	165.60	14.41	168.19
18CPTMW26SW	Monitoring Well	182.00	12.07	169.93	11.91	170.09	11.73	170.27
1824HBSW7	Surface Water Sample	167.92	2.15	165.77	4.04	163.88	2.38	165.54

Notes: amsl - above mean sea level, NM-not measured

Table 4: Treated Groundwater Discharged – January through March 2019

DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
01/01/2019	Not Measured	Not Calculated	0	0	0	0	0	6.25
01/02/2019	Not Measured	Not Calculated	0	0	0	0	0	6.46
01/03/2019	Not Measured	Not Calculated	0	0	0	0	0	6.50
01/04/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/05/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/06/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/07/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/08/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/09/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/10/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/11/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/12/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/13/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/14/2019	Not Measured	Not Calculated	0	0	0	0	0	6.69
01/15/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/16/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/17/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/18/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/19/2019	Not Measured	Not Calculated	0	0	0	0	0	6.68
01/20/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/21/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/22/2019	Not Measured	Not Calculated	0	0	0	0	0	6.67
01/23/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89
01/24/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89
01/25/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89
01/26/2019	Not Measured	Not Calculated	0	0	0	0	0	6.89
01/27/2019	Not Measured	Not Calculated	0	0	0	0	0	6.88

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DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
01/28/2019	Not Measured	Not Calculated	0	0	0	0	0	6.88
01/29/2019	16,975	305,560	0	176,319	0	0	176,319	6.45
01/30/2019	12,277	220,995	0	127,696	0	0	127,696	6.10
01/31/2019	8,224	148,042	0	65,475	0	0	65,475	5.92
02/01/2019	5,898	106,179	0	57,960	0	0	57,960	5.75
02/02/2019	Not Measured	Not Calculated	0	0	0	0	0	5.75
02/03/2019	Not Measured	Not Calculated	0	0	0	0	0	5.75
02/04/2019	Not Measured	Not Calculated	0	0	0	0	0	5.75
02/05/2019	Not Measured	Not Calculated	0	0	0	0	0	5.74
02/06/2019	Not Measured	Not Calculated	0	0	0	0	0	5.74
02/07/2019	Not Measured	Not Calculated	0	0	0	0	0	5.81
02/08/2019	Not Measured	Not Calculated	0	0	0	0	0	5.81
02/09/2019	Not Measured	Not Calculated	0	0	0	0	0	5.81
02/10/2019	Not Measured	Not Calculated	0	0	0	0	0	5.80
02/11/2019	11,579	3,383	893	0	0	893	893	5.83
02/12/2019	20,399	5,960	25,279	252,560	0	25,279	277,839	5.34
02/13/2019	13,411	3,918	15,361	221,340	0	15,361	236,701	4.78
02/14/2019	16,395	4,790	12,590	174,600	0	12,590	187,190	4.24
02/15/2019	15,454	4,515	9,109	174,240	0	9,109	183,349	3.69
02/16/2019	12,913	3,773	0	0	0	0	0	3.69
02/17/2019	10,373	3,031	21,479	0	0	21,479	21,479	3.69
02/18/2019	9,369	2,737	0	0	0	0	0	3.68
02/19/2019	8,366	2,444	17,960	0	0	17,960	17,960	3.68
02/20/2019	13,181	3,155	11,528	96,600	0	11,528	108,128	3.55
02/21/2019	20,096	4,810	11,444	28,025	0	11,444	39,469	3.50
02/22/2019	Flood Stage	Maximum	9,709	0	0	9,709	9,709	3.53
02/23/2019	Flood Stage	Maximum	0	0	0	0	0	3.60
02/24/2019	Flood Stage	Maximum	0	0	0	0	0	3.70
02/25/2019	Flood Stage	Maximum	38,835	0	0	38,835	38,835	3.70

DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
02/26/2019	21,127	5,057	10,568	132,480	0	10,568	143,048	3.35
02/27/2019	19,533	4,675	11,891	97,680	0	11,891	109,571	3.15
02/28/2019	16,620	4,856	11,694	91,000	0	11,694	102,694	2.85
03/01/2019	16,125	4,711	11,607	83,520	0	11,607	95,127	2.47
03/02/2019	16,806	4,911	0	0	0	0	0	2.50
03/03/2019	Flood Stage	Maximum	0	0	0	0	0	2.50
03/04/2019	32,976	9,636	35,970	0	0	35,970	35,970	2.50
03/05/2019	23,207	6,781	10,521	0	0	10,521	10,521	2.50
03/06/2019	16,822	4,915	7,756	0	0	7,756	7,756	2.50
03/07/2019	10,652	3,564	4,826	0	0	4,826	4,826	2.50
03/08/2019	10,204	3,414	11,008	0	0	11,008	11,008	2.50
03/09/2019	18,255	5,464	0	0	0	0	0	2.50
03/10/2019	15,231	5,026	0	0	0	0	0	2.50
03/11/2019	14,601	4,885	34,669	0	0	34,669	34,669	2.49
03/12/2019	19,104	6,391	12,730	0	0	12,730	12,730	2.49
03/13/2019	16,809	5,624	12,255	0	0	12,255	12,255	2.58
03/14/2019	Flood Stage	Maximum	12,733	0	0	12,733	12,733	2.66
03/15/2019	Flood Stage	Maximum	10,626	0	0	10,626	10,626	2.66
03/16/2019	Flood Stage	Maximum	0	0	0	0	0	2.65
03/17/2019	20,598	5,723	0	0	0	0	0	2.65
03/18/2019	17,339	5,066	33,160	0	0	33,160	33,160	2.65
03/19/2019	7,625	2,228	14,714	0	0	14,714	14,714	2.64
03/20/2019	5,599	1,636	15,654	0	0	15,654	15,654	2.64
03/21/2019	6,950	2,031	8,703	0	0	8,703	8,703	2.64
03/22/2019	5,977	1,746	9,406	0	0	9,406	9,406	2.63
03/23/2019	5,326	1,544	0	0	0	0	0	2.63
03/24/2019	4,856	1,408	0	0	0	0	0	2.63
03/25/2019	4,431	1,295	18,556	0	0	18,556	18,556	2.66

DATE	Harrison Bayou Flow (GPM)	Calculated Maximum Rate Allowable (GPM)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
03/26/2019	5,221	1,525	16,413	0	0	16,413	16,413	2.66
03/27/2019	5,592	1,634	16,818	0	0	16,818	16,818	2.66
03/28/2019	9,196	2,687	18,192	0	0	18,192	18,192	2.65
03/29/2019	7,977	2,331	15,769	0	0	15,769	15,769	2.65
03/30/2019	6,231	1,806	0	0	0	0	0	2.65
03/31/2019	5,426	1,573	48,092	0	0	48,092	48,092	2.65
Totals			**588,518**	**1,779,495**	**0**	**588,518**	**2,368,013**	

Notes: 1) Bayou flow is not measured on days when no release to the Bayou occurs from the GWTP or INF Pond.
2) When the bayou is in flood stage (over the banks), the flow is not measured and the maximum release is allowed.

Table 5: Monthly Groundwater Extraction Quantities

ICT or Well Number	January 2019 (gallons)	February 2019 (gallons)	March 2019 (gallons)	Total
1	0	0	0	0
2	0	0	32,524	32,524
3	0	0	0	0
4	0	81,881	111,868	193,749
5	0	0	0	0
EW-1	0	0	368	368
7	0	16,983	20,394	37,377
8	0	100,461	170,110	270,571
18WW17	0	58	5,943	6,001
10	0	0	0	0
11	0	60,730	92,994	153,724
12A	0	5,937	9,785	15,722
12B	0	20,722	27,602	48,324
12C	0	30,102	40,083	70,185
12D	0	0	58,149	58,149
12E	0	29,473	28,942	58,415
13A	0	18,079	41,746	59,825
13B	0	74,529	135,849	210,378
13C	0	0	29,160	29,160
13D	0	30,988	40,081	71,069
13E	0	18,792	13,465	32,257
13F	0	8,752	14,438	23,190
14A	0	0	889	889
14B	0	17,996	22,458	40,454
14C	0	4	66,955	66,959
14D	0	0	55,422	55,422
14E	0	131	44,509	44,640
Total LHAAP-18/24	***0***	***515,618***	***1,063,734***	***1,579,352***
LHAAP-16	0	0	0	
Total LHAAP-16	***0***	***0***	***0***	***0***
TOTAL	***0***	***515,618***	***1,063,734***	***1,579,352***

Note: Power was lost to the GWTP and well field on December 27, 2018. Power was fully restored on February 11, 2019.

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Table 6: Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_022119/BIX	HS19021158	2/21/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**15**	**4.2**	**8.4**
LH18/24-SP650_022819/BIX	HS19030014	2/28/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**9.5**	**1.69**	**5.1**
LH18/24-SP650_022819_BIX (monthly)	HS19030012	2/28/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_022819 (monthly)	HS19030011	2/28/2019	TK-140	--	--	--	NA	**3,700**	NA		NA	--	--	--
LH18/24-SP650_030619/BIX	HS19030298	3/6/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**5.5**	**0.48**	**2.94**
LH18/24-SP650_031419/BIX	HS19030749	3/14/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**18**	**4.65**	**2.96**
LH18/24-SP650_031419_BIX (monthly)	HS19030761	3/14/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_031419 (monthly)	HS19030763	3/14/2019	TK-140	--	--	--	NA	**8,300**	NA		NA	--	--	--
LH18/24-SP650_032119/BIX	HS19031160	3/21/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	NA	**16**	**4.15**	**2.5**
LH18/24-SP650_032719/BIX	HS19031492	3/27/2019	TK-650	INF Pond	589	17	4	NA	**2.6**	**J**	Yes	**11**	**2.42**	**2.29**
LH18/24-SP650_121818_BIX (quarterly)	HS19031511	3/27/2019	TK-650	INF Pond	589	17	4	NA	**2.3**	**J**	Yes	--	--	--
LH18/24-SP140_121818 (quarterly)	HS19031508	3/27/2019	TK-140	--	--	--	NA	**6,500**	NA		NA	--	--	--

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange

mg/L - milligrams per liter

Table 7: Bi-Weekly GWTP Analytical Sampling Results for February 2019

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_022119		LH18/24-SP650_022819/BIX+		LH18/24-SP140_022819		
			Lab Package	HS19021165		HS19030012		HS19030011		
			Sample Date	2/21/2019		2/28/2019		2/28/2019		
			Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit							
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		Yes
Acetone	1,132	2,395	2	< 1.0	U	< 1.0	U	NA		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
Chlorobezene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	NA		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	NA		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		Yes
Trichloroethene	85	181	1	**0.70**	J	**0.80**	J	NA		Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	NA		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**320**		NA		NA		NA
Sulfate	NA	NA	10	**29.8**		NA		NA		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		< 2.0	U	**3,700**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	Yes
Barium	1	2	0.004	NA		**0.137**		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00250	U	< 0.00250	U	Yes
Silver	0.0014	0.0030	0.002	NA		< 0.000500	U	< 0.000500	U	Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**4.3**		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
NA - not applicable or not analyzed
+Perchlorate sample designated by BIX (before ion exchange)
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit

Table 8: Bi-Weekly Analytical GWTP Sampling Results for March 2019

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_030619		LH18/24-SP650_031419/BIX+		LH18/24-SP140_031419		LH18/24-SP650_032119		
			Lab Package	HS19030301		HS19030761		HS19030763		HS19031189		
			Sample Date	3/6/2019		3/14/2019		3/14/2019		3/21/2019		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD											
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**						
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	**0.53**	J	NA		< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Acetone	1,132	2,395	2	< 2.0	U	< 2.0	U	NA		< 2.0	U	Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	UJ	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		< 0.5	UJ	Yes
Trichloroethene	85	181	1	**0.74**	J	**0.74**	J	NA		**0.71**	J	Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**312**		NA		NA		**314**		NA
Sulfate	NA	NA	10	**13.9**		NA		NA		**26.8**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		< 2.0	U	**8,300**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	NA		**0.139**		NA		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.002	NA		< 0.000500	U	< 0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**3.1**	J	NA		NA		Yes

Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

U - Non detect reported to the limit of detection

mg/L - milligrams per liter

+perchlorate sample designated by BIX (before ion exchange)

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

NA - not applicable or not analyzed

Grab samples are compared to the daily maximum and composite samples to the daily average

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

BIX - before ion exchange vessel

UJ - estimated non-detect due to quality control issue

Table 9: Quarterly GWTP Analytical Sampling Results

				Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_032719_BIX		LH18/24-SP140_032719		
				Lab Package	HS19031511		HS19031508		
				Sample Date	3/27/2019		3/27/2019		
				Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 5.0	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 5.0	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	**6.4**	**J**	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 5.0	U	Yes
1,2-Dichloroethane	85	181	1	**0.57**	J	**58**		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 5.0	U	Yes
Acetone	1,132	2,395	2	< 2.0	U	< 20	U	Yes
Benzene	85	181	1	< 0.5	U	**7.8**	**J**	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	**25**		Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 5.0	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	**9.1**	**J**	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 5.0	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 5.0	U	Yes
Methylene Chloride	803	1,699	2	< 0.5	U	**110**		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 5.0	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 5.0	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**15**		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 5.0	U	Yes
Trichloroethene	85	181	1	**0.85**	J	**5,600**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	**41**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**317**		**197**		NA
Sulfate	NA	NA	10	**28.5**		**32**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	**2.3**	J	**6,500**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.0311**		**0.0643**		Yes
Antimony	NA	NA	0.00200	**0.00101**	J	**0.00216**		NA
Arsenic	0.365	0.772	0.00200	**0.000860**	J	**0.000971**	J	Yes

Table 9: Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_032719_BIX		LH18/24-SP140_032719		
			Lab Package	HS19031511		HS19031508		
			Sample Date	3/27/2019		3/27/2019		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
Barium	1	2	0.00400	**0.132**		**0.223**		Yes
Beryllium	NA	NA	0.00200	< 0.00250	U	< 0.00250	U	NA
Cadmium	0.0016	0.0034	0.00200	< 0.000500	U	< 0.000500	U	Yes
Calcium	NA	NA	0.500	**14.5**		**16.8**		NA
Chromium	0.355	0.752	0.00400	**0.00142**	J	**0.00307**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.00112**	J	**0.00548**		Yes
Iron	1.132	2.395	0.200	**0.125**	J	**0.317**		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	**12.9**		**13.8**		NA
Manganese	7.323	15.494	0.00500	**0.0678**		**0.214**		Yes
Nickel	0.087	0.184	0.00200	**0.00344**		**0.0114**		Yes
Potassium	NA	NA	0.200	**1.27**		**1.30**		NA
Selenium	0.0057	0.012	0.00200	< 0.00250	U	< 0.00250	U	Yes
Silver	0.0014	0.003	0.00200	< 0.000500	U	< 0.000500	U	Yes
Sodium	NA	NA	1.00	**339**		**196**		NA
Thallium	NA	NA	0.00200	< 0.00100	U	< 0.00100	U	NA
Vanadium	1.698	3.592	0.00500	0.00382	UB	0.00237	UB	Yes
Zinc	0.146	0.31	0.00400	**0.0363**		**0.119**		No
Mercury	NA	NA	0.000200	< 0.000100	U	< 0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**11.0**		**16**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**21**		**6.0**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	**2.08**		**0.729**	J	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant
BIX - before ion exchange (perchlorate sample)
UB - considered an artifact of blank contamination

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3 EVALUATION OF LHAAP-16 EXTRACTION SYSTEM

No groundwater was extracted from LHAAP-16 in the 1st quarter of 2019 due to the main transformer being down. However, annual compliance groundwater sampling was completed in this quarter as well as depth to water measurements, which are discussed in the following sections.

3.1 Groundwater Elevation

The groundwater elevations in the piezometers and monitoring wells at LHAAP-16 for January, February, and March 2019 are presented in **Table 10**. The potentiometric surface maps for the shallow and Upper Wilcox (intermediate) groundwater zones at LHAAP-16 for January, February, and March 2019 are presented on **Figures B-7** through **B-12** in **Appendix B**. Based on the potentiometric surface maps, the general groundwater flow direction in the shallow and intermediate zone is south-southeast. However, the March 2019 groundwater flow was more east-northeast towards the Harrison Bayou following 3 months without extraction.

3.2 Groundwater Sampling Activities

On February 26, 2019, a total of eight monitoring wells were sampled at Site LHAAP-16 for VOCs and perchlorate. The analytical results are presented in **Table 11** and the laboratory analytical report is presented in **Appendix D**. Parameters exceeding their respective USEPA Maximum Contaminant Level (MCL) or Texas Risk Reduction Program (TRRP) Groundwater Industrial Medium Specific Concentration (MSC) are 1,1,-dichlorethene (DCE); 1,2-dichloroethane; cis-1,2-DCE; trichloroethene (TCE); and vinyl chloride. Perchlorate was compared to the TRRP Protective Concentration Level (PCL) of 17 µg/L, which was exceeded at LHAAP-16. Two monitoring wells had perchlorate above the PCL with a detection of 51 J (estimated concentration) µg/L in 16EW01 and 230 µg/L (duplicate of 240 µg/L) in 16EW05. All eight of the monitoring wells sampled had exceedances of the MCL for TCE with the highest detection present in 16EW02 (34,000 µg/L). All other monitoring wells had TCE detected at less than 8,000 µg/L. Elevated detections of cis-1,2-DCE and vinyl chloride were also observed in groundwater sampled from 16EW02, indicating that monitored natural attenuation is occurring in addition to the extraction and treatment of LHAAP-16 groundwater. **Figure 3-1** depicts the groundwater sampling results on the LHAAP-16 map. No isoconcentration map was prepared due to the limited number of monitoring wells sampled.

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Gray highlighting indicates concentrations above the MCL/PCL/MSC

MCL/PCL/MSC - Maximum Contaminant Level/Protective Concentration Level/Medium-Specific Concentrations

µg/L - micrograms per liter

J - estimated value between the limit of quantitation and the detection limit and/or estimated due to quality control discrepancies

U- Undetected: The analyte was analyzed for, but not detected (value is the limit of detection)

_a - Duplicate Sample

*PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW05_ 022619	16EW05_ 022619_a
Perchlorate	µg/L	17*	**230**	**240**
1,1-Dichloroethene	µg/L	7	6.0	6.5
1,2-Dichloroethane	µg/L	5	**6.0**	**6.4**
cis-1,2-Dichloroethene	µg/L	70	**1,000**	**1,200**
Trichloroethene	µg/L	5	**1,700**	**1,900**
Vinyl chloride	µg/L	2	**260 J**	**420 J**

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW01_ 022619
Perchlorate	µg/L	17*	**51 J**
1,1-Dichloroethene	µg/L	7	**14**
1,2-Dichloroethane	µg/L	5	**12**
cis-1,2-Dichloroethene	µg/L	70	**3,700 J**
Trichloroethene	µg/L	5	**3,700**
Vinyl chloride	µg/L	2	**45**

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW02_ 022619
Perchlorate	µg/L	17*	< 2.0 U
1,1-Dichloroethene	µg/L	7	**86**
1,2-Dichloroethane	µg/L	5	**34 J**
cis-1,2-Dichloroethene	µg/L	70	**17,000**
Trichloroethene	µg/L	5	**34,000**
Vinyl chloride	µg/L	2	**51**

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW06_ 022619
Perchlorate	µg/L	17*	< 2.0 U
1,1-Dichloroethene	µg/L	7	0.95 J
1,2-Dichloroethane	µg/L	5	0.56 J
cis-1,2-Dichloroethene	µg/L	70	**180**
Trichloroethene	µg/L	5	**250**
Vinyl chloride	µg/L	2	< 0.50 U

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW07_ 022619
Perchlorate	µg/L	17*	< 2.0 U
1,1-Dichloroethene	µg/L	7	1.7
1,2-Dichloroethane	µg/L	5	< 0.50 U
cis-1,2-Dichloroethene	µg/L	70	**340**
Trichloroethene	µg/L	5	**81**
Vinyl chloride	µg/L	2	**25**

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW03_ 022619
Perchlorate	µg/L	17*	< 2.0 U
1,1-Dichloroethene	µg/L	7	**12**
1,2-Dichloroethane	µg/L	5	**6.2 J**
cis-1,2-Dichloroethene	µg/L	70	**2,000**
Trichloroethene	µg/L	5	**7,400**
Vinyl chloride	µg/L	2	**7.5 J**

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW08_ 022619
Perchlorate	µg/L	17*	< 2.0 U
1,1-Dichloroethene	µg/L	7	0.76 J
1,2-Dichloroethane	µg/L	5	< 0.50 U
cis-1,2-Dichloroethene	µg/L	70	**170**
Trichloroethene	µg/L	5	**170**
Vinyl chloride	µg/L	2	0.86 J

Location ID: Sample Date:	Units	MCL/PCL/MSC	16EW04_ 022619
Perchlorate	µg/L	17*	< 2.0 U
1,1-Dichloroethene	µg/L	7	0.88 J
1,2-Dichloroethane	µg/L	5	0.55 J
cis-1,2-Dichloroethene	µg/L	70	**260**
Trichloroethene	µg/L	5	**900**
Vinyl chloride	µg/L	2	0.47 J

Harrison Bayou

Unnamed Road

LHAAP-16

0 40 80 160 Feet

Legend:
- Extraction Well Location
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line
- Former Building Location and Number

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LHAAP-16 February 2019 Annual Sampling Results

Figure 3-1

Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

DRAWN BY: MRM

DATE: 5/31/2019

SCALE: As Shown

PROJECT NO: NWO1312.0150

bhate

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Table 10: Groundwater Elevations at LHAAP-16 Piezometers and Monitoring Wells-1st Quarter 2019

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 1/30/19	Groundwater Elevation (feet amsl) 1/30/19	Depth to Water (feet) 2/27/19	Groundwater Elevation (feet amsl) 2/27/19	Depth to Water (feet) 3/26/19	Groundwater Elevation (feet amsl) 3/26/19
16PZ-1	Piezometer	199.44	27.55	171.89	27.43	172.01	26.67	172.77
16PZ-2	Piezometer	199.75	27.77	171.98	27.60	172.15	26.60	173.15
16PZ-3	Piezometer	198.61	26.64	171.97	26.49	172.12	25.47	173.14
16PZ-4	Piezometer	198.81	27.21	171.60	27.05	171.76	25.75	173.06
16PZ-5	Piezometer	198.31	26.35	171.96	26.21	172.10	25.05	173.26
16PZ-6	Piezometer	198.61	27.39	171.22	27.24	171.37	25.61	173.00
16PZ-7	Piezometer	200.10	28.70	171.40	28.50	171.60	26.63	173.47
16PZ-8	Piezometer	199.93	27.96	171.97	27.81	172.12	26.88	173.05
16PZ-9	Piezometer	196.49	24.73	171.76	24.58	171.91	23.50	172.99
16PZ-10	Piezometer	196.65	24.88	171.77	24.70	171.95	23.67	172.98
16PZ-11	Piezometer	198.88	26.79	172.09	26.65	172.23	25.68	173.20
16PZ-12	Piezometer	199.00	27.71	171.29	27.59	171.41	25.85	173.15
16PZ-13	Piezometer	196.58	24.75	171.83	24.60	171.98	23.45	173.13
16PZ-14	Piezometer	196.09	24.31	171.78	24.17	171.92	23.06	173.03
16PZ-15	Piezometer	191.93	19.64	172.29	19.49	172.44	18.69	173.24
16PZ-16	Piezometer	190.79	19.16	171.63	19.02	171.77	17.84	172.95
16PZ-17	Piezometer	186.67	16.47	170.20	16.30	170.37	13.59	173.08
16PZ-18	Piezometer	185.99	16.53	169.46	16.38	169.61	13.17	172.82
16PZ-19	Piezometer	183.98	11.29	172.69	10.92	173.06	11.07	172.91
16PZ-20	Piezometer	183.12	10.83	172.29	10.57	172.55	10.25	172.87
16WW12	Monitoring Well	188.81	16.65	172.16	16.52	172.29	16.25	172.56
16WW14	Monitoring Well	198.87	26.14	172.73	26.00	172.87	25.06	173.81
16WW22	Monitoring Well	200.13	28.34	171.79	28.25	171.88	26.92	173.21
16WW25	Monitoring Well	188.77	18.63	170.14	18.50	170.27	15.36	173.41
16WW26	Monitoring Well	188.83	17.09	171.74	16.97	171.86	14.90	173.93
16WW29	Monitoring Well	178.24	6.31	171.93	6.10	172.14	5.05	173.19
16WW30	Monitoring Well	178.47	6.60	171.87	6.41	172.06	5.30	173.17
16WW31	Monitoring Well	202.78	30.54	172.24	30.41	172.37	29.37	173.41
16WW33	Monitoring Well	203.09	30.50	172.59	30.37	172.72	29.50	173.59
16WW35	Monitoring Well	191.23	18.91	172.32	18.80	172.43	17.61	173.62
16WW36	Monitoring Well	190.94	18.15	172.79	18.04	172.90	17.10	173.84

Table 11: LHAAP-16 Annual Sampling Results - February 2019

Location Identification: Sample Date:	Units	MCL/PCL/ MSC	16EW01_ 022619	16EW02_ 022619	16EW03_ 022619	16EW04_ 022619	16EW05_ 022619	16EW05_ 022619_a	16EW06_ 022619	16EW07_ 022619	16EW08_ 022619
Lab Package:			**HS19021428**								
Location Description			NE, middle region Sampled Annually	NE, middle region Sampled Annually	NE, middle region Sampled Annually	ENE, middle region Sampled Annually	NE, middle region Sampled Annually	NE, middle region Sampled Annually Duplicate.	NE, middle region Sampled Annually	NE, middle region Sampled Annually	ENE, middle region Sampled Annually
Perchlorate (6850)											
Perchlorate	µg/L	17*	**51 J**	< 2.0 U	< 2.0 U	< 2.0 U	**230**	**240**	< 2.0 U	< 2.0 U	< 2.0 U
Volatile Organic Compounds (8260C)											
1,1,1,2-Tetrachloroethane	µg/L	110	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,1-Trichloroethane	µg/L	200	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,2-Trichloroethane	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1-Dichloroethane	µg/L	10,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	**1.4**	**1.4**	< 0.50 U	< 0.50 U	< 0.50 U
1,1-Dichloroethene	µg/L	7	**14**	**86**	**12**	**0.88 J**	**6.0**	**6.5**	**0.95 J**	**1.7**	**0.76 J**
1,1-Dichloropropene	µg/L	2.9	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,3-Trichlorobenzene	µg/L	310	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,3-Trichloropropane	µg/L	0.041	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-Trichlorobenzene	µg/L	70	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-Trimethylbenzene	µg/L	5,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dibromoethane	µg/L	0.05	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dichlorobenzene	µg/L	600	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dichloroethane	µg/L	5	**12**	**34 J**	**6.2 J**	**0.55 J**	**6.0**	**6.4**	**0.56 J**	< 0.50 U	< 0.50 U
1,2-Dichloropropane	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,3,5-Trimethylbenzene	µg/L	5,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,3-Dichlorobenzene	µg/L	3,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,3-Dichloropropane	µg/L	29	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,4-Dichlorobenzene	µg/L	75	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
2,2-Dichloropropane	µg/L	42	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
2-Butanone	µg/L	61,000	< 5.0 U	< 25 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
2-Hexanone	µg/L	6,100	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

Table 11: LHAAP-16 Annual Sampling Results - February 2019

Location Identification: / Sample Date:	Units	MCL/PCL/ MSC	16EW01_ 022619	16EW02_ 022619	16EW03_ 022619	16EW04_ 022619	16EW05_ 022619	16EW05_ 022619_a	16EW06_ 022619	16EW07_ 022619	16EW08_ 022619
Lab Package:			**HS19021428**								
Location Description			NE, middle region Sampled Annually	NE, middle region Sampled Annually	NE, middle region Sampled Annually	ENE, middle region Sampled Annually	NE, middle region Sampled Annually	NE, middle region Sampled Annually Duplicate.	NE, middle region Sampled Annually	NE, middle region Sampled Annually	ENE, middle region Sampled Annually
4-Chlorotoluene	µg/L	2,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
4-Isopropyltoluene	µg/L	10,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
4-Methyl-2-pentanone	µg/L	8,200	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Acetone	µg/L	92,000	< 10 U	< 100 U	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromobenzene	µg/L	2,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromochloromethane	µg/L	4,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromodichloromethane	µg/L	4.6	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromoform	µg/L	36	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromomethane	µg/L	140	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Carbon disulfide	µg/L	10,000	< 5.0 U	< 50 U	< 10 U	< 0.50 U	< 1.0 U	< 1.0 U	< 0.50 U	< 0.50 U	< 0.50 U
Carbon tetrachloride	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chlorobenzene	µg/L	100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloroethane	µg/L	41,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloroform	µg/L	1,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloromethane	µg/L	220	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
cis-1,2-Dichloroethene	µg/L	70	**3,700 J**	**17,000**	**2,000**	**260**	**1,000**	**1,200**	**180**	**340**	**170**
cis-1,3-Dichloropropene	µg/L	5.3	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Dibromochloromethane	µg/L	34	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Dibromomethane	µg/L	380	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Dichlorodifluoromethane	µg/L	20,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Ethylbenzene	µg/L	700	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Hexachlorobutadiene	µg/L	20	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

Table 11: LHAAP-16 Annual Sampling Results - February 2019

Location Identification: Sample Date:	Units	MCL/PCL/ MSC	16EW01_ 022619	16EW02_ 022619	16EW03_ 022619	16EW04_ 022619	16EW05_ 022619	16EW05_ 022619_a	16EW06_ 022619	16EW07_ 022619	16EW08_ 022619
Lab Package:			**HS19021428**								
Location Description			NE, middle region Sampled Annually	NE, middle region Sampled Annually	NE, middle region Sampled Annually	ENE, middle region Sampled Annually	NE, middle region Sampled Annually	NE, middle region Sampled Annually Duplicate.	NE, middle region Sampled Annually	NE, middle region Sampled Annually	ENE, middle region Sampled Annually
Isopropylbenzene	µg/L	10,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
m,p-Xylene	µg/L	10,000**	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Naphthalene	µg/L	2,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
n-Butylbenzene	µg/L	4,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
n-Propylbenzene	µg/L	4,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
o-Xylene	µg/L	10,000**	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
sec-Butylbenzene	µg/L	4,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Styrene	µg/L	100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
tert-Butylbenzene	µg/L	4,100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Tetrachloroethene	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Toluene	µg/L	1,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
trans-1,2-Dichloroethene	µg/L	100	**8.7**	**24 J**	< 5.0 U	**0.72 J**	**3.7**	**3.9**	< 0.50 U	**0.84 J**	**0.64 J**
trans-1,3-Dichloropropene	µg/L	29	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Trichloroethene	µg/L	5	**3,700**	**34,000**	**7,400**	**900**	**1,700**	**1,900**	**250**	**81**	**170**
Trichlorofluoromethane	µg/L	31,000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Vinyl chloride	µg/L	2	**45**	**51**	**7.5 J**	**0.47 J**	**260 J**	**420 J**	< 0.50 U	**25**	**0.86 J**

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL/MSC

MCL/PCL/MSC - Maximum Contaminant Limit/Protective Concentration Level/Medium-Specific Concentration

µg/L - micrograms per liter

J - estimated value between the limit of quantitation and the detection limit and/or estimated due to quality control discrepancies

U- Undetected: The analyte was analyzed for, but not detected. Value presented is the limit of detection.

*PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

** Value is for total xylenes

4 QUALITY CONTROL

This report summarizes the data for samples collected during January, February, and March 2019. The samples were reviewed and validated in accordance with the guidelines in the *USEPA Contract Laboratory Program 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 quality control criteria specified in the *Basewide Uniform Federal Policy - Quality Assurance Project Plan Longhorn Army Ammunition Plant* which is in Appendix C of the *Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant Karnack, Texas* (Bhate, May 2018).

The purpose of the sampling program is to evaluate the effectiveness of the groundwater pump and treat system, assess water quality within the capture zone, and assure compliance with the effluent discharge requirements of the Interim ROD. Quality control and quality assurance problems noted in the case narratives received from the laboratory are minor and do not affect the usability of the data for compliance at the GWTP. No sample results from the 1st quarter of 2019 were rejected due to quality control problems.

ALS Environmental analyzed the compliance samples collected from the GWTP. Independent data verification and validation was performed by the Bhate project chemist as described in the Quality Control Summary Report in **Appendix E**. The laboratory reports for the 1st quarter of 2019 are included in **Appendix C** on a CD and the laboratory results for sampling conducted at LHAAP-16 are included in **Appendix D** on CD. Air monitoring data is presented in **Appendix F** on CD.

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5 TREATED GROUNDWATER DISCHARGED

Reinjection of groundwater in ICT 6 and ICT 9 was discontinued as of July 15, 2012. The last injection occurred on May 24, 2012, immediately prior to the scrubber system malfunction which caused GWTP operation to cease temporarily.

Treated groundwater that met the perchlorate discharge criteria was discharged to Harrison Bayou or the INF Pond in accordance with the Protocol for Discharging GWTP Effluent (**Appendix G**). **Table 4** summarizes flow rates from the INF Pond to the Harrison Bayou, the maximum flow rate allowed by chloride and sulfate concentrations, and the approximated flow rate discharged for the 1st quarter of 2019. No treated groundwater was discharged to Harrison Bayou in January 2019 from the GWTP directly. Only water from the INF Pond was discharged to the Harrison Bayou in January 2019 because the main transformer was down such that the GWTP was not operational until February 2019. No treated groundwater was discharged to the INF Pond in the 1st quarter of 2019 due to the continuous flow of the Harrison Bayou.

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6 AIR MONITORING

6.1 Summary of Air Monitoring Approach

Operation of the GWTP without air abatement was approved by the TCEQ and USEPA conditioned on collection of air monitoring data to determine the effect of GWTP operation on ambient air quality with respect to potential human health exposure risk. An Interim Air Monitoring Plan was developed by AECOM in August 2012 and used to implement the air monitoring program. The air monitoring program included sampling emission concentrations from the air stripper, ambient air at the GWTP, and ambient air downwind of the GWTP. Collection of air data occurred on a weekly basis between September 2012 and September 2013, on a monthly basis between September 2013 and September 2014, and on a quarterly basis since that time. The sampling program includes use of Summa canisters and a photoionization detector (PID) to measure vapor phase concentrations. The air stripper emission sample is collected as a grab sample, while the ambient air samples are collected as composite samples. The GWTP sample is collected over 8 hours to represent a work day and the downwind sample is collected over 24 hours to represent potential exposure to an off-site receptor[1]. The downwind sample is collected at the closest downwind property boundary, based on prevailing wind direction.

PID data (after system calibration) are collected each time the GWTP is operated and serve as a real-time indicator of ambient air conditions at and downwind of the GWTP. Correlations between definitive analytical air data and PID measurements were established and a means to calculate contaminant concentration from PID measurements was developed. A PID threshold of 0.4 parts per million by volume (ppmv) in ambient air was established, such that Summa canister measurements would occur when the PID threshold is exceeded.

The Summa canister samples are analyzed for VOCs using USEPA Method TO-15. The PID measurements are collected after instrument calibration. The air sampling results are summarized and reported to the USEPA and TCEQ in the GWTP quarterly reports; however, the air results are reviewed immediately upon receipt for the potential presence of any exceedances of ambient air concentrations. **Appendix H** (Tables 1 through 3) includes a comparison of ambient air concentrations with TCEQ Air Monitoring Comparison Values (AMCVs) or the short-term Effects Screening Levels (ESLs) for chemicals with no published AMCVs, calculations of emission rates from the emission point, and a compilation of PID results and calibration records. The air monitoring results to date indicate that all ambient air concentrations are lower than the AMCVs or ESLs. The stripper stack sample concentrations are used to calculate emission rates in

[1] Off-site receptor - Any recreational area, residence, commercial/industrial facility, or other normally occupied structures not used solely by the owner or operator of the facilities or the owner of the site upon which the facilities are located. Measurements of distances to determine compliance with this distance restriction must be taken toward structures that are in use as of the date that a notification is filed with the commission.

pounds per hour (lbs/hr) and tons per year (tpy). The calculated emission rates in lbs/hr are then compared to the allowable emission rates per 30 Texas Administrative Code (TAC) §106.533(f)(1). The emission rates have been lower than the allowable emission rates to the conservatively-selected off-site receptor. The calculated emission rate in tpy is compared to the allowable limit of 5 tpy per chemical. All emission rates have been lower than the allowable emission rates.

The air monitoring results from the first few months of operation between September and November 2012 were compiled and submitted in a separate report (December 2012) (along with validated data) to TCEQ to demonstrate compliance with Texas Permit by Rule emission standards. Approval of the analytical results and concurrence that the site will continue to meet Title 30 TAC §106.533 without the use of air abatement using a catalytic oxidation system was obtained from the TCEQ via email on February 22, 2013.

On February 18, 2013, AECOM presented analysis of the approach applicable to obtaining a variance for operating the GWTP without air abatement equipment to the TCEQ and USEPA. The analysis indicated that the use of an Explanation of Significant Difference (ESD) was the appropriate approach for the site. Approval of use of an ESD was obtained from the USEPA via email on March 21, 2013. The ESD was developed, reviewed, and accepted by USEPA and TCEQ. The ESD was signed by the designated parties on April 3, 2014, and concurrence from the TCEQ was obtained in a letter dated April 16, 2014.

6.2 Air Monitoring Results for the 1st Quarter of 2019

During the 1st quarter of 2019, air sampling was completed on February 27 and 28, 2019. The laboratory data packages are presented in **Appendix F.** A summary of the air sampling results is presented in **Appendix H (Tables 1** through **3)**. All results met the criteria described in Section 6.1.

6.2.1 Summa Canister Monitoring Results

One sampling event was conducted on February 27 and 28, 2019, for presentation during the 1st Quarter 2019 reporting period using Summa canisters. The samples were collected and analyzed as described in Section 6.1 and per the approved air monitoring plan dated August 2012. The analytical results were then compiled in spreadsheets where calculations were completed and comparisons to applicable criteria were made as described in Section 6.1.

6.2.1.1 Ambient Air Results

Benzene, cis-1,2-dichloroethene, methylene chloride, trichloroethene, n-hexane, toluene, dichlorodifluoromethane, trichlorofluoromethane, and trichlorotrifluoroethane were detected in February 2019 in ambient air downwind of the GWTP.

Compounds originating at the GWTP would be expected to have lower concentrations in the downwind sampling location than at the GWTP sampling location. Likewise, compounds like dichlorodifluoromethane and trichlorofluoromethane with similar concentrations in both GWTP ambient air and downwind ambient air are suspected to be present in the ambient (background)

air. The ambient air results during the quarter met the ambient air criteria, as presented in **Table 1** within **Appendix H**.

6.2.1.2 Air Stripper Effluent Results

The VOCs present in groundwater that are removed via the air stripper include 1,2-dichloroethane; cis-1,2-DCE; methylene chloride; TCE; and trichlorotrifluoroethane. The highest reported concentrations are for TCE; methylene chloride; cis-1,2-DCE; and trichlorotrifluoroethane. These compounds are frequently reported in groundwater at the site, with the exception of trichlorotrifluoroethane which is not typically a groundwater analyte at LHAAP. Trichlorotrifluoroethane, however, appears to be present in groundwater as indicated by limited analysis conducted in December 2013, where it was detected in several wells, and from historical accounts. Many of the chemicals that are reported in ambient air are not detected in the air stripper effluent. This is likely because the reporting limit for the air stripper effluent is higher than the reporting limit for the ambient air samples or the source for some of these chemicals are extraneous to groundwater.

The air stripper effluent concentrations were below the emission criteria, as presented in **Table 2** within **Appendix H**.

6.2.2 PID Results

Along with collection of Summa canister air samples, PID measurements from the same sources/areas are collected and recorded. These simultaneous measurements allowed establishing a correlation between PID readings and VOC concentrations in the Summa canister air samples. Conversion from PID to compound concentrations was established by TCEQ in 30 TAC §106.533(h). The TCEQ equation allows use of a PID to determine individual compound concentrations if the distribution of chemicals in the ambient air is known or assumed. This allows the use of a PID as a tool to measure VOC concentrations and convert the PID results to estimates of compound concentrations. All ambient air PID measurements during this quarter at the GWTP were reported at 0.0 parts per million. The results of the PID readings collected during GWTP operations are presented in **Table 3** within **Appendix H**.

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7 COMMENTS AND RESPONSES

The USEPA issued the following two comments on July 9, 2019.

Comment 1: Appendix D, Trend Analysis: For monitoring wells 18WW08, MW-2, MW-8, MW-109, and MW-120, please provide bigger charts with larger print for the contaminant concentrations. The print size for well AWD-3 is a good size to use. These are very useful charts.

Response to Comment 1: These charts will be reformatted and provided as change pages to the 4th Quarter 2018 Report.

Comment 2: General Comment: Have the pump replacements for ICTs 12D, 13C, 2, 14A, 14C, 14D, 14E, and WW-01 been completed?

Response to Comment 2: Section 1.2.2.6 of this report documents that these pumps were replaced in the 1st Quarter 2019.

The TCEQ issued the following comment on July 17, 2019.

Comment 3: Table ES-1 and 4 – Could "No Release" be moved to a different column? Isn't bayou flow collected/calculated every day even when there is no release? If so, could this information be included in the Harrison Bayou Flow column. When there is no discharge, "No Release" could go in the calculated max rate column instead of NA.

Response to Comment 3: Bayou flow is not measured when there is no release to the bayou from the GWTP or the INF Pond. Tables ES-1 and 4 will be revised to note "Not Measured" in the "Harrison Bayou Flow" column and "Not Calculated" in the "Calculated Maximum Rate Allowable" column. The following notes will also be added to the tables:

1) Bayou flow is not measured on days when no release to the Bayou occurs from the GWTP or INF Pond.

2) When the bayou is in flood stage (over the banks), the flow is not measured and the maximum release is allowed.

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APPENDIX A
ICT LAYOUT AND GWTP PROCESS FLOW DIAGRAM

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Table A-1: ICTs Completion Depths

ICT	TOC Elevation	Total Depth	Sump Elevation	Comment
1	186.07	22.5	163.57	Taken out of service in 2007.
2	185.02	29.5	155.52	
3	192.27	37.75	154.52	Taken out of service in 2007.
4	193.51	37.5	156.01	
5	192.67	35	157.67	Taken out of service in 2007.
6	197.30	40.75	156.55	Converted to infiltration in 2007. Ceased reinjection in July 2012.
7	198.03	32.33	165.7	
8	198.97	44.5	154.47	
9	197.64	45.5	152.14	Converted to infiltration in 2007. Ceased reinjection in July 2012.
10	198.07	45.42	152.65	Taken out of service in 2007.
11	198.01	43.33	154.68	
12A	189.06	31.5	157.56	Taken out of service in 2007. Reinstituted in December 2012.
12B	191.97	36.25	155.72	
12C	193.90	34.33	159.57	
12D	185.64	33.75	151.89	
12E	183.38	32.25	151.13	
13A	182.59	28.17	154.42	
13B	184.72	29.58	155.14	
13C	186.13	28.17	157.96	
13D	186.72	26.17	160.55	
13E	191.79	27.08	164.71	
13F	197.81	32.33	165.48	
13G	197.03	27.25	169.78	Taken out of service in 2008.
14A	196.8	43.00	153.8	
14B	197.61	43.42	154.19	
14C	197.86	41.33	156.53	
14D	198.47	44.25	154.22	
14E	198.47	43.08	155.39	

Note(s):

ICT - interception-collection trench

TOC - top of casing, measuring point for groundwater elevations

Elevations are reported as feet above mean sea level.

Total depths are reported as feet below TOC.

Sump elevation calculated by subtracting total depth from TOC elevation.

ICTs were installed in 1998.

ICT 12A was replaced on December 5, 2012, and extraction has resumed.

TOC Elevations and total depth measured in October 2003, 4th Quarter 2003, Groundwater Treatment Plant Report.

0 100 200 400 Feet

Harrison Bayou

ICT-13G
ICT-13F
ICT-13E
ICT-13D
ICT-13C
ICT-13B
ICT-13A
ICT-12E
ICT-12D
ICT-12C
ICT-12B
ICT-12A
ICT-14A
ICT-14B
ICT-14C
ICT-14D
ICT-14E
ICT-7
ICT-5
ICT-6
ICT-1
ICT-2
ICT-3
ICT-4
ICT-8
ICT-9
ICT-10
ICT-11
EW-1

18WW17

LHAAP-24
LHAAP-18
LHAAP-39
LHAAP-17

Open Burning Pan 157
Open Burning Cage 155

33-X
35-X
37-X
41-X
21-X
27-X
22-X
22-X-1
20-X
24-X
25-X

Groundwater Treatment Plant

Ditch

AVE "Q"
SCUDDAY AVE
LONG POINT RD

Legend:
- Extraction Location
- Deactivated ICT Sump
- Injection Point – Inactive since May 24, 2012
- ICT Location
- HDPE Liner Installed outside of the ICT
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line
- 401 Building Number
- 717 Former Building Location and Number

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Quarterly Evaluation Report
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
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ICT Layout Map

Figure A-1

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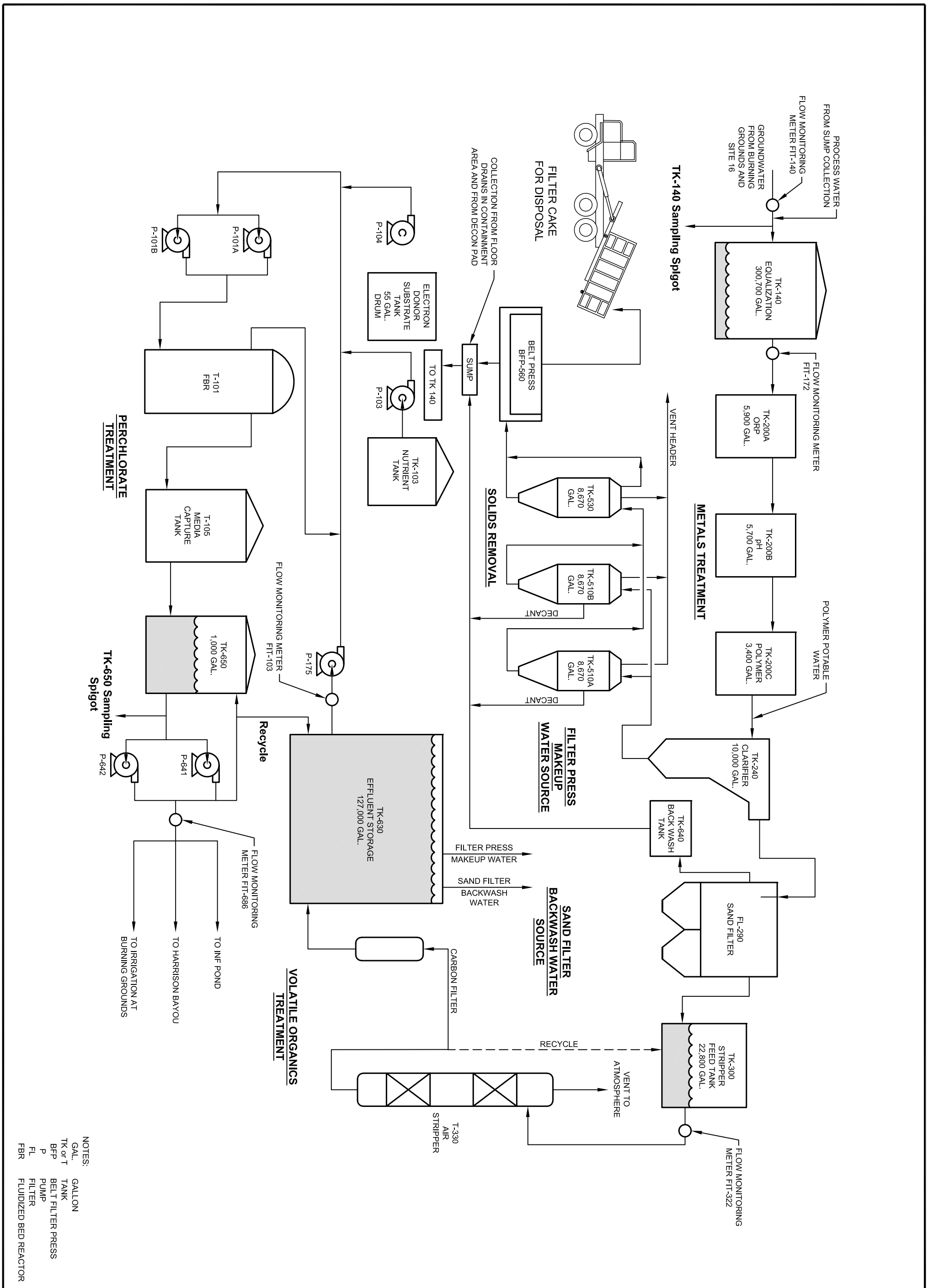

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Quarterly Evaluation Report
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

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Process Flow Diagram

Figure A-2

APPENDIX B
GROUNDWATER ELEVATION CONTOUR MAPS

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Table B-1: Extraction Equipment Maintenance Since 2011

LHAAP-18/24

Well I.D.	Replaced Parts	Date	Contractor
ICT 14E	Pump	3/15/2012	Shaw
ICT 14D	Pump, motor, level probes	3/16/2012	Shaw
ICT 14B	Pump, level probes, level probe wire	3/16/2012	Shaw
ICT 14A	Pump, motor, level probes, level probe wire	3/17/2012	Shaw
ICT 2	Pump, motor	3/17/2012	Shaw
ICT 13D	Pump	3/19/2012	Shaw
ICT 13B	Pump	3/20/2012	Shaw
ICT 14E	Pump, motor, broken piping	11/19/2012	AECOM
ICT 13C	Pump	11/20/2012	AECOM
ICT13E	Pump	11/20/2012	AECOM
ICT 12A	Pump, motor, wiring harness, level probes, level probe wire	12/5/2012	AECOM
ICT 7	Pump, motor, wiring harness, level probes	12/6/2012	AECOM
ICT2	Pump	6/10/2013	AECOM
ICT 13C	Pump	6/11/2013	AECOM
ICT 13D	Pump	6/12/2013	AECOM
ICT 14E	Pump rebuilt	6/15/2013	AECOM
ICT 14E	Replacedd low level switch	6/19/2013	AECOM
ICT 13C	Pump, wiring harness, flow meter	4/15/2014	AECOM
ICT 14D	Repaired level probes	6/24/2014	AECOM
ICT 14E	Repaired level probes	6/24/2014	AECOM
ICT 14E	Pump and motor troubleshooting	6/26/2014	AECOM
ICT2, 13F, 14C, 14D, 14E	Repaired level probes	7/7/2014	AECOM
ICT 12E	Pump, motor	10/2/2014	AECOM
ICT 12E	Wiring harness, fixed leak	10/8/2014	AECOM
ICT 12E	Level probes	10/9/2014	AECOM
ICT13A	Pump, piping	10/15/2014	AECOM
ICT 12E	Repaired leaking fittings	10/16/2014	AECOM
ICT 11	1" tee and 1" elbow	1/13/2015	AECOM
ICT 12B	Flow meter	1/13/2015	AECOM
ICT 7	1" tee, Repaired 1" pipe	1/13/2015	AECOM
ICT 13A	Flow meter	1/15/2015	AECOM
ICT 13B	Pump	1/15/2015	AECOM
ICT 13C	Pump	1/16/2015	AECOM
ICT 7	Low level probe	1/16/2015	AECOM
ICT 13D	Pump, level probes	1/17/2015	AECOM
ICT 14C	Low level probe	1/17/2015	AECOM
ICT 14C	Low level probe	1/29/2015	AECOM
ICT 14D	Low level probe	1/29/2015	AECOM
ICT 13D	Level probes	1/29/2015	AECOM
ICT 2	Pump	1/30/2015	AECOM
ICT 8	Fuse	3/2/2015	AECOM
ICT 8	Fuse	3/9/2015	AECOM
ICT 12E	Flow meter	3/13/2015	AECOM
ICT 13D	Union	3/13/2015	AECOM
ICT 14C	Cleaned level probes	4/1/2015	AECOM
ICT 14D	Cleaned level probes	4/1/2015	AECOM
ICT 13A	Cleaned level probes	4/21/2015	AECOM
ICT 14C	Cleaned level probes	4/21/2015	AECOM
ICT 8	Low level probe	7/24/2015	AECOM
ICT 13C	Installed New Pump	7/28/2015	AECOM

Table B-1: Extraction Equipment Maintenance Since 2011

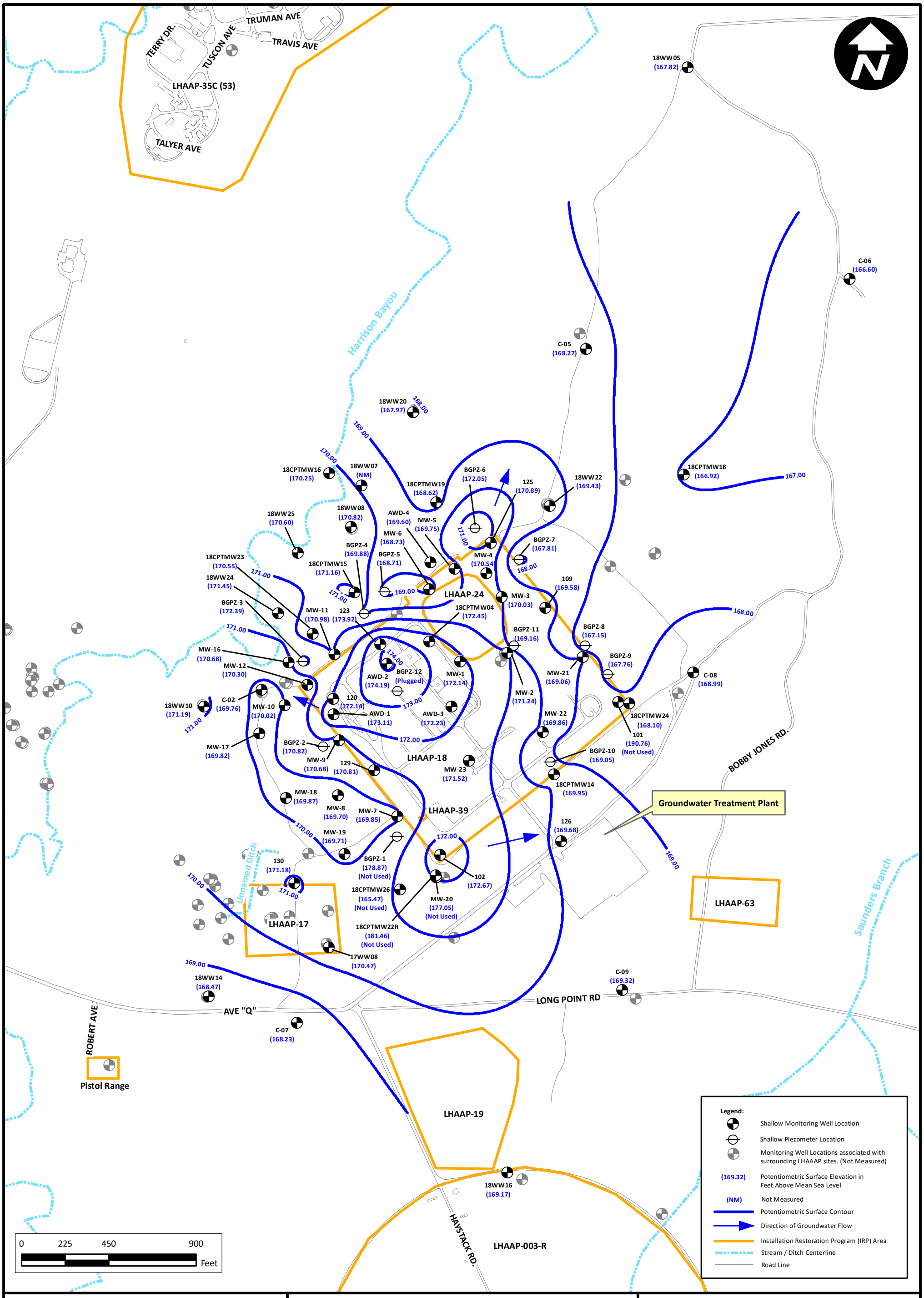
Well I.D.	Replaced Parts	Date	Contractor
ICT 14C	Installed New Pump and Electric Motor	7/29/2015	AECOM
ICT 14E	Installed New Pump and Electric Motor	7/31/2015	AECOM
ICT 12E	Repaired wiring	8/12/2015	AECOM
ICT 13E	Replaced high and low level probes	8/12/2015	AECOM
ICT 2	Installed Rebuilt Pump	9/9/2015	AECOM
ICT 12 E, ICT 14E	Replaced high level probe and wiring	9/15/2015	AECOM
ICT 13A	Installed new pump	12/23/2015	AECOM
ICT 13B	Installed new pump	12/24/2015	AECOM
ICT 13D	Replaced high level probe	2/11/2016	Aerotek
ICT 14C	Replaced low level probe on ICT 14C	2/15/2016	Aerotek
ICT 8	Installed new pump and electric motor	2/19/2016	Aerotek
ICT 14C	Repaired piping leak	3/10/2016	Aerotek
ICT 14E	Installed high and low level probes, level probe wire	3/22/2016	Aerotek
ICT 13D, ICT 14B	Installed high and low level probes, level probe wire	3/24/2016	Aerotek
ICT 14B	Installed new pump and electric motor	3/31/2016	Aerotek
ICT 14C	Installed new low level probe	4/20/2016	Aerotek
ICT 12B	Installed new mechanical flow meter	6/16/2016	Aerotek
ICT 13C	Installed rebuilt pump and new flow meter	8/10/2016	Aerotek
ICT 13A	Installed rebuilt pump, new flow meter, and new 1" unions	8/24/2016	Aerotek
ICT 14E	Installed new mechanical flow meter	8/26/2016	Aerotek
ICT 12C	Repaired flow meter	8/30/2016	Aerotek
ICT 2	Installed rebuilt pump and new flow meter	8/31/2016	Aerotek
ICT 14C	Cleaned and adjust level probes	9/7/2016	Aerotek
ICT 14C	Replaced level probes	9/12/2016	Aerotek
ICT 14C	Installed new level probe wire and level probes	9/21/2016	Aerotek
ICT 12C	Installed rebuilt pump, new electric motor, new wiring harness, new level probe wire, and new level probes	9/27/2016	Aerotek
ICT 14C	Cleaned and adjusted level probes	10/14/2016	Aerotek
ICT 13C	Cleaned and adjusted level probes	10/21/2016	Aerotek
ICT 13B	Installed rebuilt pump	10/25/2016	Aerotek
ICT 14D	Installed rebuilt pump	10/27/2016	Aerotek
ICT 13C	Replaced low level probe	11/8/2016	Aerotek
ICT 13B	Replaced relay base plate	11/8/2016	Aerotek
ICT 13E	Cleaned and adjusted low level probe	11/15/2016	Aerotek
ICT 13B	Replaced broken relay base plate and bad level probe wire	11/17/2016	Aerotek
ICT 13C	Cleaned & repaired leaking flow meter	11/18/2016	Aerotek
ICT 13B	Cleaned & adjusted low level probe	11/18/2016	Aerotek
ICT 13A, 13B, & 13E	Cleaned and adjusted low level probes	12/2/2016	Aerotek
ICT 13C & 14C	Pulled piping and pumps	2/8/2017	Aerotek
ICT 14C	Installed new electric motor	2/8/2017	Aerotek
ICT 13C & 14C	Installed rebuilt grundfos pumps	2/8/2017	Aerotek
ICT 7, 13A, & 14D	Repaired sample ports	2/9/2017	Aerotek
ICT 13B & 14E	Cleaned and adjusted low level probes	3/30/2017	Aerotek
ICT 13B & 13F	Installed new flow meters	3/30/2017	Aerotek
ICT 12B	Repaired flow meter	4/13/2017	Aerotek
ICT 12C	Replaced broken 1" tee	5/1/2017	Aerotek
ICT 11	Installed new manual flow meter	5/5/2017	Aerotek
ICT 2	Installed new flow meter	5/9/2017	Aerotek
ICT 14C & 14D	Cleaned and adjusted low level probes	5/31/2017	Aerotek
ICT 14C	Cleaned and adjusted low level probe	6/27/2017	Aerotek
ICT 8	Cleaned low level probe	7/11/2017	Aerotek
ICT 2 & 14D	Cleaned and replaced level probes	7/17/2017	Aerotek
ICT 14C	Cleaned low level probe	7/24/2017	Aerotek

Table B-1: Extraction Equipment Maintenance Since 2011

Well I.D.	Replaced Parts	Date	Contractor
ICT 13A	Installed new pump and flow meter	8/8/2017	Aerotek
ICT 13C & 13B	Installed new pump and flow meter	8/9/2017	Aerotek
ICT 13B	Installed new low level probe	8/10/2017	Aerotek
ICT 11	Installed new pump and flow meter	8/11/2017	Aerotek
ICT 4	Replaced low level probe	8/11/2017	Aerotek
ICT 2	Installed rebuilt pump	9/19/2017	Aerotek
ICT 13D	Adjusted level probes	9/22/2017	Aerotek
ICT 14C	Cleaned level probes	10/11/2017	Bhate
ICT 13E	Cleaned and adjusted level probes	10/24/2017	Bhate
ICT 12B	Adjusted level probes	11/15/2017	Bhate
ICT 14D	Cleaned level probes	11/15/2017	Bhate
ICT 8	Cleaned and adjusted level probes	11/28/2017	Bhate
ICT 2	Cleaned level probes	12/20/2017	Bhate
ICT 13C	Installed new flow meter	1/30/2018	Bhate
ICT 14C	Cleaned level probes	1/30/2018	Bhate
ICT 13C	Cleaned & adjusted level probes	2/1/2018	Bhate
ICT 13B	Repaired broken 1" union	2/1/2018	Bhate
ICT 14A	Repaired 2 broken 1" elbows & lower high level probe	2/1/2018	Bhate
ICT 14B	Repaired broken 1" tee & lower high level probe	2/1/2018	Bhate
ICT 14D	Installed new flow meter	2/8/2018	Bhate
ICT 8	Replaced broken 1" tee & cleaned level probes	2/8/2018	Bhate
ICT 14D	Cleaned level probes	2/28/2018	Bhate
ICT 14C	Replaced low level probe	2/28/2018	Bhate
ICT 13B	Cleaned level probes	2/28/2018	Bhate
ICT 13A	Installed new motor & replaced leaking 1" union	3/14/2018	Bhate
ICT 13C	Cleaned & adjusted level probes	3/21/2018	Bhate
ICT 12B	Replaced broken 1" elbow & installed new flow meter	3/21/2018	Bhate
ICT 2	Installed new pump	3/22/2018	Bhate
ICT 13B	Replaced level probes	3/30/2018	Bhate
ICT 14E	Lower high level probe	3/30/2018	Bhate
ICT 14C	Cleaned level probes	4/27/2018	Bhate
ICT 11	Installed new breaker	4/27/2018	Bhate
ICT 14E	Cleaned level probes	6/7/2018	Bhate
ICT 12C	Cleaned level probes	6/7/2018	Bhate
EW 01	Cleaned level probes	6/7/2018	Bhate
ICT 14E	Replaced level probes	6/8/2018	Bhate
ICT 11	Installed new electrical wire from breaker to well	6/14/2018	Bhate
ICT 12B	Replaced pump	6/25/2018	Bhate
ICT 14E	Cleaned level probes	6/26/2018	Bhate
ICT 8	Cleaned level probes	6/26/2018	Bhate
ICT 14C	Replaced pump	6/27/2018	Bhate
EW01	Replaced level probes	9/12/2018	Bhate
ICT 7	Cleaned level probes	9/12/2018	Bhate
ICT 12C	Replaced low level probe wire and probe	9/12/2018	Bhate
ICT 14D	Replaced high level probe wire & probe	9/13/2018	Bhate
ICT 12B	Replaced high and low level probe wires & probes	9/13/2018	Bhate
ICT 12B	Replaced electrical relay and relay base plate	9/13/2018	Bhate
ICT 14C	Cleaned level probes	9/13/2018	Bhate
ICT 13E	Replaced flow meter	9/14/2018	Bhate
ICT 14D	Replaced low level probe	10/31/2018	Bhate
ICT 8	Cleaned level probes	10/31/2018	Bhate
ICT 14C	Cleaned level probes	10/31/2018	Bhate
ICT 13A	Replaced broken 1" Tee	12/12/2018	Bhate
ICT 14C	Cleaned level probes	12/12/2018	Bhate

Table B-1: Extraction Equipment Maintenance Since 2011

Well I.D.	Replaced Parts	Date	Contractor
ICT 13A	Installed new flow meter	2/14/2019	Bhate
ICT 13E	Cleaned probes	2/25/2019	Bhate
18WW17	Cleaned probes	2/26/2019	Bhate
ICT 12D	Replaced pump & motor	3/6/2019	Bhate
ICT 13C	Replaced pump	3/8/2019	Bhate
ICT 2	Replaced pump & flow meter	3/11/2019	Bhate
ICT 14C	Replaced pump & motor	3/12/2019	Bhate
ICT 14D	Replaced pump	3/12/2019	Bhate
ICT 2	Replaced leaking 1" union	3/12/2019	Bhate
ICT 14E	Replaced pump, seal plate & level probes	3/14/2019	Bhate
ICT 14A	Replaced pump & motor and repaired leaking 1" pipe	3/15/2019	Bhate
18WW17	Replaced level prbes and level probe wire	3/18/2019	Bhate
ICT 13C	Lower high level probe	3/22/2019	Bhate
ICT 14A	Lower high level probe	3/22/2019	Bhate
EW-01	Replaced pump	3/29/2019	Bhate
	LHAAP-16		
Well I.D.	**Replaced Parts**	**Date**	**Contractor**
EW08	New pump	2/28/2011	Shaw
EW01	Rebuild pump	8/25/2011	Shaw
EW06	Rebuild pump	8/25/2011	Shaw
EW02	Rebuild pump	2/12/2012	Shaw
EW03	Rebuild pump	2/12/2012	Shaw
EW08	Rebuild pump	11/8/2012	AECOM
EW01	Rebuild pump	11/8/2012	AECOM
EW04	Repaired pump	11/13/2012	AECOM
EW07	Rebuild pump	11/13/2012	AECOM
EW04	Installed New Pump	11/28/2012	AECOM
EW06	Installed New Pump	11/28/2012	AECOM
EW02	Installed New Pump	12/4/2012	AECOM
EW03	Installed New Pump	12/4/2012	AECOM
EW01	Installed New Pump	12/17/2012	AECOM
EW01	Replaced Low level probe	1/17/2015	AECOM
EW01	Cleaned and adjusted level probes	10/21/2016	Aerotek



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Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
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Groundwater Potentiometric Surface Map
Shallow Zone (January 31, 2019) LHAAP-18/24

Figure B-1

TERRY DR.
TUSCON AVE
TRUMAN AVE
TRAVIS AVE
LHAAP-35C (53)
TALYER AVE
Harrison Bayou
Unnamed Ditch
Saunders Branch
BOBBY JONES RD.
ROBERT AVE
AVE "Q"
LONG POINT RD
HAYSTACK RD.
LHAAP-24
LHAAP-18
LHAAP-39
LHAAP-17
LHAAP-63
LHAAP-19
LHAAP-003-R
Pistol Range
Groundwater Treatment Plant
18WW05 (167.69)
C-06 (166.72)
C-05 (168.77)
18WW20 (168.13)
18CPTMW16 (170.37)
18WW07 (NM)
18CPTMW19 (168.76)
BGPZ-6 (171.97)
125 (171.08)
18WW22 (169.59)
18CPTMW18 (166.83)
18WW25 (170.67)
18WW08 (170.96)
MW-5 (169.87)
AWD-4 (169.54)
BGPZ-5 (168.87)
BGPZ-4 (170.07)
MW-6 (168.87)
BGPZ-7 (167.94)
18CPTMW23 (170.70)
18WW24 (171.59)
MW-11 (171.10)
BGPZ-3 (172.56)
18CPTMW15 (171.29)
123 (174.16)
MW-4 (170.62)
MW-3 (170.14)
109 (169.72)
18CPTMW04 (172.57)
BGPZ-8 (167.28)
MW-21 (168.93)
BGPZ-11 (169.08)
C-08 (169.10)
MW-16 (170.88)
C-02 (170.01)
MW-10 (170.15)
18WW10 (171.34)
BGPZ-12 (Plugged)
MW-1 (172.27)
AWD-2 (174.53)
MW-2 (170.37)
BGPZ-9 (167.90)
18CPTMW24 (168.29)
AWD-1 (173.02)
AWD-3 (172.35)
MW-22 (169.98)
MW-17 (169.93)
MW-12 (170.54)
MW-23 (171.64)
101 (190.94) (Not Used)
120 (172.28)
BGPZ-2 (170.94)
MW-9 (170.58)
129 (171.02)
BGPZ-10 (169.20)
18CPTMW14 (170.07)
MW-18 (169.98)
MW-8 (169.84)
MW-7 (169.95)
126 (169.83)
MW-19 (169.87)
130 (171.46)
BGPZ-1 (179.08) (Not Used)
102 (175.10)
18CPTMW26 (165.60) (Not Used)
18CPTMW22R (181.53) (Not Used)
MW-20 (177.17) (Not Used)
17WW08 (170.77)
18WW14 (168.64)
C-07 (168.13)
C-09 (169.45)
18WW16 (169.28)
167.00
168.00
169.00
170.00
171.00
172.00
173.00
174.00

0 225 450 900 Feet

Legend:
- Shallow Monitoring Well Location
- Shallow Piezometer Location
- Monitoring Well Locations associated with surrounding LHAAAP sites. (Not Measured)
- (169.45) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- (NM) Not Measured
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line

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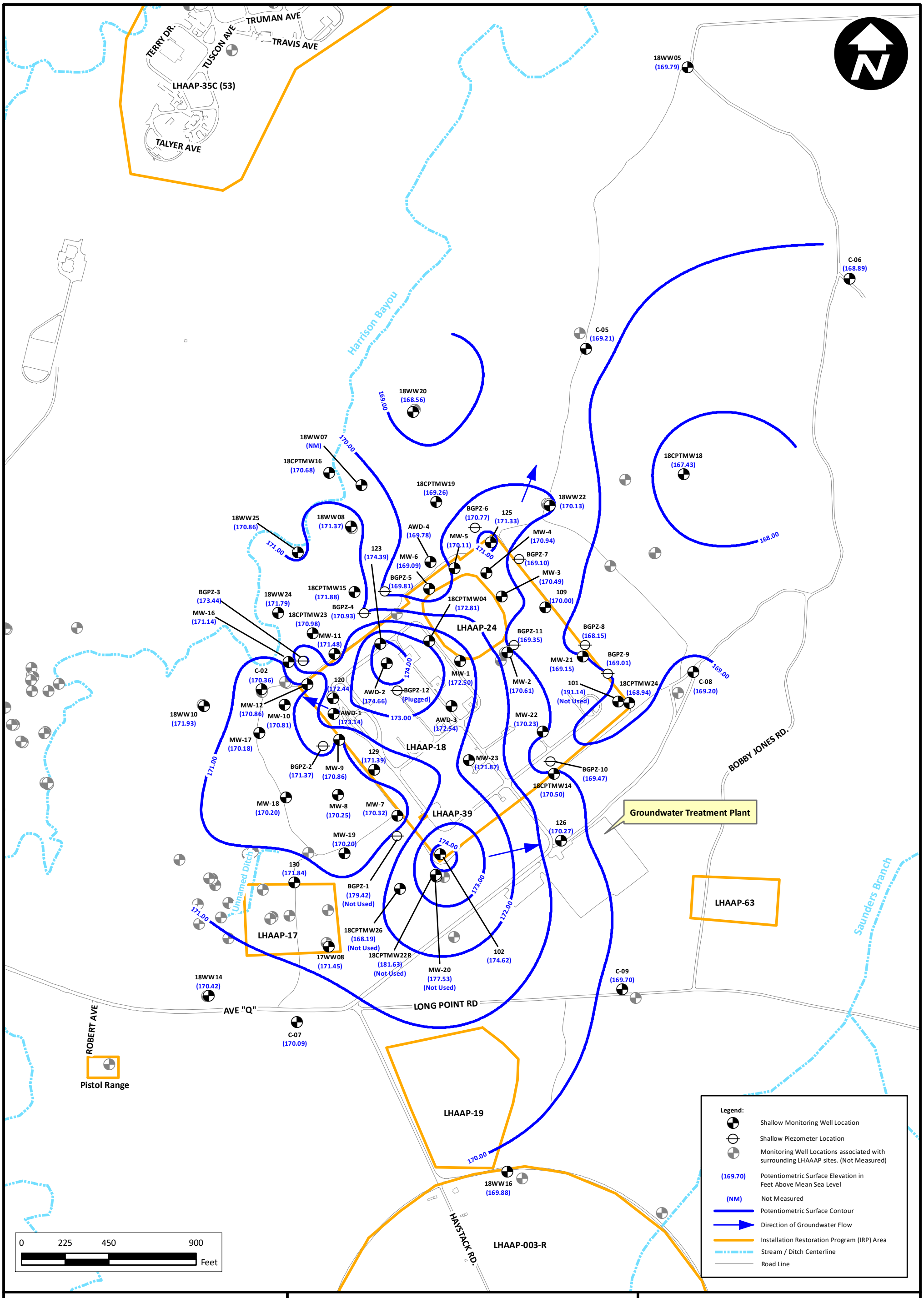
Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/31/2019	MRM

Groundwater Potentiometric Surface Map
Shallow Zone (February 28, 2019) LHAAP-18/24

Figure B-2



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Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/31/2019	MRM

Groundwater Potentiometric Surface Map
Shallow Zone (March 26-27, 2019) LHAAP-18/24

Figure B-3

TALYER AVE
LHAAP-35C (53)
Harrison Bayou
18WW04 (168.12)
18WW19 (167.86)
18CPTMW19SW (167.85)
168.00
168.50
C-04A (169.44)
18WW21 (168.79)
169.00
C-04 (169.16)
169.50
18WW09 (170.38)
C-03 (169.61)
170.00
18WW18 (170.29)
18CPTMW23SW (170.69)
18CPTMW08SW (169.46)
18CPTMW08DW (169.28)
18WW06 (170.21)
LHAAP-24
18WW02 (170.28)
MW-14 (173.11)
18CPTMW04SW (169.58)
18CPTMW01SW (170.85)
18CPTMW07 (169.99)
18CPTMW01DW (170.63)
18WW11 (169.77)
MW-13 (169.05)
172.00
171.50
171.00
170.50
18WW03 (168.86)
LHAAP-18
18CPTMW06 (170.51)
18CPTMW10DW (169.25)
18CPTMW03SW (170.10)
18CPTMW10SW (169.69)
BOBBY JONES RD.
Groundwater Treatment Plant
18CPTMW12SW (170.11)
LHAAP-39
18CPTMW12DW (169.70)
18CPTMW22SW (168.83)
Unnamed Ditch
18CPTMW26SW (169.93)
LHAAP-63
LHAAP-17
18CPTMW22DW (168.79)
C-01 (169.27)
18WW15 (168.85)
LONG POINT RD
AVE "Q"
ROBERT AVE
C-10 (169.21)
Pistol Range
LHAAP-19
18WW01 (169.40)
HAYSTACK RD.
LHAAP-003-R
Saunders Branch

0 225 450 900 Feet

Legend:
- Wilcox Zone Monitoring Well Location
- Monitoring Well Locations associated with surrounding LHAAAP sites. (Not Measured)
- (169.21) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line

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Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/24/2019	MRM

Groundwater Potentiometric Surface Map
Wilcox Zone (January 31, 2019) LHAAP-18/24

Figure B-4

TALYER AVE
LHAAP-35C (53)
Harrison Bayou
18WW04 (168.52)
18WW19 (168.07)
18WW21 (168.71)
18CPTMW19SW (168.00)
C-04A (169.60)
C-04 (169.35)
18WW09 (170.49)
18WW18 (169.98)
18CPTMW08DW (169.47)
18CPTMW08SW (169.63)
C-03 (169.75)
LHAAP-24
18WW06 (170.40)
MW-14 (173.19)
18CPTMW23SW (170.84)
18WW02 (170.45)
18CPTMW01SW (170.76)
18CPTMW07 (170.13)
MW-13 (169.15)
18CPTMW04SW (169.72)
18CPTMW01DW (170.53)
18WW11 (169.90)
18WW03 (168.98)
18CPTMW06 (170.63)
LHAAP-18
18CPTMW10DW (169.43)
18CPTMW10SW (169.90)
18CPTMW03SW (170.22)
BOBBY JONES RD.
18CPTMW12SW (170.30)
Groundwater Treatment Plant
LHAAP-39
18CPTMW12DW (169.82)
18CPTMW22SW (168.94)
Unnamed Ditch
LHAAP-63
Saunders Branch
18CPTMW26SW (170.09)
18CPTMW22DW (168.93)
LHAAP-17
C-01 (169.40)
18WW15 (169.00)
AVE "Q"
LONG POINT RD
C-10 (169.33)
ROBERT AVE
Pistol Range
LHAAP-19
18WW01 (169.51)
HAYSTACK RD.
LHAAP-003-R
168.50
169.00
169.50
170.00
172.00
171.50
171.00
170.50

0 225 450 900 Feet

Legend:
- Wilcox Zone Monitoring Well Location
- Monitoring Well Locations associated with surrounding LHAAAP sites. (Not Measured)
- (169.33) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line

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Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/24/2019	MRM

Groundwater Potentiometric Surface Map
Wilcox Zone (February 28, 2019) LHAAP-18/24

Figure B-5

TALYER AVE
LHAAP-35C (53)
Harrison Bayou
18WW04 (168.85)
18WW19 (168.54)
C-04A (170.42)
C-04 (170.22)
18WW21 (169.54)
18CPTMW19SW (168.51)
169.00
169.50
170.00
170.50
18WW09 (170.72)
18CPTMW08SW (169.87)
18CPTMW08DW (169.70)
18WW18 (170.02)
C-03 (170.34)
MW-14 (173.31)
18CPTMW23SW (171.13)
18CPTMW04SW (169.91)
18WW02 (171.01)
18WW06 (170.99)
LHAAP-24
18CPTMW01SW (170.99)
18CPTMW07 (170.68)
18CPTMW01DW (170.72)
MW-13 (169.80)
18WW11 (170.48)
172.50
172.00
171.50
171.00
18WW03 (169.82)
18CPTMW06 (170.88)
LHAAP-18
BOBBY JONES RD.
18CPTMW10DW (169.76)
18CPTMW10SW (170.25)
18CPTMW03SW (170.43)
Groundwater Treatment Plant
LHAAP-39
18CPTMW12SW (170.65)
18CPTMW12DW (170.21)
18CPTMW22SW (170.02)
18CPTMW26SW (170.27)
18CPTMW22DW (170.35)
Unnamed Ditch
LHAAP-17
LHAAP-63
Saunders Branch
C-01 (170.53)
18WW15 (170.78)
AVE "Q"
LONG POINT RD
C-10 (169.94)
ROBERT AVE
Pistol Range
LHAAP-19
18WW01 (170.25)
HAYSTACK RD.
LHAAP-003-R

0 225 450 900 Feet

Legend:
- Wilcox Zone Monitoring Well Location
- Monitoring Well Locations associated with surrounding LHAAAP sites. (Not Measured)
- (169.94) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line

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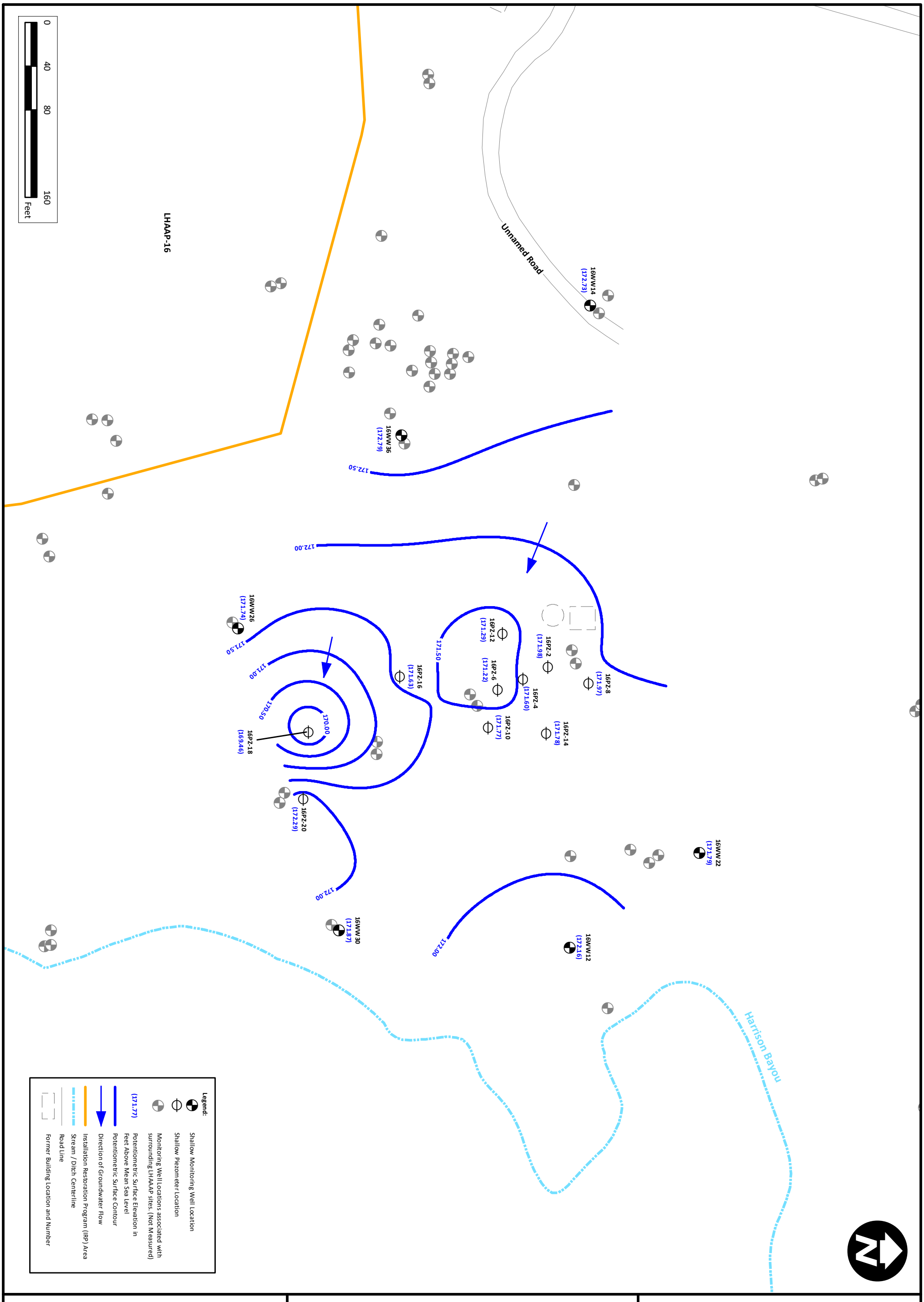
Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/24/2019	MRM

Groundwater Potentiometric Surface Map
Wilcox Zone (March 26-27, 2019) LHAAP-18/24

Figure B-6



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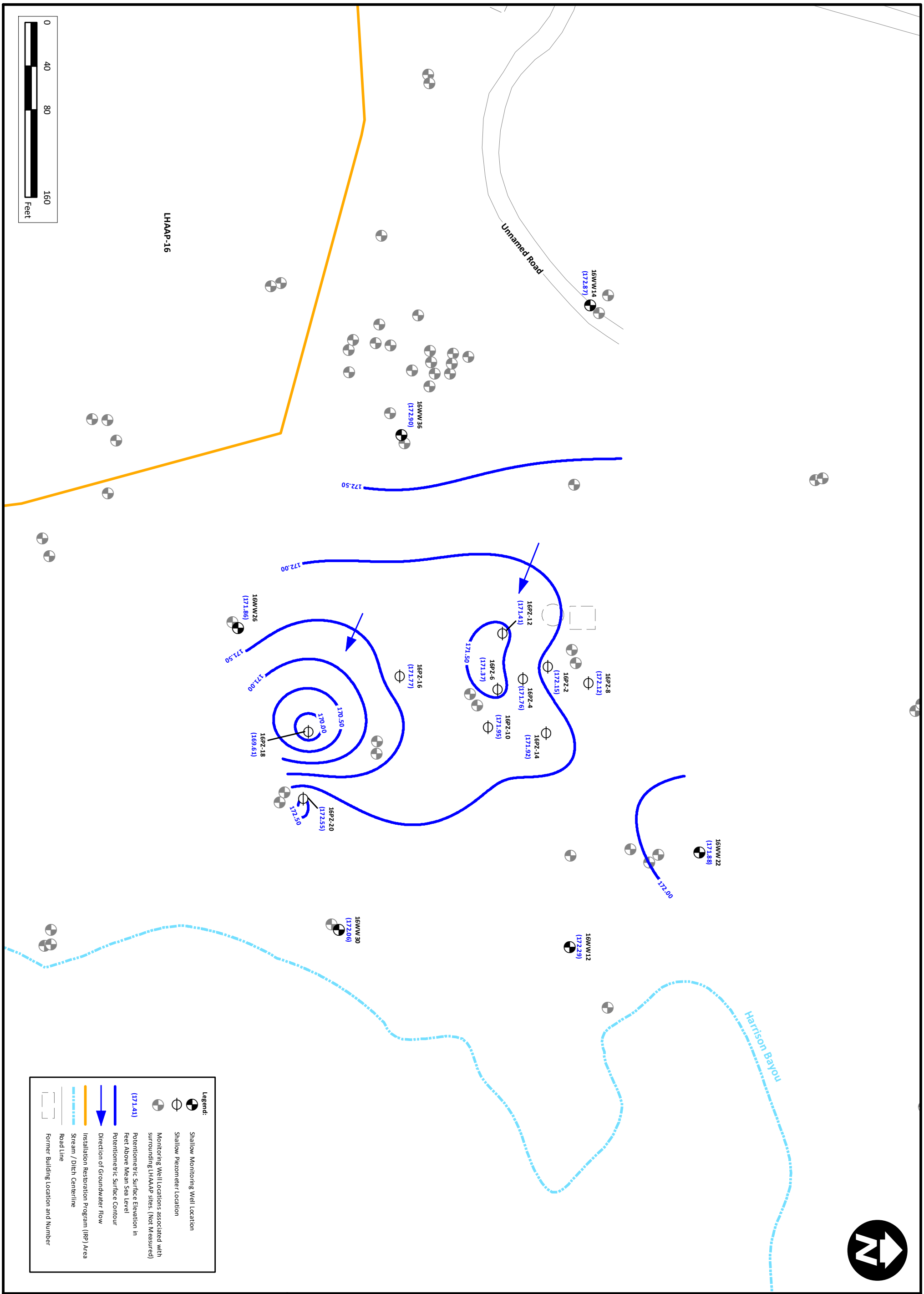
Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/25/2019	MRM

Groundwater Potentiometric Surface Map
Shallow Zone (January 30, 2019) LHAAP-16

Figure B-7



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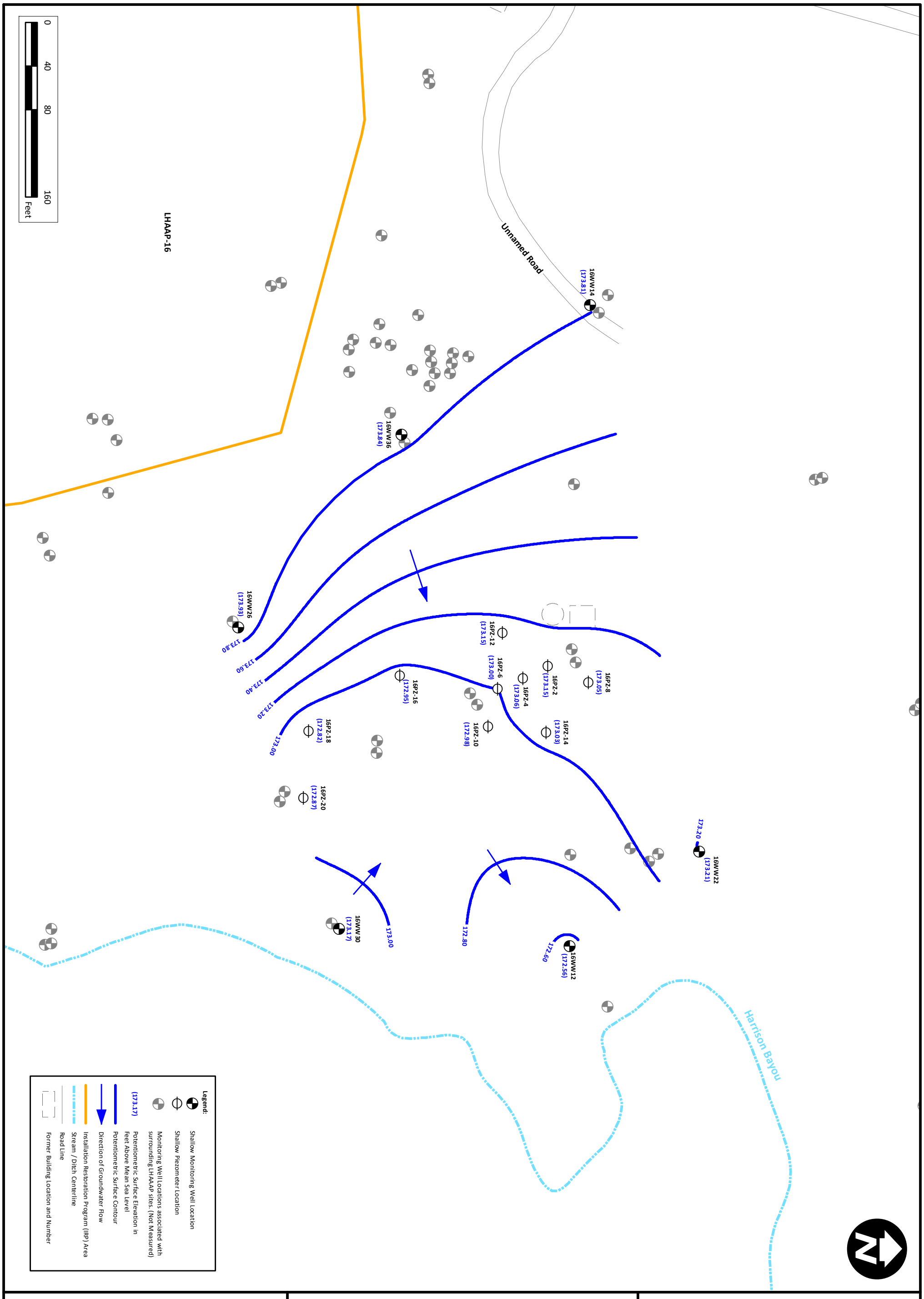
Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/25/2019	MRM

Groundwater Potentiometric Surface Map
Shallow Zone (February 27, 2019) LHAAP-16

Figure B-8

00934306



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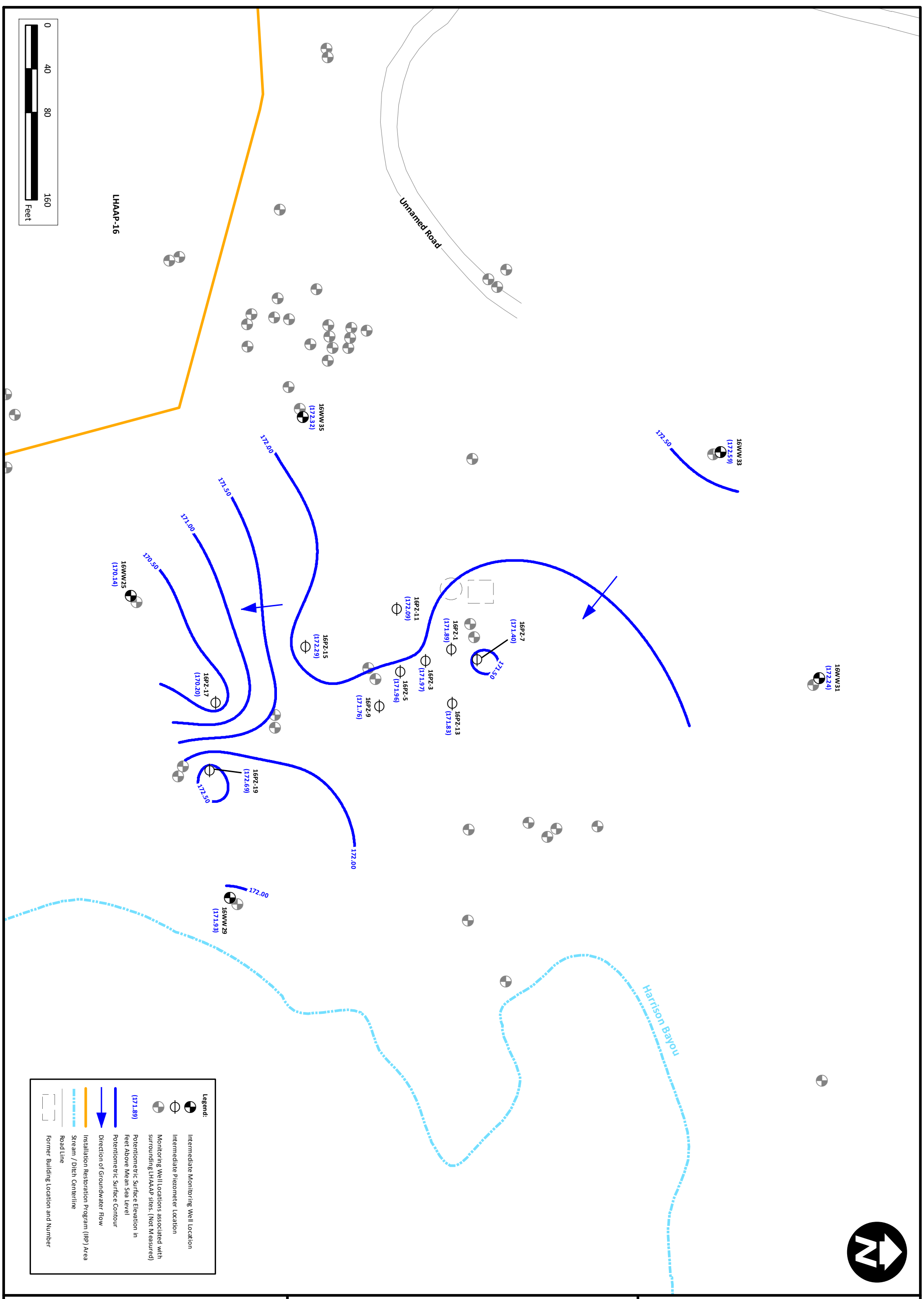
Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/25/2019	MRM

Groundwater Potentiometric Surface Map
Shallow Zone (March 26, 2019) LHAAP-16

Figure B-9

00934307



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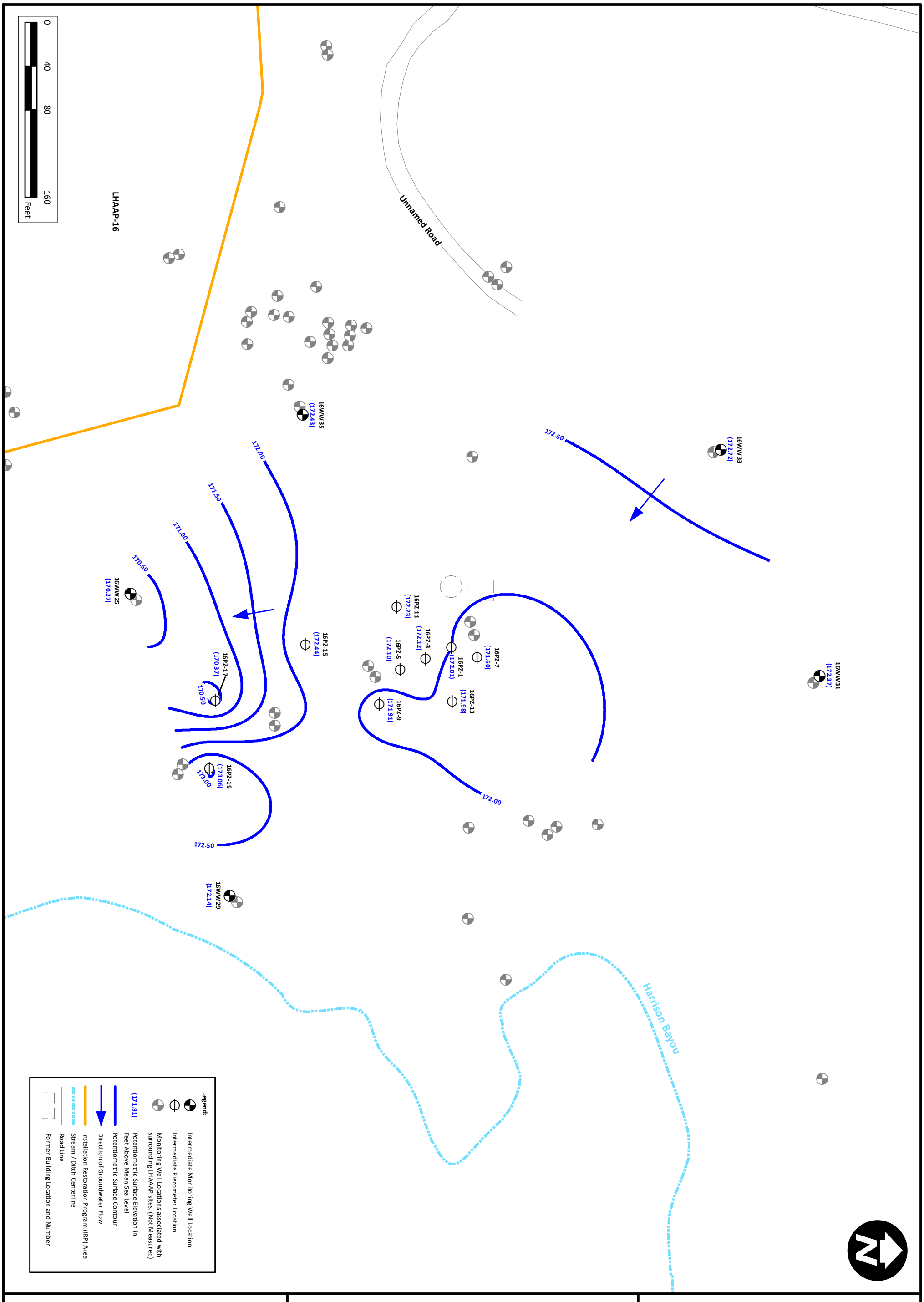
Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/25/2019	MRM

Groundwater Potentiometric Surface Map
Intermediate Zone (January 30, 2019) LHAAP-16

Figure B-10



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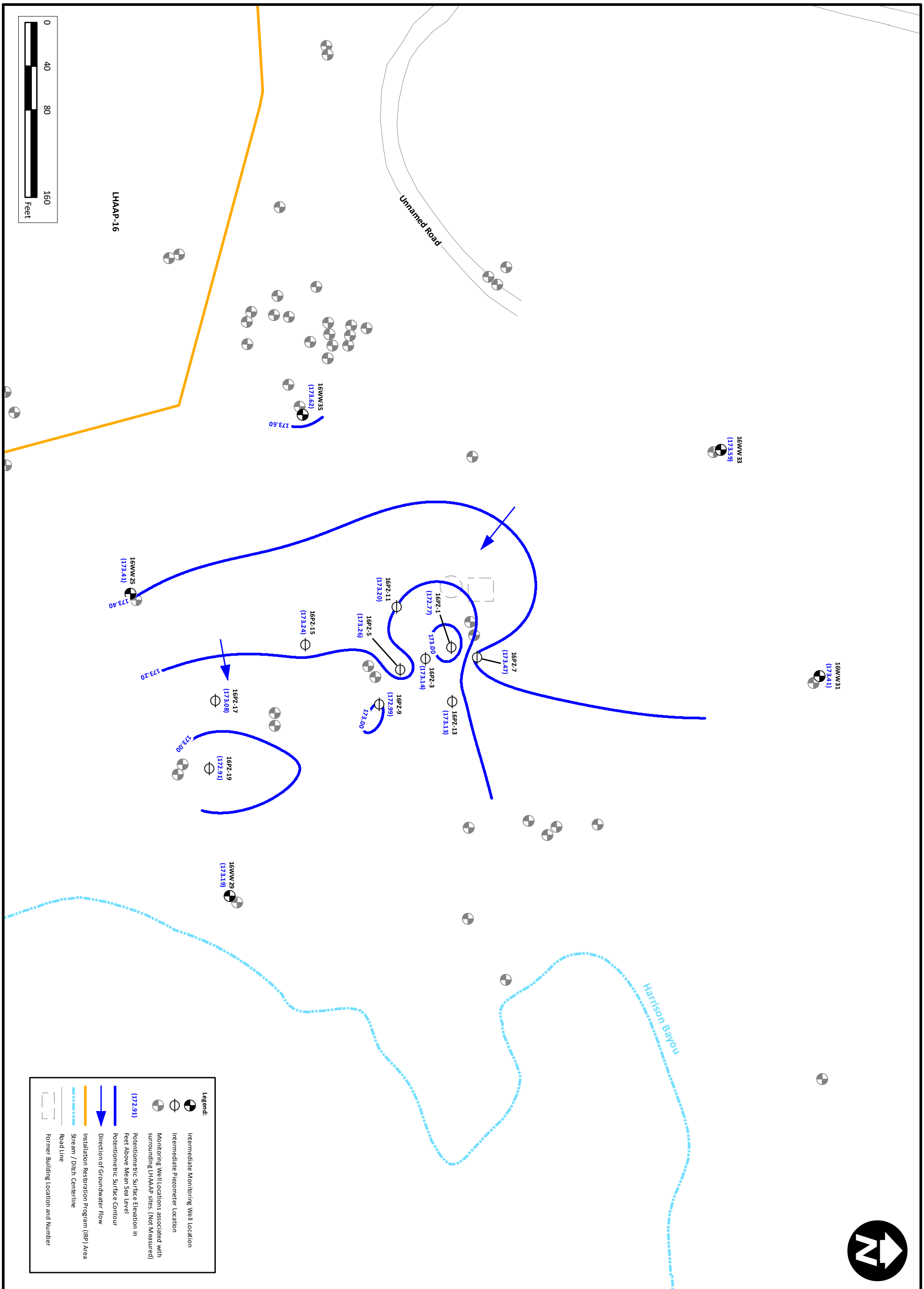
Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/25/2019	MRM

Groundwater Potentiometric Surface Map
Intermediate Zone (February 27, 2019) LHAAP-16

Figure B-11

00934309



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Quarterly Evaluation Report 1st Quarter (January – March) 2019
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/25/2019	MRM

Groundwater Potentiometric Surface Map
Intermediate Zone (March 26, 2019) LHAAP-16

Figure B-12

APPENDIX C
GWTP WATER SAMPLING LABORATORY ANALYTICAL RESULTS
(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

March 14, 2019

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

Work Order: **HS19021158**

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

Dear Marcia,

ALS Environmental received 2 sample(s) on Feb 22, 2019 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 Houston, US Date: 14-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS19021158

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19021158-01	LH18/24-SP650_022119	Water		21-Feb-2019 09:06	22-Feb-2019 09:06	☐
HS19021158-02	LH18/24-SP650_022119_BIX	Water		21-Feb-2019 14:00	22-Feb-2019 09:06	☐

ALS Houston, US Date: 14-Mar-19

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.
- The analysis for TOC was subcontracted to ALS Environmental in Kelso, WA. Final Report attached.

WetChemistry by Method E365.3

Batch ID: R333717

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

WetChemistry by Method E350.3

Batch ID: R333409

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

ALS Houston, US

Date: 14-Mar-19

Client: Bhate Environmental Associates, Inc.

ANALYTICAL REPORT

Project: Longhorn GW Treatment Plant

WorkOrder:HS19021158

Sample ID: LH18/24-SP650_022119

Lab ID:HS19021158-01

Collection Date: 21-Feb-2019 09:06

Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: KVL
Nitrogen, Ammonia (As N)	**15**		**2.0**	**2.0**	**2.0**	**mg/L**	10	25-Feb-2019 10:20
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**4.20**		**0.100**	**0.250**	**0.250**	**mg/L**	10	22-Feb-2019 14:30
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	14-Mar-2019 14:02

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

ALS Houston, US

Date: 14-Mar-19

Client: Bhate Environmental Associates, Inc.

ANALYTICAL REPORT

Project: Longhorn GW Treatment Plant

WorkOrder:HS19021158

Sample ID: LH18/24-SP650_022119_BIX

Lab ID:HS19021158-02

Collection Date: 21-Feb-2019 14:00

Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	07-Mar-2019 17:47

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

ALS Houston, US Date: 14-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021158

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R333409	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS19021158-01	LH18/24-SP650_022119	21 Feb 2019 09:06			25 Feb 2019 10:20	10
Batch ID R333717	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS19021158-01	LH18/24-SP650_022119	21 Feb 2019 09:06			22 Feb 2019 14:30	10
Batch ID R334176	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS19021158-02	LH18/24-SP650_022119_BIX	21 Feb 2019 14:00			07 Mar 2019 17:47	1
Batch ID R334558	**Test Name :** SUBCONTRACT ANALYSIS - TOC ANALYSIS			**Matrix:** Water		
HS19021158-01	LH18/24-SP650_022119	21 Feb 2019 09:06			14 Mar 2019 14:02	1

ALS Houston, US Date: 14-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021158

QC BATCH REPORT

Batch ID: R333409 **Instrument: WetChem_HS** **Method: E350.3**

MBLK Sample ID: **MBLK-R333409** Units: **mg/L** Analysis Date: **25-Feb-2019 10:20**
Client ID: Run ID: **WetChem_HS_333409** SeqNo: **4962077** 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)	0.20	0.20								U

LCS Sample ID: **LCS-R333409** Units: **mg/L** Analysis Date: **25-Feb-2019 10:20**
Client ID: Run ID: **WetChem_HS_333409** SeqNo: **4962076** 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)	9.117	0.20	10	0	91.2	80 - 120				

MS Sample ID: **HS19021211-02MS** Units: **mg/L** Analysis Date: **25-Feb-2019 10:20**
Client ID: Run ID: **WetChem_HS_333409** SeqNo: **4962079** 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)	9.246	0.20	10	0.3054	89.4	80 - 120				

MSD Sample ID: **HS19021211-02MSD** Units: **mg/L** Analysis Date: **25-Feb-2019 10:20**
Client ID: Run ID: **WetChem_HS_333409** SeqNo: **4962078** 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)	9.272	0.20	10	0.3054	89.7	80 - 120	9.246	0.281	20	

The following samples were analyzed in this batch: HS19021158-01

ALS Houston, US Date: 14-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021158

QC BATCH REPORT

Batch ID: R333717 **Instrument: UV-2450** **Method: E365.3**

MBLK Sample ID: **MBLK-333717** Units: **mg/L** Analysis Date: **22-Feb-2019 14:30**
Client ID: Run ID: **UV-2450_333717** SeqNo: **4969292** 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-333717** Units: **mg/L** Analysis Date: **22-Feb-2019 14:30**
Client ID: Run ID: **UV-2450_333717** SeqNo: **4969293** 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)	0.222	0.0250	0.25	0	88.8	85 - 115				

MS Sample ID: **HS19021157-03MS** Units: **mg/L** Analysis Date: **22-Feb-2019 14:30**
Client ID: Run ID: **UV-2450_333717** SeqNo: **4969296** 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	0.009	88.4	80 - 120				

MSD Sample ID: **HS19021157-03MSD** Units: **mg/L** Analysis Date: **22-Feb-2019 14:30**
Client ID: Run ID: **UV-2450_333717** SeqNo: **4969297** 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)	0.239	0.0250	0.25	0.009	92.0	80 - 120	0.23	3.84	20	

The following samples were analyzed in this batch: HS19021158-01

ALS Houston, US Date: 14-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: **HS19021158**

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 Houston, US Date: 14-Mar-19

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	20-Dec-2021
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019
North Carolina	624-2019	31-Dec-2019
California	2919, 2018-2019	30-Apr-2019
Maryland	343, 2018-2019	30-Jun-2019

00934322

ALS Houston, US Date: 14-Mar-19

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS19021158
Date/Time Received: **22-Feb-2019 09:06**
Received by: **RPG**

Checklist completed by: *Raegen Giga* eSignature 22-Feb-2019 Date
Reviewed by: *RJ Modashia* eSignature 22-Feb-2019 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 ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	1.6c/1.6c uc/c	IR 11
Cooler(s)/Kit(s):	24406	
Date/Time sample(s) sent to storage:	02/22/2019 11:59	

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:

00934323

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: RJ Modshia

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

HS19021158

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

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_022119	Water	02/21/19 / 14:00		2	X	X									H2SO4	
LH18/24-SP650_022119	Water	02/21/19 / 14:00		1			X								NONE	
LH18/24-SP650_022119_BIX	Water	02/21/19 / 14:00		1				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	02/21/19	14:30	R Cisa	2/21/19	2904						

For Lab Use Only

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

Remarks: Cooler 24406 Temp 1-6C
IR 11 CF 0

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

00934324

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 2 1 530 5656
Fax. +1 281 530 5887

CUSTODY SEAL

Date: 2/21/19 Time 1450
Name: Scott Buesinger
Company: BHBIL

Seal Broken By:
2/21/19

RETURNS MON-SAT
TRK# 0221 4380 9530 9467
PRIORITY OVERNIGHT

FedEx.
TRK# 0221 4380 9530 9467
FRI - 22 FEB 10:30A
PRIORITY OVERNIGHT

AB SGRA
77099
TX-US
IAH

ALS Environmental
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March 13, 2019

Analytical Report for Service Request No: K1901637

RJ Modashia
ALS Laboratory Group
10450 Stancliff Road
Suite 210
Houston, TX 77099-4338

RE: HS19021158 / HS19021158

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory February 23, 2019
For your reference, these analyses have been assigned our service request number **K1901637.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3350. You may also contact me via email at Kelley.Lovejoy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kelley Lovejoy

Kelley Lovejoy
Project Manager

ALS Environmental
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Table of Contents

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

1317 South 13th Ave, Kelso, WA 98626 | 1-360-577-7222 | www.alsglobal.com

Client: ALS Environmental - US
Project: HS19021158
Sample Matrix: Water

Service Request: K1901637
Date Received: 02/23/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 02/23/2019. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4ºC upon receipt at the laboratory.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 03/13/2019

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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T: +1 281 530 5656
F: +1 281 530 5887
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K190637

Subcontract Chain of Custody

COC ID: 10804

SUBCONTRACT TO:

ALS Environmental Kelso
1317 S. 13th Avenue
Kelso, WA 98626

Phone: +1 360 501 3312

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:	HS19021158
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19021158-01**	**LH18/24-SP650_022119**	**Water**	**21 Feb 2019 09:06**
	TOC Analysis for DOD Level IV			08 Mar 2019

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: 2/22/19 1800

Received By: _____ Date/Time: 2-23-19 1130

Cooler ID(s): _____ Temperature(s): _____

00934334

PC KL

Cooler Receipt and Preservation Form

Client ALS-Houston Service Request K19 01637

Received: 2-23-19 Opened: 2-23-19 By: JSD Unloaded: 2-23-19 By: JSD

1. Samples were received via? *USPS* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 Top Front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID (NA)	Tracking Number NA	Filed
4.4	4.2	1.4	1.2	-0.2	327		4809 7851 0617	

4. Packing material: *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA (Y) N
   If applicable, tissue samples were received: ***Frozen*** ***Partially Thawed*** ***Thawed***
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
12. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577- 7222 Fax (360)636-1 068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K1901637
Project:	HS19021158/HS19021158	**Date Collected:**	02/21/19
Sample Matrix:	Water	**Date Received:**	02/23/19
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Carbon, Total Organic

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
HS19021158 -01	K1901637-001	**8.40**	0.50	0.20	0.07	1	03/06/19 22:02	
Method Blank	K1901637-MB2	ND U	0.50	0.20	0.07	1	03/06/19 15:18	
Method Blank	K1901637-MB3	ND U	0.50	0.20	0.07	1	03/07/19 00:39	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1901637
Project	HS19021158/HS19021158	**Date Collected:**	02/21/19
Sample Matrix:	Water	**Date Received:**	02/23/19
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Carbon, Total Organic

Sample Name:	Lab Code:	LOQ	LOD	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1901602-003DUP	2.0	0.8	0.3	65.7	66.0	65.8	<1	10	03/06/19
HS19021158 -01	K1901637-001DUP2	0.50	0.20	0.07	8.40	8.29	8.35	1	10	03/06/19

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1901637
Project:	HS19021158/HS19021158	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	03/6/19
		Date Extracted:	NA

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1901602-003	**Basis:**	NA
Analysis Method:	SM 5310 C		
Prep Method:	None		

Matrix Spike
K1901602-003MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	65.7	173	100	107	83-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1901637
Project:	HS19021158/HS19021158	**Date Analyzed:**	03/06/19
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	627457

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1901637-LCS2	27.5	25.0	110	83-117

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1901637
Project:	HS19021158/HS19021158	**Date Analyzed:**	03/07/19
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	627458

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1901637-LCS3	27.6	25.0	110	83-117

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: ALS Environmental - US **Service Request:** K1901637
Project: HS19021158/HS19021158

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	627457	KQ1902968-06	03/06/19 14:44	25.0	26.2	105	90-110
CCV2	627457	KQ1902968-07	03/06/19 18:45	25.0	25.8	103	90-110
CCV3	627457	KQ1902968-08	03/07/19 00:09	25.0	26.1	104	90-110
CCV4	627457	KQ1902968-09	03/07/19 04:52	25.0	26.3	105	90-110
CCV5	627457	KQ1902968-10	03/07/19 10:17	25.0	25.7	103	90-110
CCV6	627458	KQ1902969-05	03/07/19 04:52	25.0	26.3	105	90-110
CCV7	627458	KQ1902969-06	03/07/19 10:17	25.0	25.7	103	90-110
CCV8	627458	KQ1902969-07	03/07/19 15:00	25.0	25.9	103	90-110
CCV9	627458	KQ1902969-08	03/07/19 19:43	25.0	25.8	103	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: ALS Environmental - US **Service Request:**K1901637
Project: HS19021158/HS19021158

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic

Analysis Method: SM 5310 C **Units:**mg/L

	Analysis Lot	Lab Code	Date Analyzed	LOQ	LOD	MDL	Result	Q
CCB1	627457	KQ1902968-01	03/06/19 15:01	0.50	0.20	0.07	ND	U
CCB2	627457	KQ1902968-02	03/06/19 18:59	0.50	0.20	0.07	ND	U
CCB3	627457	KQ1902968-03	03/07/19 00:24	0.50	0.20	0.07	ND	U
CCB4	627457	KQ1902968-04	03/07/19 05:07	0.50	0.20	0.07	ND	U
CCB5	627457	KQ1902968-05	03/07/19 10:31	0.50	0.20	0.07	ND	U
CCB6	627458	KQ1902969-01	03/07/19 05:07	0.50	0.20	0.07	ND	U
CCB7	627458	KQ1902969-02	03/07/19 10:31	0.50	0.20	0.07	ND	U
CCB8	627458	KQ1902969-03	03/07/19 15:15	0.50	0.20	0.07	0.17	J
CCB9	627458	KQ1902969-04	03/07/19 19:58	0.50	0.20	0.07	ND	U

Raw Data

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
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General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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Work Request # Original ( ) KP00530, 1484, 1559, 1564, 1602, 1612, 1637, 1638, 1651, 1594, 1674, 1676, 1706, 1897, 1553, 1203, 1865

Tier: I II II IV II II IV IV II II II II II

Date Analyzed: 3/6/19

Analyst: BCD

Analysis: TOC

Run # TOC;627457, 627458, TOC;627459

DATA QUALITY REPORT
INORGANICS

Explain any "no" responses to questions below, and any corrective actions in the comments section below.

1.	Is the method name and number correct and appropriate?	yes/no/NA
2.	Holding times met for all analyses and for all samples?	yes/no/NA
3.	Are calculations correct?	yes/no/NA
4.	Is the reporting basis correct? (Dry Weight)	yes/no/NA
5.	All quality control criteria met?	yes/no/NA
6.	Is the calibration curve correlation coefficient ≥ 0.995?	yes/no
7.	MBs, CCVs, CCBs, LCSs, Dups, and Spikes, analyzed at proper frequency?	yes/no/NA
8.	Are ICVs, CCVs, and CCBs all within acceptance limits?	yes/no/NA
9.	Are results for methods blanks all ND?	yes/no/NA
10.	Are all QC samples within acceptance criteria? (LCS % rec, MS/DMS % rec, DUP or MS/DMS RPDs, etc.)	yes/no/NA
11.	Are all exceptions explained?	yes/no/NA
12.	Have all applicable service requests been reviewed?	yes/no/NA
13.	Are all samples labeled correctly?	yes/no/NA
14.	Have all instructions on the service request been followed? (e.g. Special MRLs, QC on a specific sample, Form V)	yes/no/NA
15.	Are detection limits and units reported correctly?	yes/no/NA
16.	Is the unused space on the benchsheet crossed out?	yes/no/NA
17.	Was analysis turned in by the due date? (n-2) (If not record SR#)	yes/no/NA

COMMENTS: K1901612-1/2 sent for RA for additional dilution.
KP01728-2 Needed large dilution due to dirty/oily sample.
K1901559-2/3, 1676-1, 1594-4 have a high %RSD, but are less than 5x the MRL.
K1901674-3, 1676-3, 1706-1/2/3 have a high %RSD, but these are dirty, non-homogenous samples.

Final Approved by: _____ Date: 03/08/19

DQREPORT

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 627457 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1900530-026	Carbon, Total Organic	N/A		Water	0.43 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			3/6/19 16:23:00	N	I
K1901484-001	Carbon, Total Organic	N/A		Water	8.93 mg/L	10 ml	893 mg/L	100	7	50			3/7/19 01:08	N	II
K1901484-004	Carbon, Total Organic	N/A		Water	7.41 mg/L	10 ml	741 mg/L	100	7	50			3/7/19 01:36	N	II
K1901559-001	Carbon, Total Organic	N/A		Ground Water	1.04 mg/L	10 ml	1.04 mg/L	1	0.07	0.50			3/7/19 05:22	N	II
K1901564-002	Carbon, Total Organic	N/A		Water	4.27 mg/L	10 ml	4.27 mg/L	1	0.07	0.50			3/6/19 17:48	N	IV
K1901564-003	Carbon, Total Organic	N/A		Water	3.26 mg/L	10 ml	3.26 mg/L	1	0.07	0.50			3/6/19 18:16	N	IV
K1901564-019	Carbon, Total Organic	N/A		Water	20.14 mg/L	10 ml	80.6 mg/L	4	0.3	2.0			3/6/19 19:14	N	IV
K1901564-020	Carbon, Total Organic	N/A		Water	16.24 mg/L	10 ml	65.0 mg/L	4	0.3	2.0			3/6/19 19:42	N	IV
K1901602-003	Carbon, Total Organic	N/A		Water	16.41 mg/L	10 ml	65.7 mg/L	4	0.3	2.0			3/6/19 16:38	N	II
K1901612-001	Carbon, Total Organic	N/A		Water	111.94 mg/L	10 ml	1120 mg/L	10	0.7	5.0			3/6/19 20:10	N	II
K1901612-002	Carbon, Total Organic	N/A		Water	111.76 mg/L	10 ml	447 mg/L	4	0.3	2.0			3/6/19 20:38	N	II
K1901637-001	Carbon, Total Organic	N/A		Water	8.40 mg/L	10 ml	8.40 mg/L	1	0.07	0.50			3/6/19 22:02	N	IV
K1901638-001	Carbon, Total Organic	N/A		Ground Water	2.65 mg/L	10 ml	2.65 mg/L	1	0.07	0.50			3/6/19 22:30	N	IV
K1901638-002	Carbon, Total Organic	N/A		Ground Water	11.19 mg/L	10 ml	11.2 mg/L	1	0.07	0.50			3/6/19 22:58	N	IV
K1901638-003	Carbon, Total Organic	N/A		Ground Water	4.88 mg/L	10 ml	4.88 mg/L	1	0.07	0.50			3/6/19 23:26	N	IV
K1901651-001	Carbon, Total Organic	N/A		Water	9.25 mg/L	10 ml	925 mg/L	100	7	50			3/7/19 02:04	N	II
K1901651-002	Carbon, Total Organic	N/A		Water	8.89 mg/L	10 ml	889 mg/L	100	7	50			3/7/19 02:32	N	II
K1901651-003	Carbon, Total Organic	N/A		Water	6.58 mg/L	10 ml	658 mg/L	100	7	50			3/7/19 03:00	N	II
K1901651-004	Carbon, Total Organic	N/A		Water	7.90 mg/L	10 ml	790 mg/L	100	7	50			3/7/19 03:28	N	II
K1901651-005	Carbon, Total Organic	N/A		Water	7.24 mg/L	10 ml	724 mg/L	100	7	50			3/7/19 03:56	N	II
KQ1902968-01	Carbon, Total Organic	CCB		Water	0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/6/19 15:01	N	I
KQ1902968-02	Carbon, Total Organic	CCB		Water	2.19999999999998E	10 ml	0.50 mg/L U	1	0.07	0.50			3/6/19 18:59	N	I
KQ1902968-03	Carbon, Total Organic	CCB		Water	3.40000000000001E	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 00:24	N	I
KQ1902968-04	Carbon, Total Organic	CCB		Water	-0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 05:07	N	I
KQ1902968-05	Carbon, Total Organic	CCB		Water	-0.23 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 10:31	N	I
KQ1902968-06	Carbon, Total Organic	CCV		Water	26.22 mg/L	10 ml	26.2 mg/L	1			105		3/6/19 14:44	N	I
KQ1902968-07	Carbon, Total Organic	CCV		Water	25.78 mg/L	10 ml	25.8 mg/L	1			107		3/6/19 18:45	N	I
KQ1902968-08	Carbon, Total Organic	CCV		Water	26.12 mg/L	10 ml	26.1 mg/L	1			104		3/7/19 00:09	N	I
KQ1902968-09	Carbon, Total Organic	CCV		Water	26.35 mg/L	10 ml	26.3 mg/L	1			105		3/7/19 04:52	N	I
KQ1902968-10	Carbon, Total Organic	CCV		Water	25.73 mg/L	10 ml	25.7 mg/L	1			103		3/7/19 10:17	N	I
KQ1902968-11	Carbon, Total Organic	MB		Water	-0.02 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/6/19 15:18	N	I
KQ1902968-12	Carbon, Total Organic	LCS		Water	27.50 mg/L	10 ml	27.5 mg/L	1	0.07	0.50	110		3/6/19 15:39	N	I
KQ1902968-13	Carbon, Total Organic	LODV		Water	0.14 mg/L	10 mL	0.14 mg/L J	1	0.07	0.50			3/6/19 16:09:00	N	I
KQ1902968-14	Carbon, Total Organic	LOQV		Water	0.43 mg/L	10 mL	0.43 mg/L J	1	0.07	0.50			3/6/19 16:23:00	N	I

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

03/08/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 627457 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1902968-17	Carbon, Total Organic	DUP	K1901602-003	Water	16.49 mg/L	10 ml	66.0 mg/L	4	0.3	2.0		<1	3/6/19 16:38	N	II
KQ1902968-18	Carbon, Total Organic	DUP	K1901564-002	Water	4.23 mg/L	10 ml	4.23 mg/L	1	0.07	0.50		<1	3/6/19 17:48	N	IV
KQ1902968-19	Carbon, Total Organic	DUP	K1901564-003	Water	3.10 mg/L	10 ml	3.10 mg/L	1	0.07	0.50		5	3/6/19 18:16	N	IV
KQ1902968-20	Carbon, Total Organic	DUP	K1901564-019	Water	20.70 mg/L	10 ml	82.8 mg/L	4	0.3	2.0		3	3/6/19 19:14	N	IV
KQ1902968-21	Carbon, Total Organic	DUP	K1901564-020	Water	16.48 mg/L	10 ml	65.9 mg/L	4	0.3	2.0		1	3/6/19 19:42	N	IV
KQ1902968-22	Carbon, Total Organic	DUP	K1901612-001	Water	112.46 mg/L	10 ml	1120 mg/L	10	0.7	5.0		<1	3/6/19 20:10	N	II
KQ1902968-23	Carbon, Total Organic	DUP	K1901612-002	Water	119.75 mg/L	10 ml	479 mg/L	4	0.3	2.0		7	3/6/19 20:38	N	II
KQ1902968-24	Carbon, Total Organic	DUP	K1901637-001	Water	8.29 mg/L	10 ml	8.29 mg/L	1	0.07	0.50		1	3/6/19 22:02	N	IV
KQ1902968-25	Carbon, Total Organic	DUP	K1901638-001	Ground Water	2.55 mg/L	10 ml	2.55 mg/L	1	0.07	0.50		4	3/6/19 22:30	N	IV
KQ1902968-26	Carbon, Total Organic	DUP	K1901638-002	Ground Water	10.99 mg/L	10 ml	11.0 mg/L	1	0.07	0.50		2	3/6/19 22:58	N	IV
KQ1902968-27	Carbon, Total Organic	DUP	K1901638-003	Ground Water	4.80 mg/L	10 ml	4.80 mg/L	1	0.07	0.50		1	3/6/19 23:26	N	IV
KQ1902968-28	Carbon, Total Organic	DUP	K1901484-001	Water	8.99 mg/L	10 ml	899 mg/L	100	7	50		<1	3/7/19 01:08	N	II
KQ1902968-29	Carbon, Total Organic	DUP	K1901484-004	Water	7.54 mg/L	10 ml	754 mg/L	100	7	50		2	3/7/19 01:36	N	II
KQ1902968-30	Carbon, Total Organic	DUP	K1901651-001	Water	9.26 mg/L	10 ml	926 mg/L	100	7	50		<1	3/7/19 02:04	N	II
KQ1902968-31	Carbon, Total Organic	DUP	K1901651-002	Water	8.91 mg/L	10 ml	891 mg/L	100	7	50		<1	3/7/19 02:32	N	II
KQ1902968-32	Carbon, Total Organic	DUP	K1901651-003	Water	6.44 mg/L	10 ml	644 mg/L	100	7	50		2	3/7/19 03:00	N	II
KQ1902968-33	Carbon, Total Organic	DUP	K1901651-004	Water	7.88 mg/L	10 ml	788 mg/L	100	7	50		<1	3/7/19 03:28	N	II
KQ1902968-34	Carbon, Total Organic	DUP	K1901651-005	Water	7.21 mg/L	10 ml	721 mg/L	100	7	50		<1	3/7/19 03:56	N	II
KQ1902968-35	Carbon, Total Organic	DUP	K1901559-001	Ground Water	1.00 mg/L	10 ml	1.00 mg/L	1	0.07	0.50		5	3/7/19 05:22	N	II
KQ1902968-36	Carbon, Total Organic	MS	K1901602-003	Water	43.16 mg/L	10 ml	173 mg/L	4	0.3	2.0	107		3/6/19 17:06	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 627458 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1901559-002	Carbon, Total Organic	N/A		Ground Water	0.53 mg/L	10 ml	0.53 mg/L	1	0.07	0.50			3/7/19 05:50	N	II
K1901559-003	Carbon, Total Organic	N/A		Ground Water	1.09 mg/L	10 ml	1.09 mg/L	1	0.07	0.50			3/7/19 06:18	N	II
K1901594-001	Carbon, Total Organic	N/A		Water	1.52 mg/L	10 ml	1.52 mg/L	1	0.07	0.50			3/7/19 15:58	N	II
K1901594-002	Carbon, Total Organic	N/A		Water	29.13 mg/L	10 ml	29.1 mg/L	1	0.07	0.50			3/7/19 16:26	N	II
K1901594-003	Carbon, Total Organic	N/A		Water	31.09 mg/L	10 ml	31.1 mg/L	1	0.07	0.50			3/7/19 16:54	N	II
K1901594-004	Carbon, Total Organic	N/A		Water	1.34 mg/L	10 ml	1.34 mg/L	1	0.07	0.50			3/7/19 17:22	N	II
K1901594-005	Carbon, Total Organic	N/A		Water	1.87 mg/L	10 ml	1.87 mg/L	1	0.07	0.50			3/7/19 17:50	N	II
K1901674-001	Carbon, Total Organic	N/A		Water	3.39 mg/L	10 ml	169 mg/L	50	4	25			3/7/19 06:46	Y	II
K1901674-002	Carbon, Total Organic	N/A		Water	0.96 mg/L	10 ml	9.6 mg/L	10	0.7	5.0			3/7/19 07:57	N	II
K1901674-003	Carbon, Total Organic	N/A		Water	4.90 mg/L	10 ml	49.0 mg/L	10	0.7	5.0			3/7/19 08:25	N	II
K1901674-004	Carbon, Total Organic	N/A		Water	3.94 mg/L	10 ml	39.4 mg/L	10	0.7	5.0			3/7/19 08:53	N	II
K1901676-001	Carbon, Total Organic	N/A		Water	2.10 mg/L	10 ml	2.10 mg/L	1	0.07	0.50			3/7/19 11:15	N	II
K1901676-002	Carbon, Total Organic	N/A		Water	17.93 mg/L	10 ml	179 mg/L	10	0.7	5.0			3/7/19 11:43	N	II
K1901676-003	Carbon, Total Organic	N/A		Water	1.20 mg/L	10 ml	60 mg/L	50	4	25			3/7/19 12:11	N	II
K1901676-004	Carbon, Total Organic	N/A		Water	2.53 mg/L	10 ml	2.53 mg/L	1	0.07	0.50			3/7/19 12:39	N	II
K1901706-001	Carbon, Total Organic	N/A		Ground Water	3.15 mg/L	10 ml	3.15 mg/L	1	0.07	0.50			3/7/19 13:36	N	IV
K1901706-002	Carbon, Total Organic	N/A		Ground Water	14.68 mg/L	10 ml	14.7 mg/L	1	0.07	0.50			3/7/19 14:04	N	IV
K1901706-003	Carbon, Total Organic	N/A		Ground Water	9.39 mg/L	10 ml	9.39 mg/L	1	0.07	0.50			3/7/19 14:32	N	IV
K1901706-004	Carbon, Total Organic	N/A		Ground Water	6.28 mg/L	10 ml	6.28 mg/L	1	0.07	0.50			3/7/19 15:30	N	IV
K1901897-001	Carbon, Total Organic	N/A		Water	5.41 mg/L	10 ml	5.41 mg/L	1	0.07	0.50			3/7/19 18:18	N	II
KQ1902969-01	Carbon, Total Organic	CCB		Ground Water	-0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 05:07	N	II
KQ1902969-02	Carbon, Total Organic	CCB		Ground Water	-0.23 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 10:31	N	II
KQ1902969-03	Carbon, Total Organic	CCB		Ground Water	0.17 mg/L	10 ml	0.17 mg/L J	1	0.07	0.50			3/7/19 15:15	N	II
KQ1902969-04	Carbon, Total Organic	CCB		Ground Water	-0.22 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 19:58	N	II
KQ1902969-05	Carbon, Total Organic	CCV		Ground Water	26.35 mg/L	10 ml	26.3 mg/L	1			105		3/7/19 04:52	N	II
KQ1902969-06	Carbon, Total Organic	CCV		Ground Water	25.73 mg/L	10 ml	25.7 mg/L	1			103		3/7/19 10:17	N	II
KQ1902969-07	Carbon, Total Organic	CCV		Ground Water	25.85 mg/L	10 ml	25.9 mg/L	1			104		3/7/19 15:00	N	II
KQ1902969-08	Carbon, Total Organic	CCV		Ground Water	25.81 mg/L	10 ml	25.8 mg/L	1			103		3/7/19 19:43	N	II
KQ1902969-09	Carbon, Total Organic	MS	K1901674-001	Water	31.30 mg/L	10 ml	1570 mg/L	50	4	25	112		3/7/19 07:14	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

03/08/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 627458 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1902969-10	Carbon, Total Organic	DUP	K1901559-002	Ground Water	0.42 mg/L	10 ml	0.42 mg/L J	1	0.07	0.50		24*	3/7/19 05:50	N	II
KQ1902969-11	Carbon, Total Organic	DUP	K1901559-003	Ground Water	0.96 mg/L	10 ml	0.96 mg/L	1	0.07	0.50		13*	3/7/19 06:18	N	II
KQ1902969-12	Carbon, Total Organic	DUP	K1901674-001	Water	3.33 mg/L	10 ml	166 mg/L	50	4	25		2	3/7/19 06:46	N	II
KQ1902969-13	Carbon, Total Organic	DUP	K1901674-002	Water	0.91 mg/L	10 ml	9.1 mg/L	10	0.7	5.0		5	3/7/19 07:57	N	II
KQ1902969-14	Carbon, Total Organic	DUP	K1901674-003	Water	4.35 mg/L	10 ml	43.5 mg/L	10	0.7	5.0		12*	3/7/19 08:25	N	II
KQ1902969-15	Carbon, Total Organic	DUP	K1901674-004	Water	3.80 mg/L	10 ml	38.0 mg/L	10	0.7	5.0		3	3/7/19 08:53	N	II
KQ1902969-16	Carbon, Total Organic	DUP	K1901676-001	Water	1.75 mg/L	10 mL	1.75 mg/L	1	0.07	0.50		18*	3/7/19 11:15:00	N	II
KQ1902969-17	Carbon, Total Organic	DUP	K1901676-002	Water	18.02 mg/L	10 ml	180 mg/L	10	0.7	5.0		<1	3/7/19 11:43	N	II
KQ1902969-18	Carbon, Total Organic	DUP	K1901676-003	Water	0.66 mg/L	10 ml	33 mg/L	50	4	25		58*	3/7/19 12:11	N	II
KQ1902969-19	Carbon, Total Organic	DUP	K1901676-004	Water	2.40 mg/L	10 ml	2.40 mg/L	1	0.07	0.50		5	3/7/19 12:39	N	II
KQ1902969-20	Carbon, Total Organic	DUP	K1901706-001	Ground Water	3.56 mg/L	10 ml	3.56 mg/L	1	0.07	0.50		12*	3/7/19 13:36	N	IV
KQ1902969-21	Carbon, Total Organic	DUP	K1901706-002	Ground Water	12.07 mg/L	10 ml	12.1 mg/L	1	0.07	0.50		19*	3/7/19 14:04	N	IV
KQ1902969-22	Carbon, Total Organic	DUP	K1901706-003	Ground Water	7.15 mg/L	10 ml	7.15 mg/L	1	0.07	0.50		27*	3/7/19 14:32	N	IV
KQ1902969-23	Carbon, Total Organic	DUP	K1901706-004	Ground Water	6.10 mg/L	10 ml	6.10 mg/L	1	0.07	0.50		3	3/7/19 15:30	N	IV
KQ1902969-24	Carbon, Total Organic	DUP	K1901594-001	Water	1.42 mg/L	10 ml	1.42 mg/L	1	0.07	0.50		7	3/7/19 15:58	N	II
KQ1902969-25	Carbon, Total Organic	DUP	K1901594-002	Water	29.44 mg/L	10 ml	29.4 mg/L	1	0.07	0.50		1	3/7/19 16:26	N	II
KQ1902969-26	Carbon, Total Organic	DUP	K1901594-003	Water	31.30 mg/L	10 ml	31.3 mg/L	1	0.07	0.50		<1	3/7/19 16:54	N	II
KQ1902969-27	Carbon, Total Organic	DUP	K1901594-004	Water	1.20 mg/L	10 ml	1.20 mg/L	1	0.07	0.50		11*	3/7/19 17:22	N	II
KQ1902969-28	Carbon, Total Organic	DUP	K1901594-005	Water	1.80 mg/L	10 ml	1.80 mg/L	1	0.07	0.50		4	3/7/19 17:50	N	II
KQ1902969-29	Carbon, Total Organic	DUP	K1901897-001	Water	5.36 mg/L	10 ml	5.36 mg/L	1	0.07	0.50		<1	3/7/19 18:18	N	II
KQ1902969-30	Carbon, Total Organic	LCS		Ground Water	27.56 mg/L	10 ml	27.6 mg/L	1	0.07	0.50	110		3/7/19 00:53	N	II
KQ1902969-31	Carbon, Total Organic	MB		Ground Water	0.02 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 00:39	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 627459 **Method/Testcode:** SM 5310 C/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1901553-001	Carbon, Dissolved Organic (DOC)	N/A		Water	7.55 mg/L	10 ml	15.1 mg/L	2	0.2	1.0			3/7/19 23:01	N	I
K1901553-002	Carbon, Dissolved Organic (DOC)	N/A		Water	3.06 mg/L	10 ml	3.06 mg/L	1	0.07	0.50			3/7/19 23:29	N	I
K1901703-001	Carbon, Dissolved Organic (DOC)	N/A		Water	1.99 mg/L	10 ml	1.99 mg/L	1	0.07	0.50			3/7/19 18:46	N	II
K1901703-002	Carbon, Dissolved Organic (DOC)	N/A		Water	1.83 mg/L	10 ml	1.83 mg/L	1	0.07	0.50			3/7/19 20:13	N	II
K1901703-003	Carbon, Dissolved Organic (DOC)	N/A		Water	3.41 mg/L	10 ml	3.41 mg/L	1	0.07	0.50			3/7/19 20:41	N	II
K1901703-004	Carbon, Dissolved Organic (DOC)	N/A		Water	6.14 mg/L	10 ml	6.14 mg/L	1	0.07	0.50			3/7/19 21:09	N	II
K1901703-005	Carbon, Dissolved Organic (DOC)	N/A		Water	7.31 mg/L	10 ml	7.31 mg/L	1	0.07	0.50			3/7/19 21:37	N	II
K1901703-006	Carbon, Dissolved Organic (DOC)	N/A		Water	7.26 mg/L	10 ml	7.26 mg/L	1	0.07	0.50			3/7/19 22:05	N	II
K1901703-007	Carbon, Dissolved Organic (DOC)	N/A		Water	0.69 mg/L	10 ml	0.69 mg/L	1	0.07	0.50			3/7/19 22:33	N	II
K1901728-001	Carbon, Dissolved Organic (DOC)	N/A		Water	1.43 mg/L	10 ml	1.43 mg/L	1	0.07	0.50			3/8/19 02:19	N	I
K1901728-002	Carbon, Dissolved Organic (DOC)	N/A		Water	0.25 mg/L	10 ml	25 mg/L J	100	7	50			3/8/19 02:47	N	I
K1901865-001	Carbon, Dissolved Organic (DOC)	N/A		Water	5.58 mg/L	10 ml	5.58 mg/L	1	0.07	0.50			3/8/19 00:27	N	II
K1901865-002	Carbon, Dissolved Organic (DOC)	N/A		Water	2.46 mg/L	10 ml	2.46 mg/L	1	0.07	0.50			3/8/19 00:55	N	II
KQ1902970-01	Carbon, Dissolved Organic (DOC)	CCB		Water	0.17 mg/L	10 ml	0.17 mg/L J	1	0.07	0.50			3/7/19 15:15	N	II
KQ1902970-02	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.22 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/7/19 19:58	N	II
KQ1902970-03	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.29 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/8/19 00:12	N	II
KQ1902970-04	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.32 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/8/19 03:30	N	II
KQ1902970-05	Carbon, Dissolved Organic (DOC)	CCV		Water	25.85 mg/L	10 ml	25.9 mg/L	1			104		3/7/19 15:00	N	II
KQ1902970-06	Carbon, Dissolved Organic (DOC)	CCV		Water	25.81 mg/L	10 ml	25.8 mg/L	1			103		3/7/19 19:43	N	II
KQ1902970-07	Carbon, Dissolved Organic (DOC)	CCV		Water	25.44 mg/L	10 ml	25.4 mg/L	1			102		3/7/19 23:57	N	II
KQ1902970-08	Carbon, Dissolved Organic (DOC)	CCV		Water	24.94 mg/L	10 ml	24.9 mg/L	1			100		3/8/19 03:15	N	II
KQ1902970-09	Carbon, Dissolved Organic (DOC)	MB		Water	-0.26 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			3/7/19 10:46:00	N	II
KQ1902970-10	Carbon, Dissolved Organic (DOC)	LCS		Water	26.60 mg/L	10 mL	26.6 mg/L	1	0.07	0.50	106		3/7/19 11:01:00	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

03/08/19

Printed 3/8/19 10:46

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 627459 **Method/Testcode:** SM 5310 C/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1902970-11	Carbon, Dissolved Organic (DOC)	MS	K1901703-001	Water	30.19 mg/L	10 ml	30.2 mg/L	1	0.07	0.50	113		3/7/19 19:14	N	II
KQ1902970-12	Carbon, Dissolved Organic (DOC)	DUP	K1901703-001	Water	1.86 mg/L	10 ml	1.86 mg/L	1	0.07	0.50		7	3/7/19 18:46	N	II
KQ1902970-13	Carbon, Dissolved Organic (DOC)	DUP	K1901703-002	Water	1.85 mg/L	10 ml	1.85 mg/L	1	0.07	0.50		<1	3/7/19 20:13	N	II
KQ1902970-14	Carbon, Dissolved Organic (DOC)	DUP	K1901703-003	Water	3.35 mg/L	10 ml	3.35 mg/L	1	0.07	0.50		2	3/7/19 20:41	N	II
KQ1902970-15	Carbon, Dissolved Organic (DOC)	DUP	K1901703-004	Water	6.18 mg/L	10 ml	6.18 mg/L	1	0.07	0.50		<1	3/7/19 21:09	N	II
KQ1902970-16	Carbon, Dissolved Organic (DOC)	DUP	K1901703-005	Water	7.26 mg/L	10 ml	7.26 mg/L	1	0.07	0.50		<1	3/7/19 21:37	N	II
KQ1902970-17	Carbon, Dissolved Organic (DOC)	DUP	K1901703-006	Water	7.29 mg/L	10 ml	7.29 mg/L	1	0.07	0.50		<1	3/7/19 22:05	N	II
KQ1902970-18	Carbon, Dissolved Organic (DOC)	DUP	K1901703-007	Water	0.67 mg/L	10 ml	0.67 mg/L	1	0.07	0.50		4	3/7/19 22:33	N	II
KQ1902970-19	Carbon, Dissolved Organic (DOC)	DUP	K1901553-001	Water	7.64 mg/L	10 ml	15.3 mg/L	2	0.2	1.0		1	3/7/19 23:01	N	I
KQ1902970-20	Carbon, Dissolved Organic (DOC)	DUP	K1901553-002	Water	2.92 mg/L	10 ml	2.92 mg/L	1	0.07	0.50		5	3/7/19 23:29	N	I
KQ1902970-21	Carbon, Dissolved Organic (DOC)	DUP	K1901865-001	Water	5.66 mg/L	10 ml	5.66 mg/L	1	0.07	0.50		1	3/8/19 00:27	N	II
KQ1902970-22	Carbon, Dissolved Organic (DOC)	DUP	K1901865-002	Water	2.48 mg/L	10 ml	2.48 mg/L	1	0.07	0.50		<1	3/8/19 00:55	N	II
KQ1902970-23	Carbon, Dissolved Organic (DOC)	DUP	K1901728-001	Water	1.45 mg/L	10 ml	1.45 mg/L	1	0.07	0.50		1	3/8/19 02:19	N	I
KQ1902970-24	Carbon, Dissolved Organic (DOC)	DUP	K1901728-002	Water	0.22 mg/L	10 ml	22 mg/L J	100	7	50		14*	3/8/19 02:47	N	I

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

TOC: 627457
627458
DOC: 627459

Schedule: Daily Run Method 010711

Version: 67
Instrument: Fusion1
Last Saved by: Fusion1 (Fusion1)
Last Saved on: 2019/03/06 16:23 - Wednesday

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps	Use	State
(Clean)	Clean	Clean		1	True	Ready
(Clean)	Clean	Clean		1	True	Ready
(Clean)	Clean	Clean		1	True	Ready
(Blank)	Blank	Reagent/Acid Blank		1	True	Ready
D	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
1	Sample	MB1	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
2	Sample	ICS	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
3	Sample	LOD	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
4	Sample	LOQ	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
5	Sample	K1901602-003.01 4x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
6	Sample	K1901602-003.01 ms 4x	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
7	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
8	Sample	K1901564-002.11	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
9	Sample	K1901564-003.11	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
10	Sample	K1901564-019.11 4x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
11	Sample	K1901564-020.11 4x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
12	Sample	K1901612-001.01 10x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
13	Sample	K1901612-002.01 4x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
14	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	4	True	Ready
15	Sample	K1901637-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
16	Sample	K1901638-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
17	Sample	K1901638-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
18	Sample	K1901638-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
19	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
20	Sample	MB2	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
21	Sample	K1901484-001.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
22	Sample	K1901484-004.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
23	Sample	K1901651-001.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
24	Sample	K1901651-002.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
25	Sample	K1901651-003.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
26	Sample	K1901651-004.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
27	Sample	K1901651-005.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
28	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
29	Sample	K1901559-001.09	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
30	Sample	K1901559-002.09	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
31	Sample	K1901559-003.09	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
32	Sample	K1901674-001.01 50x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
33	Sample	K1901674-001.01 ms 50x	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
34	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
35	Sample	K1901674-002.01 10x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
36	Sample	K1901674-003.01 10x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
37	Sample	K1901674-004.01 10x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
38	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	4	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready

Schedule: Daily Run Method 010711

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps	Use	State
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
39	Sample	MB3	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
40	Sample	K1901676-001.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
41	Sample	K1901676-002.02 10x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
42	Sample	K1901676-003.02 50x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
43	Sample	K1901676-004.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
44	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
45	Sample	K1901706-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
46	Sample	K1901706-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
47	Sample	K1901706-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
48	Sample	K1901706-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
49	Sample	K1901594-001.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
50	Sample	K1901594-002.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
51	Sample	K1901594-003.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
52	Sample	K1901594-004.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
53	Sample	K1901594-005.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
54	Sample	K1901897-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
55	Sample	K1901703-001.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
56	Sample	K1901703-001.01 ms doc	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
57	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
58	Sample	MB4	CAS_salt_010711 (CAS_salt_010711)	1	False	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	False	Ready
59	Sample	K1901703-002.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
60	Sample	K1901703-003.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
61	Sample	K1901703-004.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
62	Sample	K1901703-005.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
63	Sample	K1901703-006.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
64	Sample	K1901703-007.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
65	Sample	K1901553-001.06 doc 2x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
66	Sample	K1901553-002.05 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
67	Sample	K1901865-001.02 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
68	Sample	K1901865-002.02 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
69	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
70	Sample	FB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
71	Sample	K1901728-001.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
72	Sample	K1901728-002.01 doc 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
					False	

Fusion Report - Daily Run Method 010711
Wednesday, March 06, 2019 12:36 PM

(View - Reps, Unused Reps, Meta-Data, Signature, History)
Printed on 2019/03/08 09:03 - Friday

Report Summary Information

Company Location:	Gen Chem Lab		
Schedule Name:	Daily Run Method 010711	Engine Version:	1.1.5.1
Instrument Name:	Fusion1	Firmware Version:	1.2.0696
Report Version:	1 of 1	Connection:	RS232 COM1
Report Creation by Operators (schedule version):	Fusion1 (Fusion1) (v59) Fusion1 (Fusion1) (v60) Fusion1 (Fusion1) (v61) Fusion1 (Fusion1) (v62) Fusion1 (Fusion1) (v63) Fusion1 (Fusion1) (v64) Fusion1 (Fusion1) (v65) Fusion1 (Fusion1) (v66) Fusion1 (Fusion1) (v67)		

Comment:

Report Results

03/08/19

Sample Type: Clean — From Schedule Version 59

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/03/06 12:36

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	13.35	17.28	3.93	49.57	05:24
2	TC Clean	6.77	9.63	2.86	49.99	04:01
3	TC Clean	1.88	4.84	2.96	50.01	03:55
4	TC Clean	1.47	4.58	3.10	50.03	03:55

Sample Type: Clean — From Schedule Version 60

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/03/06 12:59

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	11.70	14.60	2.91	49.67	05:22

2	TC Clean	4.26	7.36	3.10	49.99	04:04
3	TC Clean	2.14	5.17	3.02	50.05	03:55
4	TC Clean	1.41	4.44	3.03	50.10	03:56

Sample Type: Clean From Schedule Version 61

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/03/06 13:33

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	11.51	14.34	2.83	49.74	05:23
2	TC Clean	5.23	7.99	2.75	50.05	04:01
3	TC Clean	2.47	5.42	2.96	50.11	03:46
4	TC Clean	1.76	4.78	3.02	50.07	03:46

Sample Type: Blank (Creating v1229) From Schedule Version 62

	Pos	Analysis Type	Sample ID	Start Time
◈	(blank)		Reagent/Acid Blank	2019/03/06 13:55

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	0.87	3.78	2.91	49.71	05:12
2	TC Clean	4.88	8.00	3.13	50.12	04:02
3	TC Clean	2.68	5.63	2.95	50.12	03:45
4	TC Clean	2.03	4.98	2.95	50.12	03:47
5	Reagent Blank	7.97	10.93	2.95	50.11	05:06
6	Acid Blank	1.37	4.40	3.03	49.55	05:29

Sample Type: Sample From Schedule Version 62

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	D	TOC	RB	0.9560 ppm	0.0000 ppm	0.0000%	2019/03/06 14:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9560	9.5600	15.54	18.56	3.02	50.25	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — From Schedule Version 63

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	26.5547 ppm (PASS)	0.0000 ppm	0%	2019/03/06 14:44

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	26.5547	265.5467	189.71	192.74	3.02	50.29	10:29

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB — From Schedule Version 64

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.3488 ppm (PASS)	0.0000 ppm	0%	2019/03/06 15:01

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.3488	3.4878	11.83	14.80	2.97	50.26	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample — From Schedule Version 65

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	1	TOC	MB1	0.3156 ppm	0.0000 ppm	0.0000%	2019/03/06 15:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3156	3.1560	11.19	14.09	2.90	50.28	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — From Schedule Version 66

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS [24.0 ppm]	0 / infinity (NA / NA)	27.8336 ppm (PASS)	0.0000 ppm	0%	2019/03/06 15:39

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	27.8336	278.3355	198.40	201.37	2.98	50.24	10:28

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	25 ppmC

Sample Type: Sample — From Schedule Version 66

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	2	TOC	ICS	0.7157 ppm	0.0000 ppm	0.0000%	2019/03/06 15:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7157	7.1572	13.91	16.87	2.96	50.28	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	3	TOC	LOD	0.4741 ppm	0.0000 ppm	0.0000%	2019/03/06 16:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4741	4.7412	12.27	15.13	2.87	50.31	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Sample — From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	4	TOC	LOQ	0.7682 ppm	0.0000 ppm	0.0000%	2019/03/06 16:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7682	7.6817	14.26	17.26	3.00	50.33	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

5	TOC	K1901602-003.01 4x	16.7892 ppm	0.0542 ppm	0.3200%	2019/03/06 16:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	16.7509	167.5093	122.75	125.69	2.94	50.36	10:28
2	TOC	16.8275	168.2753	123.27	126.23	2.96	50.37	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
	6	TOC	K1901602-003.01 ms 4x	43.4995 ppm	0.0000 ppm	0.0000%	2019/03/06 17:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	43.4995	434.9954	304.32	307.30	2.98	50.39	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
	7	TOC	RB	0.3908 ppm	0.1172 ppm	29.9900%	2019/03/06 17:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4737	4.7368	12.26	15.25	2.99	50.39	10:29
2	TOC	0.3079	3.0794	11.14	14.21	3.07	50.41	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
	8	TOC	K1901564-002.11	4.5904 ppm	0.0277 ppm	0.6000%	2019/03/06 17:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.6100	46.0998	40.34	43.18	2.84	50.42	10:26
2	TOC	4.5708	45.7080	40.07	43.06	2.98	50.40	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
	9	TOC	K1901564-003.11	3.5189 ppm	0.1106 ppm	3.1400%	2019/03/06 18:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.5972	35.9716	33.47	36.50	3.04	50.43	10:30
2	TOC	3.4407	34.4070	32.40	35.36	2.96	50.37	10:27

Dilution	Blank Contribution	Method	Calibration

1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	26.1143 ppm (PASS)	0.0000 ppm	0%	2019/03/06 18:45

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	26.1143	261.1433	186.72	189.64	2.91	50.48	10:33

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.3404 ppm (PASS)	0.0000 ppm	0%	2019/03/06 18:59

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.3404	3.4038	11.77	14.71	2.94	50.50	10:29

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample — From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	10	TOC	K1901564-019.11 4x	20.7624 ppm	0.3955 ppm	1.9100%	2019/03/06 19:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	20.4827	204.8269	148.08	151.03	2.95	50.51	10:27
2	TOC	21.0421	210.4207	151.88	154.91	3.03	50.53	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	11	TOC	K1901564-020.11 4x	16.6990 ppm	0.1645 ppm	0.9900%	2019/03/06 19:42

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	16.5827	165.8269	121.61	124.60	2.99	50.55	10:29
2	TOC	16.8153	168.1530	123.19	126.24	3.05	50.56	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	12	TOC	K1901612-001.01 10x	112.5359 ppm	0.3656 ppm	0.3200%	2019/03/06 20:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	112.2774	1122.7739	771.18	774.16	2.98	50.57	10:27
2	TOC	112.7945	1127.9449	774.69	777.84	3.15	50.59	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	13	TOC	K1901612-002.01 4x	116.0911 ppm	5.6458 ppm	4.8600%	2019/03/06 20:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	112.0990	1120.9899	769.97	773.21	3.24	50.60	10:28
2	TOC	120.0833	1200.8330	824.17	828.26	4.10	50.60	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	14	TOC	RB	3.5314 ppm	4.1684 ppm	118.0400%	2019/03/06 21:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.7391	97.3908	75.16	79.27	4.12	50.63	10:26
2	TOC	2.1399	21.3987	23.57	26.84	3.27	50.63	10:25
3	TOC	1.2919	12.9189	17.82	20.87	3.05	50.65	10:29
4	TOC	0.9548	9.5482	15.53	18.48	2.95	50.61	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	15	TOC	K1901637-001.01	8.6847 ppm	0.0773 ppm	0.8900%	2019/03/06 22:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.7394	87.3937	68.37	71.34	2.97	50.59	10:28
2	TOC	8.6301	86.3005	67.63	70.64	3.01	50.50	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	16	TOC	K1901638-001.01	2.9411 ppm	0.0696 ppm	2.3700%	2019/03/06 22:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.9903	29.9035	29.35	32.52	3.18	50.49	10:28
2	TOC	2.8919	28.9194	28.68	31.60	2.92	50.48	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	17	TOC	K1901638-002.01	11.4260 ppm	0.1424 ppm	1.2500%	2019/03/06 22:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	11.5267	115.2666	87.29	90.10	2.81	50.44	10:28
2	TOC	11.3253	113.2527	85.92	88.83	2.91	50.42	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	18	TOC	K1901638-003.01	5.1774 ppm	0.0507 ppm	0.9800%	2019/03/06 23:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.2133	52.1326	44.44	47.54	3.11	50.37	10:28
2	TOC	5.1415	51.4151	43.95	46.97	3.02	50.36	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	19	TOC	RB	0.4492 ppm	0.0000 ppm	0.0000%	2019/03/06 23:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4492	4.4922	12.10	15.09	3.00	50.35	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 67

			Concentration			Min / Max				

	Pos	BAT	(ppm)	Dil	Sample ID	(% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	26.4560 ppm (PASS)	0.0000 ppm	0%	2019/03/07 00:09

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	26.4560	264.5596	189.04	191.98	2.94	50.32	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.3416 ppm (PASS)	0.0000 ppm	0%	2019/03/07 00:24

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.3416	3.4156	11.78	14.62	2.84	50.32	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	20	TOC	MB2	0.3558 ppm	0.0000 ppm	0.0000%	2019/03/07 00:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3558	3.5582	11.46	14.21	2.74	50.29	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS [24.0 ppm]	0 / infinity (NA / NA)	27.8960 ppm (PASS)	0.0000 ppm	0%	2019/03/07 00:53

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

C	TOC	25.0 ppm	1	27.8960	278.9602	198.82	201.65	2.83	50.27	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	25 ppmC

Sample Type: Sample — From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	21	TOC	K1901484-001.01 100x	9.2955 ppm	0.0429 ppm	0.4600%	2019/03/07 01:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.2652	92.6515	71.94	74.67	2.73	50.26	10:30
2	TOC	9.3258	93.2585	72.35	75.23	2.88	50.28	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	22	TOC	K1901484-004.01 100x	7.8135 ppm	0.0953 ppm	1.2200%	2019/03/07 01:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.7461	77.4613	61.63	64.55	2.92	50.28	10:26
2	TOC	7.8809	78.8093	62.54	65.32	2.77	50.27	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	23	TOC	K1901651-001.01 100x	9.5939 ppm	0.0064 ppm	0.0700%	2019/03/07 02:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.5894	95.8940	74.14	77.01	2.87	50.26	10:26
2	TOC	9.5984	95.9839	74.20	77.23	3.03	50.26	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	24	TOC	K1901651-002.01 100x	9.2408 ppm	0.0160 ppm	0.1700%	2019/03/07 02:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.2295	92.2950	71.70	74.56	2.86	50.26	10:31
2	TOC	9.2522	92.5219	71.85	74.63	2.78	50.24	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC)	CAS_salt_010711	CAS_salt_010711

(v1229) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	25	TOC	K1901651-003.01 100x	6.8494 ppm	0.0944 ppm	1.3800%	2019/03/07 03:00

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.9161	69.1613	55.99	58.88	2.89	50.24	10:28
2	TOC	6.7827	67.8266	55.09	57.97	2.88	50.24	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	26	TOC	K1901651-004.01 100x	8.2291 ppm	0.0176 ppm	0.2100%	2019/03/07 03:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.2416	82.4157	64.99	67.94	2.95	50.22	10:26
2	TOC	8.2167	82.1667	64.82	67.64	2.81	50.23	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	27	TOC	K1901651-005.01 100x	7.5602 ppm	0.0206 ppm	0.2700%	2019/03/07 03:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.5748	75.7480	60.46	63.31	2.85	50.22	10:26
2	TOC	7.5456	75.4563	60.27	63.11	2.84	50.23	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	28	TOC	RB	0.5632 ppm	0.0731 ppm	12.9800%	2019/03/07 04:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6150	6.1496	13.22	16.24	3.02	50.19	10:26
2	TOC	0.5115	5.1154	12.52	15.25	2.73	50.20	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time

◆	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	26.6839 ppm (PASS)	0.0000 ppm	0%	2019/03/07 04:52

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	26.6839	266.8387	190.59	193.38	2.78	50.20	10:28

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.3270 ppm (PASS)	0.0000 ppm	0%	2019/03/07 05:07

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.3270	3.2698	11.68	14.51	2.83	50.20	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	29	TOC	K1901559-001.09	1.3591 ppm	0.0340 ppm	2.5000%	2019/03/07 05:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.3831	13.8308	18.44	21.25	2.82	50.19	10:29
2	TOC	1.3351	13.3506	18.11	20.97	2.86	50.22	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	30	TOC	K1901559-002.09	0.8134 ppm	0.0800 ppm	9.8400%	2019/03/07 05:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.8700	8.6997	14.95	17.92	2.97	50.19	10:31
2	TOC	0.7568	7.5683	14.18	17.14	2.95	50.19	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	31	TOC	K1901559-003.09	1.3630 ppm	0.0964 ppm	7.0700%	2019/03/07 06:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4311	14.3111	18.76	21.55	2.79	50.19	10:29
2	TOC	1.2948	12.9484	17.84	20.78	2.95	50.17	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	32	TOC	K1901674-001.01 50x	3.6953 ppm	0.0453 ppm	1.2300%	2019/03/07 06:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.7274	37.2739	34.35	37.26	2.91	50.20	10:31
2	TOC	3.6633	36.6330	33.91	36.74	2.83	50.22	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	33	TOC	K1901674-001.01 ms 50x	31.6409 ppm	0.0000 ppm	0.0000%	2019/03/07 07:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.6409	316.4086	223.82	226.59	2.77	50.19	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	34	TOC	RB	0.3333 ppm	0.0729 ppm	21.8800%	2019/03/07 07:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3848	3.8484	11.66	14.60	2.94	50.18	10:30
2	TOC	0.2817	2.8172	10.96	13.85	2.89	50.19	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	35	TOC	K1901674-002.01 10x	1.2695 ppm	0.0338 ppm	2.6600%	2019/03/07 07:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2934	12.9337	17.83	20.72	2.90	50.20	10:26

2	TOC	1.2456	12.4563	17.50	20.40	2.89	50.20	10:32

Dilution 1:10 | **Blank Contribution** (TC) 9.0477 (IC) (v1229) | **Method** CAS_salt_010711 (v4) | **Calibration** CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	36	TOC	K1901674-003.01 10x	4.9624 ppm	0.3896 ppm	7.8500%	2019/03/07 08:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.2379	52.3786	44.60	47.46	2.86	50.18	10:29
2	TOC	4.6869	46.8688	40.86	43.91	3.05	50.20	10:27

Dilution 1:10 | **Blank Contribution** (TC) 9.0477 (IC) (v1229) | **Method** CAS_salt_010711 (v4) | **Calibration** CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	37	TOC	K1901674-004.01 10x	4.2076 ppm	0.0953 ppm	2.2700%	2019/03/07 08:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.2750	42.7498	38.07	40.94	2.88	50.18	10:27
2	TOC	4.1402	41.4018	37.15	40.13	2.98	50.19	10:31

Dilution 1:10 | **Blank Contribution** (TC) 9.0477 (IC) (v1229) | **Method** CAS_salt_010711 (v4) | **Calibration** CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	38	TOC	RB	0.1295 ppm	0.0214 ppm	16.5400%	2019/03/07 09:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1460	1.4604	10.04	12.97	2.93	50.21	10:29
2	TOC	0.1490	1.4898	10.06	12.92	2.86	50.17	10:23
3	TOC	0.1179	1.1790	9.85	12.83	2.98	50.24	10:28
4	TOC	0.1052	1.0523	9.76	12.62	2.86	50.27	10:25

Dilution 1:10 | **Blank Contribution** (TC) 9.0477 (IC) (v1229) | **Method** CAS_salt_010711 (v4) | **Calibration** CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	26.0678 ppm (PASS)	0.0000 ppm	0%	2019/03/07 10:17

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

B	TOC	25 ppm	1	26.0678	260.6777	186.41	189.20	2.79	50.31	10:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.1057 ppm (PASS)	0.0000 ppm	0%	2019/03/07 10:31

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.1057	1.0570	10.18	12.99	2.81	50.33	10:33

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	39	TOC	MB3	0.0790 ppm	0.0000 ppm	0.0000%	2019/03/07 10:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0790	0.7901	9.58	12.38	2.79	50.36	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS [24.0 ppm]	0 / infinity (NA / NA)	26.9353 ppm (PASS)	0.0000 ppm	0%	2019/03/07 11:01

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	26.9353	269.3534	192.30	195.05	2.75	50.37	10:29

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	25 ppmC

Sample Type: Sample From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	40	TOC	K1901676-001.02	2.2636 ppm	0.2458 ppm	10.8600%	2019/03/07 11:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.4375	24.3745	25.59	28.67	3.07	50.39	10:29
2	TOC	2.0898	20.8978	23.23	26.41	3.18	50.42	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	41	TOC	K1901676-002.02 10x	18.3144 ppm	0.0619 ppm	0.3400%	2019/03/07 11:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	18.2707	182.7068	133.07	136.14	3.07	50.42	10:27
2	TOC	18.3582	183.5819	133.66	136.63	2.96	50.43	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	42	TOC	K1901676-003.02 50x	1.2686 ppm	0.3821 ppm	30.1200%	2019/03/07 12:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5388	15.3880	19.49	22.49	3.00	50.46	10:30
2	TOC	0.9984	9.9843	15.82	18.79	2.96	50.44	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	43	TOC	K1901676-004.02	2.8031 ppm	0.0879 ppm	3.1400%	2019/03/07 12:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.8653	28.6527	28.50	31.49	2.99	50.43	10:26
2	TOC	2.7409	27.4093	27.65	30.68	3.02	50.43	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	44	TOC	RB	0.3509 ppm	0.1574 ppm	44.8600%	2019/03/07 13:07

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time

1	TOC	0.4622	4.6219	12.18	15.13	2.94	50.45	10:26
2	TOC	0.2396	2.3959	10.67	13.63	2.96	50.46	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	45	TOC	K1901706-001.01	3.6934 ppm	0.2852 ppm	7.7200%	2019/03/07 13:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4917	34.9168	32.75	35.76	3.01	50.46	10:28
2	TOC	3.8950	38.9504	35.49	38.44	2.95	50.47	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	46	TOC	K1901706-002.01	13.7127 ppm	1.8415 ppm	13.4300%	2019/03/07 14:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	15.0149	150.1491	110.97	113.95	2.98	50.45	10:26
2	TOC	12.4106	124.1058	93.29	96.46	3.17	50.43	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	47	TOC	K1901706-003.01	8.6082 ppm	1.5858 ppm	18.4200%	2019/03/07 14:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.7295	97.2950	75.09	78.13	3.03	50.41	10:30
2	TOC	7.4868	74.8685	59.87	62.82	2.95	50.38	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	26.1926 ppm (PASS)	0.0000 ppm	0%	2019/03/07 15:00

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	26.1926	261.9256	187.26	190.28	3.03	50.40	10:33

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.5100 ppm (PASS)	0.0000 ppm	0%	2019/03/07 15:15

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.5100	5.0995	12.92	15.76	2.84	50.44	10:29

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample — From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	48	TOC	K1901706-004.01	6.5273 ppm	0.1218 ppm	1.8700%	2019/03/07 15:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.6134	66.1339	53.94	56.91	2.97	50.39	10:30
2	TOC	6.4412	64.4117	52.77	55.73	2.96	50.45	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	49	TOC	K1901594-001.04	1.8063 ppm	0.0694 ppm	3.8400%	2019/03/07 15:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.8554	18.5539	21.64	24.59	2.94	50.39	10:26
2	TOC	1.7573	17.5728	20.98	23.88	2.90	50.42	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	50	TOC	K1901594-002.04	29.6254 ppm	0.2211 ppm	0.7500%	2019/03/07 16:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	29.4691	294.6907	209.08	211.97	2.89	50.42	10:28

2	TOC	29.7817	297.8168	211.20	214.26	3.05	50.44	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	51	TOC	K1901594-003.04	31.5352 ppm	0.1514 ppm	0.4800%	2019/03/07 16:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.4281	314.2813	222.38	225.28	2.90	50.45	10:25
2	TOC	31.6422	316.4219	223.83	226.87	3.04	50.47	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	52	TOC	K1901594-004.04	1.6091 ppm	0.1022 ppm	6.3500%	2019/03/07 17:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6814	16.8141	20.46	23.60	3.14	50.42	10:27
2	TOC	1.5369	15.3689	19.48	22.47	2.99	50.45	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	53	TOC	K1901594-005.04	2.1766 ppm	0.0484 ppm	2.2300%	2019/03/07 17:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.2109	22.1088	24.06	27.02	2.96	50.43	10:27
2	TOC	2.1424	21.4237	23.59	26.83	3.24	50.44	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	54	TOC	K1901897-001.01	5.7203 ppm	0.0368 ppm	0.6400%	2019/03/07 18:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.7463	57.4626	48.05	50.98	2.93	50.46	10:28
2	TOC	5.6943	56.9426	47.70	50.53	2.83	50.41	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◆	55	TOC	K1901703-001.01 doc	2.2652 ppm	0.0938 ppm	4.1400%	2019/03/07 18:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.3315	23.3153	24.87	27.84	2.96	50.49	10:27
2	TOC	2.1989	21.9894	23.97	27.02	3.05	50.49	10:23

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	56	TOC	K1901703-001.01 ms doc	30.5280 ppm	0.0000 ppm	0.0000%	2019/03/07 19:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	30.5280	305.2801	216.27	219.40	3.13	50.50	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	57	TOC	RB	0.2627 ppm	0.0000 ppm	0.0000%	2019/03/07 19:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2627	2.6271	10.83	13.87	3.04	50.50	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	26.1528 ppm (PASS)	0.0000 ppm	0%	2019/03/07 19:43

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	26.1528	261.5278	186.99	189.86	2.88	50.56	10:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time

◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.1190 ppm (PASS)	0.0000 ppm	0%	2019/03/07 19:58

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.1190	1.1896	10.27	13.16	2.89	50.53	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	59	TOC	K1901703-002.01 doc	2.1764 ppm	0.0127 ppm	0.5800%	2019/03/07 20:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.1674	21.6742	23.76	26.74	2.98	50.48	10:26
2	TOC	2.1854	21.8539	23.88	26.87	2.99	50.45	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	60	TOC	K1901703-003.01 doc	3.7162 ppm	0.0463 ppm	1.2400%	2019/03/07 20:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.7489	37.4890	34.49	37.39	2.90	50.42	10:29
2	TOC	3.6835	36.8349	34.05	36.98	2.93	50.40	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	61	TOC	K1901703-004.01 doc	6.4987 ppm	0.0318 ppm	0.4900%	2019/03/07 21:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.4762	64.7623	53.01	55.91	2.90	50.39	10:25
2	TOC	6.5212	65.2117	53.31	56.18	2.86	50.39	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	62	TOC	K1901703-005.01 doc	7.6223 ppm	0.0299 ppm	0.3900%	2019/03/07 21:37

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.6435	76.4345	60.93	63.69	2.76	50.36	10:28
2	TOC	7.6012	76.0117	60.64	63.26	2.62	50.37	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	63	TOC	K1901703-006.01 doc	7.6095 ppm	0.0211 ppm	0.2800%	2019/03/07 22:05

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.5945	75.9454	60.60	63.50	2.91	50.33	10:28
2	TOC	7.6244	76.2445	60.80	63.72	2.92	50.29	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	64	TOC	K1901703-007.01 doc	1.0166 ppm	0.0185 ppm	1.8200%	2019/03/07 22:33

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0297	10.2966	16.04	18.95	2.91	50.12	10:27
2	TOC	1.0034	10.0344	15.86	18.52	2.66	50.21	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	65	TOC	K1901553-001.06 doc 2x	7.9336 ppm	0.0659 ppm	0.8300%	2019/03/07 23:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.8870	78.8697	62.58	65.48	2.89	50.40	10:30
2	TOC	7.9802	79.8022	63.22	66.07	2.85	50.43	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	66	TOC	K1901553-002.05 doc	3.3275 ppm	0.0993 ppm	2.9800%	2019/03/07 23:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.3977	33.9769	32.11	35.01	2.90	50.41	10:29
2	TOC	3.2573	32.5729	31.16	33.95	2.79	50.39	10:31

Dilution	Blank Contribution	Method	Calibration

1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	25.7792 ppm (PASS)	0.0000 ppm	0%	2019/03/07 23:57

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.7792	257.7917	184.45	187.32	2.87	50.36	10:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB — From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.0491 ppm (PASS)	0.0000 ppm	0%	2019/03/08 00:12

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0491	0.4913	9.80	12.77	2.97	50.32	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample — From Schedule Version 67

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	67	TOC	K1901865-001.02 doc	5.9540 ppm	0.0577 ppm	0.9700%	2019/03/08 00:27

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.9132	59.1318	49.19	52.18	2.99	50.29	10:30
2	TOC	5.9948	59.9479	49.74	52.50	2.76	50.30	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	68	TOC	K1901865-002.02 doc	2.8095 ppm	0.0151 ppm	0.5400%	2019/03/08 00:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.7988	27.9883	28.05	30.99	2.94	50.29	10:24
2	TOC	2.8202	28.2019	28.19	31.23	3.04	50.28	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	69	TOC	RB	0.1225 ppm	0.0605 ppm	49.3900%	2019/03/08 01:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1653	1.6534	10.17	12.88	2.71	50.28	10:27
2	TOC	0.0797	0.7974	9.59	12.49	2.90	50.28	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	70	TOC	FB	0.0226 ppm	0.0198 ppm	87.6400%	2019/03/08 01:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0366	0.3658	9.30	12.23	2.94	50.27	10:28
2	TOC	0.0086	0.0859	9.11	11.91	2.80	50.26	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	71	TOC	K1901728-001.01 doc	1.7817 ppm	0.0129 ppm	0.7200%	2019/03/08 02:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.7726	17.7260	21.08	23.90	2.82	50.26	10:25
2	TOC	1.7909	17.9087	21.20	23.95	2.75	50.25	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	72	TOC	K1901728-002.01 doc 100x	0.5750 ppm	0.0235 ppm	4.0900%	2019/03/08 02:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5917	5.9168	13.06	15.82	2.75	50.24	10:28
2	TOC	0.5584	5.5839	12.84	15.78	2.94	50.23	10:27

Dilution	Blank Contribution	Method	Calibration

1:10	(TC) 9.0477 (IC) (v1229)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	25.2814 ppm (PASS)	0.0000 ppm	0%	2019/03/08 03:15

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.2814	252.8138	181.07	183.95	2.88	50.22	10:28

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB From Schedule Version 67

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.0213 ppm (PASS)	0.0000 ppm	0%	2019/03/08 03:30

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0213	0.2129	9.61	12.42	2.81	50.22	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Meta Data Used in this Report

Blanks

Version	Reagent (Abs)	Acid (Abs)	DI IC (Abs)	DI TC (Abs)	DI TOC (Abs)	Save Time	Operator
v1228	1.4157	0.7880	0.0000	0.0000	0.0000	2019/03/05 15:06	Fusion1 (Fusion1)
v1229	2.6573	1.3700	0.0000	0.0000	0.0000	2019/03/06 14:28	Fusion1 (Fusion1)

Calibrations

Name: CAS_salt_010711 (TOC)

Version: v30
Ver Creation: 2019/03/05 17:42
Comment:
Operator: Fusion1 (Fusion1)
Basic Analysis Type: TOC

Calibration curve formula: TOC: y = 6.788x + 9.463
r^2 value: TOC: r^2 = 0.99963

Basic Analysis Type: TOC

Sample ID	Y Raw Value	X Expected	Message	End Time
DI Water	7.8970	0.0000		2019/03/05 16:15
0.500 ppm	11.5280	0.5000		2019/03/05 16:29
1.0 ppm	14.9760	1.0000		2019/03/05 16:44
5.0 ppm	43.6500	5.0000		2019/03/05 16:58
10 ppm	79.6020	10.0000		2019/03/05 17:12
25 ppm	183.3580	25.0000		2019/03/05 17:26
50 ppm	346.3230	50.0000		2019/03/05 17:40

Methods

Name: CAS_salt_010711 (TOC)

Version: v4
Ver Creation: 2019/02/21 17:57
Comment:
Operator: Fusion1 (Fusion1)

Parameter	Value
SampleVolume	10.0 mL
Dilution	1:10
AcidVolume	0.5 ml
ReagentVolume	2.0 ml
UVReactorPrerinse	Off
UVReactorPrerinseVolume	5.0
NumberOfUVReactorPrerinses	1
ICSpargeTime	1.00 mins
DetectorSweepFlow	500 ml/min
PreSpargeTime	2.00 mins
SystemFlow	500 ml/min

Advanced Parameter	Value
NeedleRinseVolume	5.0 ml
VialPrimeVolume	2.0 ml
ICSamplePrimeVolume	2.0 ml
ICSpargeRinseVolume	12.0 ml
BaselineStabilizeTime	0.70 min
DetectorPressureFlow	150 ml/min
SyringeSpeedWaste	10
SyringeSpeedAcid	7
SyringeSpeedReagent	7
SyringeSpeedDIWater	7
NDIRPressurization	60 psig
SyringeSpeedSampleDispense	5
SyringeSpeedSampleAspirate	4
SyringeSpeedUVDispense	5
SyringeSpeedUVAspirate	5
SyringeSpeedICDispense	5
SyringeSpeedICAspirate	5
NDIRPressureStabilize	1.75 min
SampleMixing	Off
SampleMixingCycles	1
SampleMixingVolume	10.0

	LowLevelFilterNDIR	Off

Acceptance / Approval

Electronic Signatures

Report Version	User Name	Acceptance	Reason	Date

Report History

Report History

Report Version	User Name	System Reason	User Reason	Date
1	Fusion1 (Fusion1)	Schedule completed	Schedule completed	2019/03/08 03:48

ALS Environmental

StarLIMS Run: 627457, 627458, 627459

Analysis: TOC

Method: 9060, 415.1, SM 5310 C, 9060A

CCV: 11-GEN-05-76B 50 ppm LCS: 11-GEN-05-74L 25.0 ppm

ICAL Date: 3/6/19

ICAL ID: 11-GEN-05-76H

ICS ID: 11-GEN-05-74A

ICS TV: 25.0 ppm ICS % R = 2

Spike ID: 11-GEN-05-70O 0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-76F

21 % H3PO4: 11-GEN-05-76G

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, 129001F, N11314F, Marge

FILTER ID: NA

Analyzed By: BD	Date Analyzed: 3/6/19
Reviewed By:	Date Reviewed: 03/08/19

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1905651; 1906112; 1906330; 1906332; 1906334

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2223 (233911)

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: Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 642099) was less than 1/2 the CRDL. The recovery for the LCS (642100) was within acceptable parameters.

MS/MSD Analysis: MS/MSD was performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 4.µg/L. The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

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 5.1.1. The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level of 4.0µg/L. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported. Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

Thomas Bosch March 06, 2019
Analyst Date

ANALYTICAL REPORT

Report Date: March 07, 2019

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1905651**
Project ID: 10803
Purchase Order: 10803
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
HS19021158-02/LH18/24-SP650_022119_BIX	1905651001	02/21/19	02/23/19	

ANALYTICAL REPORT

Workorder: 34-1905651
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **HS19021158-02/LH18/24-SP650_022119_BIX**
Lab ID: 1905651001
Matrix: Water

Sampling Site: NA
Media: 250 mL Nalgene
Sampling Parameter: NA

Collected: 02/21/2019
Received: 02/23/2019

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable

Analysis: EPA 6850, DoD QSM Water
Batch: ELMS/2223 (HBN: 233911)
Analyzed: 03/05/2019 09:40

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

Comments

Quality Control: **EPA 6850, DoD QSM - (HBN: 233911)**

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 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 03/06/2019 09:17	/S/ Stephen Brose 03/07/2019 11:04

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: 34-1905651
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	PJLA (DoD ELAP)	L17-506	http://www.pjlabs.com
	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com
	Utah (TNI)	UT00953	http://lams.nelac-institute.org/search
	Nevada (TNI)	UT00953201-1	https://ndep.nv.gov/water/lab-certification
	Iowa (TNI)	IA# 376	http://www.shl.uiowa.edu/labcert/idnr/
	Kansas	E-10416	http://www.kdheks.gov/envlab/disclaimer.html
	Oklahoma (TNI)	IJ# 9980	http://www.deq.state.ok.us/CSDnew/labcert.htm
	Texas (TNI)	T104704456-18-9	https://www.tceq.texas.gov/assets/public/compliance/compliance_support/qa/txnelap_lab_list.pdf
Industrial Hygiene	AIHA (ISO 17025 & AIHA IHLAP)	101574	http://www.aihaaccreditedlabs.org
	DOECAP-AP	L18-606	http://www.pjlabs.com
	Washington	C596	https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Laboratory-Accreditation
Dietary Supplements	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com

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.
< Means 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: 1905651

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 642099
Analyzed: 03/05/2019 09:26
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 642100
Analyzed: 03/05/2019 09:00
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.11	4.00	103	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample:	1906112001	**MS:**	1906112002					**MSD:**	1906112003			
Analyzed:	03/05/2019 09:54	**Analyzed:**	03/05/2019 10:07					**Analyzed:**	03/05/2019 10:20			
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	4	▲ 65.7	78.8	123.8	53.7	▲ 61.2	0.337	0.0	20.0

Continuing Calibration Verification

CCV:	642096			**CCV:**	642101			**CCV:**	642102		
Analyzed:	03/05/2019 08:44			**Analyzed:**	03/05/2019 12:18			**Analyzed:**	03/05/2019 14:07		
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	25.0	25.0	100	25.0	25.0	100	24.5	25.0	97.8

Interference Check Sample

ICSA: 642098
Analyzed: 03/05/2019 09:13
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	3.93	4.00	98.2

Comments

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Quality Control Sample
Batch Report

Analysis Information

Workorder: **1905651**

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		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
03/06/2019 13:45	03/07/2019 11:04

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

00934389

W

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

18698/#2

Subcontract Chain of Custody

COC ID: 10803

SUBCONTRACT TO:

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

Phone: +1 801 266 7700

1905051

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:	HS19021158
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19021158-02**	**LH18/24-SP650_022119_BIX**	**Water**	**21 Feb 2019 14:00**
	SUB_Perch-6850			08 Mar 2019

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: 2/22/19 18:00

Received By: _____ Date/Time: 2/23/19 8SD

Cooler ID(s): 9181 Temperature(s): 2°

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: 10803	Split:	Workorder ID: 1905651	Level: ENV_LVL4	Requested Analysis
Client: ALS Environmental (Houston)		Account: 8101	Type: 250Poly	
Comments:			Preservatives	
			COOL	
			Containers	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	ID(s)	Count	EPA 6850_DoD QSM
1	02/21/2019 14:00	HS19021158-02/LH18/24-SP650_0	1905651001		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
Schmith, Marianne	02/23/2019 08:50	ALS Sample Receiving	Sample Login
[signature]	02/28/2019 1337	R33-1 10 B	Storage
R.33.1	03/04/19/12:10	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

00934390

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALL Honstan Project/Task/Site: 1905051

Date/Time of Receipt: 2/23/19 850 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~~ NA MW 2/23/19

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	C19 971 81	2 °C	4	C19	°C	7	C19	°C
2	C19	°C	5	C19	°C	8	C19	°C
3	C19	°C	6	C19	°C	9	C19	°C

Taken By: [signature] Signature Meredith Edwards Printed Name 2/23/19 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

urday Delivery

Must Deliver Next Business Day
Time and Tempature Sensitive!

ALS

Part # 159469-434 RIT2 EXP 11/19

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

SHIP DATE: 22FEB19
ACTWGT: 8.65 LB
CAD: 300130/CAFE3211

BILL THIRD PARTY

TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS19021158 - RJ

551C2/0E3D/104C

FedEx
Express
E

J181118090501uv

SATURDAY 12:00P
PRIORITY OVERNIGHT

TRK# 0201 4809 7831 0661

X0 BTFA

84123
UT-US SLC

B 12:00 1
0661
02.23

FedEx Express

Batch Worklist

Batch: ELMS/ 2223 **Created:** 3/5/2019 08:21 **Instrument:** **HBN:** 233911

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

Workorder: 1905651 [ENV_LVL4]
Workorder: 1906112 [ENV_LVL4]
Workorder: 1906330 [ENV_LVL4]
Workorder: 1906332 [ENV_LVL4]
Workorder: 1906334 [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	642096	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
2	642097	RLVS for HBN 233911 [ELMS/2223				RLVS	3		E685041C3Q	5311		3/7/2019	
3	642098	ICS for HBN 233911 [ELMS/2223]				ICS	3		E6850..D3Q	5311		3/7/2019	
4	642099	LMB for HBN 233911 [ELMS/2223]				LMB	3		E6850Q413Q	5311		3/7/2019	
5	642100	LCS for HBN 233911 [ELMS/2223]				LCS	3		E6850Q413Q	5311		3/7/2019	
6	1905651001	HS19021158-02/LH18/24-SP650_02				SAMPLE	3	1905651001-A	E6850Q41.3	5480	3/21/2019	3/7/2019	
7	1906112001	EW01_022619				SAMPLE	3	1906112001-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
8	1906112002	EW01_022619MS				MS	3	1906112002-A	E6850Q413Q	5480		3/7/2019	
9	1906112003	EW01_022619MSD				MSD	3	1906112003-A	E6850Q413Q	5480		3/7/2019	
10	1906112004	EW05_022619				SAMPLE	3	1906112004-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
11	1906112005	EW05_022619_FD				FLDDUP	3	1906112005-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
12	1906112006	EW02_022619				SAMPLE	3	1906112006-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
13	1906112007	EW06_022619				SAMPLE	3	1906112007-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
14	1906112008	EW03_022619				SAMPLE	3	1906112008-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
15	1906112009	EW07_022619				SAMPLE	3	1906112009-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
16	642101	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
17	1906112010	EW04_022619				SAMPLE	3	1906112010-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
18	1906112011	EW08_022619				SAMPLE	3	1906112011-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
19	1906330001	LH18/24-SP140_022819				SAMPLE	3	1906330001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
20	1906332001	LH18/24-SP650_022819_BIX				SAMPLE	3	1906332001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
21	1906334001	LH18-24-SP650_022819_BIX				SAMPLE	3	1906334001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
22	642102	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1905651 (001); 1906112 (001-11); 1906330 (001); 1906332 (001); 1906334 (001) ELMS Batch/HBN ID: 2223 (233911)
Prep Date: 03/04/2019 Analysis Date: 03/05/2019 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2019\MAR\05MAR19D.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 AH015-4)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot AH015-4)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 43730. Dilutions of Working Standard Solution ID 43702 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/15/2019, sequence 15FEB19D.s Offline Quantitation Method: CLO4-DP1.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-AQN.M Fragmentor: 160 Output Gain: 3 Injection Volume: 30µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.65
5.8	0.65
5.9	0.25
10.3	0.25
10.5	0.65
12.0	0.65

QC DATA: 4.0µL of QC Solution Horizon ID 41830 was used for LCS 642100; Target = 4.0µg/L. ASTM type II water was used for LMB 642099.

MS/MSD: The Matrix Spike and duplicate (MS/MSD) were performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. Spike target = 4.0µg/L.

COMMENTS:

1) Results reported in µg/L. Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2019\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2019\23911-DoD-ALS-Hstn LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#
5) The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level 4.0µg/L.
6) Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

5.5 Chromatography (GC, HPLC and LC/MS) Technical Review

Note: It is the peer reviewer's responsibility to ensure that appropriate criteria are used as defined in the HORIZON PROFILE. The evaluation criteria are prioritized as per Section 2.2 of this SOP. These items must be checked for all projects. The following checklist will be completed by both the analyst and the peer reviewer and scanned into the HBN folder with the raw data.

Chromatography (GC, HPLC, LC/MS) Technical Review Criteria Batch(es)/SDG: ELMS: 2223 HBN: 233911 Sample Set IDs if Applicable: 1905651/1906912/1906330 1906332/1906334	Analyst Initials	Reviewer Initials
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
For method 8081A, Endrin/DDT Breakdown is checked for compliance	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR#	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 43702
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 WRK

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
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK — Description - 6850 Stock AccStd 1,000ug/mL

Standard: 43659
MFG: AccuStandard
MFG Lot: 218065075
Part ID: IC-PER-10X-1

Created By: Thomas Bosch
Create Date: 09/17/2018 09:09AM

Amount: 100 mL
Expires: 07/25/2020
Usable: No
Lab Lot: CLO4 STOCK

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: 43701
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 INT

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
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020

STANDARD REPORT

Working Standard - CLO4 QC WRK

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

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

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
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

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

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

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: 43730	**Created By:** Thomas Bosch	**Amount:** 25 mL
MFG: ALS/SLC	**Create Date:** 09/20/2018 09:09AM	**Expires:** 09/20/2019
MFG Lot: TNB: 05/09/2018	**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
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date:	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

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

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

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

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

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

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®

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

CERTIFICATE OF ANALYSIS

S 43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 218065075
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Date Certified: Jun 25, 2018
Expiration: Jul 25, 2020
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO 17034 Scope of Accreditation: Yes

Signal Word: None

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

The gravimetric uncertainty for this product is ±0.24%.
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.

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 (1804, 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 Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
*	642096 CCV@25	Vial 71	1	Control	1	2.57589e6	8.017	25.04585
*	642100 QC@4.0	Vial 72	1	Control	2	4.23307e5	8.139	4.10749
*	642098 ICS@4.0	Vial 73	1	Control	3	3.17619e5	7.883	3.92708
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	7.71127e6	7.438	51.25151
*	1906112002 MS	Vial 77	1	Sample	7	8.02696e6	7.464	53.87972
*	1906112003 MSD	Vial 78	1	Sample	8	7.94242e6	7.442	53.69940
*	1906112004	Vial 79	1	Sample	9	2.33017e7	7.227	172.36522
*	1906112005	Vial 80	1	Sample	10	2.30991e7	7.229	180.38568
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	2.33611e6	8.114	25.01987
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	2.53126e6	7.736	226.48155
*	1906112005 10X	Vial 91	1	Sample	22	2.68237e6	7.739	241.03710
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	3.77363e6	8.090	3708.65666
*	642102 CCV@25	Vial 71	1	Control	25	2.15787e6	8.144	24.45533

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	642096 CCV@25	Vial 71	1	Control	1	6.79028e5	8.036	25.15984
*	642100 QC@4.0	Vial 72	1	Control	2	1.27412e5	8.156	4.45187
*	642098 ICS@4.0	Vial 73	1	Control	3	9.68721e4	7.906	4.29888
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	2.02786e6	7.452	51.10329
*	1906112002 MS	Vial 77	1	Sample	7	2.14637e6	7.478	54.46797
*	1906112003 MSD	Vial 78	1	Sample	8	2.10991e6	7.456	53.98100
*	1906112004	Vial 79	1	Sample	9	6.79668e6	7.243	180.45962
*	1906112005	Vial 80	1	Sample	10	6.82834e6	7.246	190.34382
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	6.28961e5	8.128	25.63410
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	6.46870e5	7.754	220.91905
*	1906112005 10X	Vial 91	1	Sample	22	6.95643e5	7.756	238.44674
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	1.01021e6	8.102	3771.67475
*	642102 CCV@25	Vial 71	1	Control	25	5.83711e5	8.160	25.16652

#	*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
	*	642096 CCV@25	Vial 71	1	Control	1	3.12207e5	8.043	5.00000
	*	642100 QC@4.0	Vial 72	1	Control	2	3.41038e5	8.157	5.00000
	*	642098 ICS@4.0	Vial 73	1	Control	3	2.68237e5	7.902	5.00000
	*	642099 LMB	Vial 74	1	Control	4	3.53313e5	8.102	5.00000
	*	1905651001	Vial 75	1	Sample	5	3.26356e5	7.780	5.00000
	*	1906112001	Vial 76	1	Sample	6	4.26473e5	7.464	5.00000
	*	1906112002 MS	Vial 77	1	Sample	7	4.19549e5	7.491	5.00000
	*	1906112003 MSD	Vial 78	1	Sample	8	4.16709e5	7.467	5.00000
	*	1906112004	Vial 79	1	Sample	9	2.95705e5	7.253	5.00000
	*	1906112005	Vial 80	1	Sample	10	2.75946e5	7.263	5.00000
	*	1906112006	Vial 81	1	Sample	11	3.73575e5	7.480	5.00000
	*	1906112007	Vial 82	1	Sample	12	5.00533e5	7.256	5.00000
	*	1906112008	Vial 83	1	Sample	13	4.65121e5	7.237	5.00000
	*	1906112009	Vial 84	1	Sample	14	2.43675e5	7.672	5.00000
	*	1906112010	Vial 85	1	Sample	15	2.51865e5	7.710	5.00000
	*	1906112011	Vial 86	1	Sample	16	2.80792e5	7.876	5.00000
	*	642101 CCV@25	Vial 71	1	Control	17	2.83460e5	8.140	5.00000
	*	1906332001	Vial 88	1	Sample	19	2.64674e5	7.827	5.00000
	*	1906334001	Vial 89	1	Sample	20	2.65662e5	7.808	5.00000
	*	1906112004 10X	Vial 90	1	Sample	21	3.41608e5	7.756	50.00000
	*	1906112005 10X	Vial 91	1	Sample	22	3.38724e5	7.764	50.00000
	*	1906112007 RE	Vial 82	1	Sample	23	4.31135e5	7.332	5.00000
	*	1906330001 100	Vial 92	1	Sample	24	2.98985e5	8.111	500.00000
	*	642102 CCV@25	Vial 71	1	Control	25	2.68305e5	8.165	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

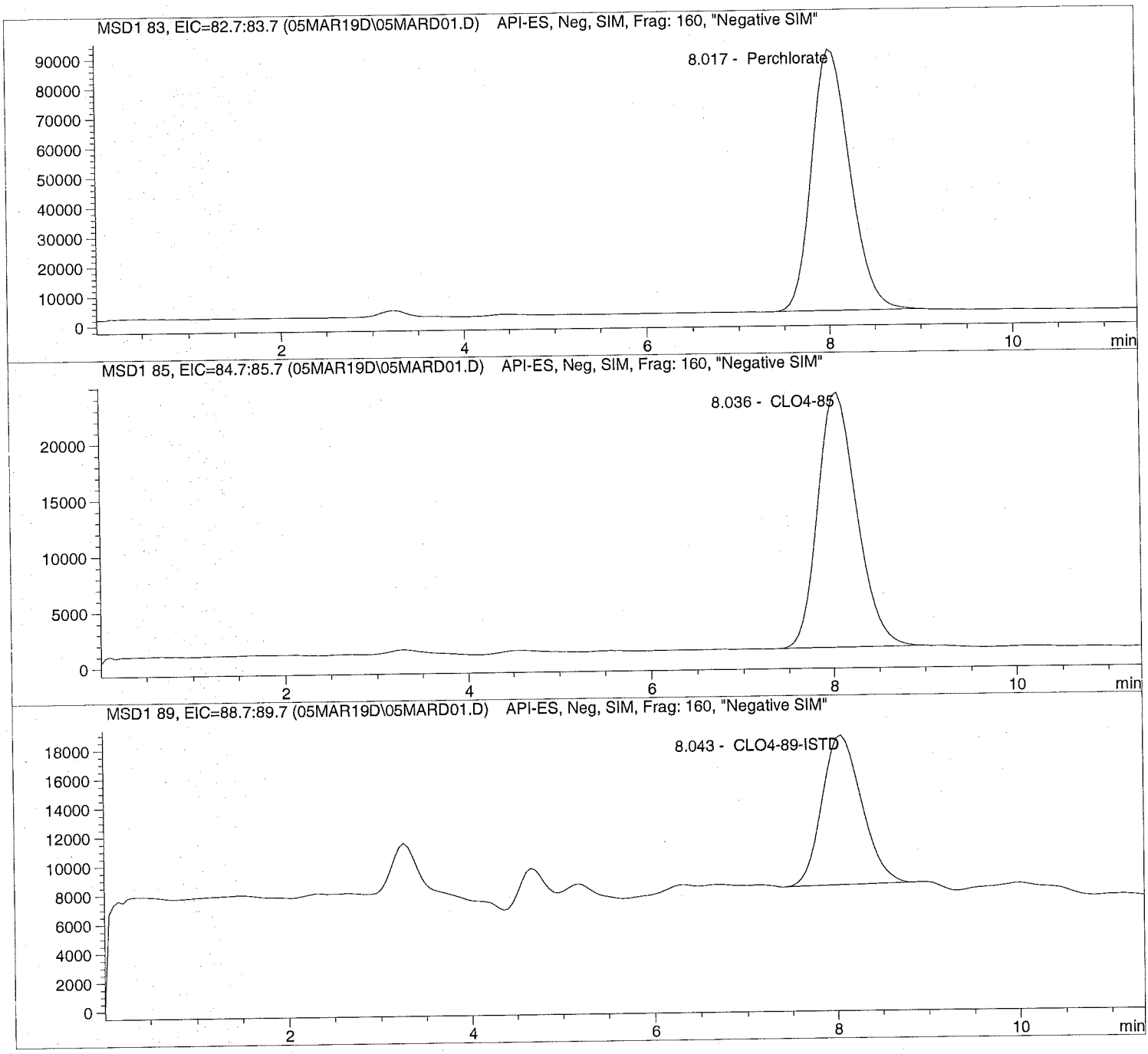
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	642096	CCV@25	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	642100	QC@4.0	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	642098	ICS@4.0	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	642099	LMB	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	1905651001		CLO4-AQN	1	Sample		
6	Vial 76	1906112001		CLO4-AQN	1	Sample		
7	Vial 77	1906112002	MS	CLO4-AQN	1	Sample		
8	Vial 78	1906112003	MSD	CLO4-AQN	1	Sample		
9	Vial 79	1906112004		CLO4-AQN	1	Sample		
10	Vial 80	1906112005		CLO4-AQN	1	Sample		
11	Vial 81	1906112006		CLO4-AQN	1	Sample		
12	Vial 82	1906112007		CLO4-AQN	1	Sample		
13	Vial 83	1906112008		CLO4-AQN	1	Sample		
14	Vial 84	1906112009		CLO4-AQN	1	Sample		
15	Vial 85	1906112010		CLO4-AQN	1	Sample		
16	Vial 86	1906112011		CLO4-AQN	1	Sample		
17	Vial 71	642101	CCV@25	CLO4-AQN	1	Ctrl Samp		
18	Vial 87	1906330001	1K	CLO4-AQN	1	Sample		
19	Vial 88	1906332001		CLO4-AQN	1	Sample		
20	Vial 89	1906334001		CLO4-AQN	1	Sample		
21	Vial 90	1906112004	10X	CLO4-AQN	1	Sample		
22	Vial 91	1906112005	10X	CLO4-AQN	1	Sample		
23	Vial 82	1906112007	RE	CLO4-AQN	1	Sample		
24	Vial 92	1906330001	100	CLO4-AQN	1	Sample		
25	Vial 71	642102	CCV@25	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.017	PBA	2575886.3	25.0459	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.036	PBA	679028.4	25.1598	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.043	PBA	312206.9	5.0000	CLO4-89-ISTD

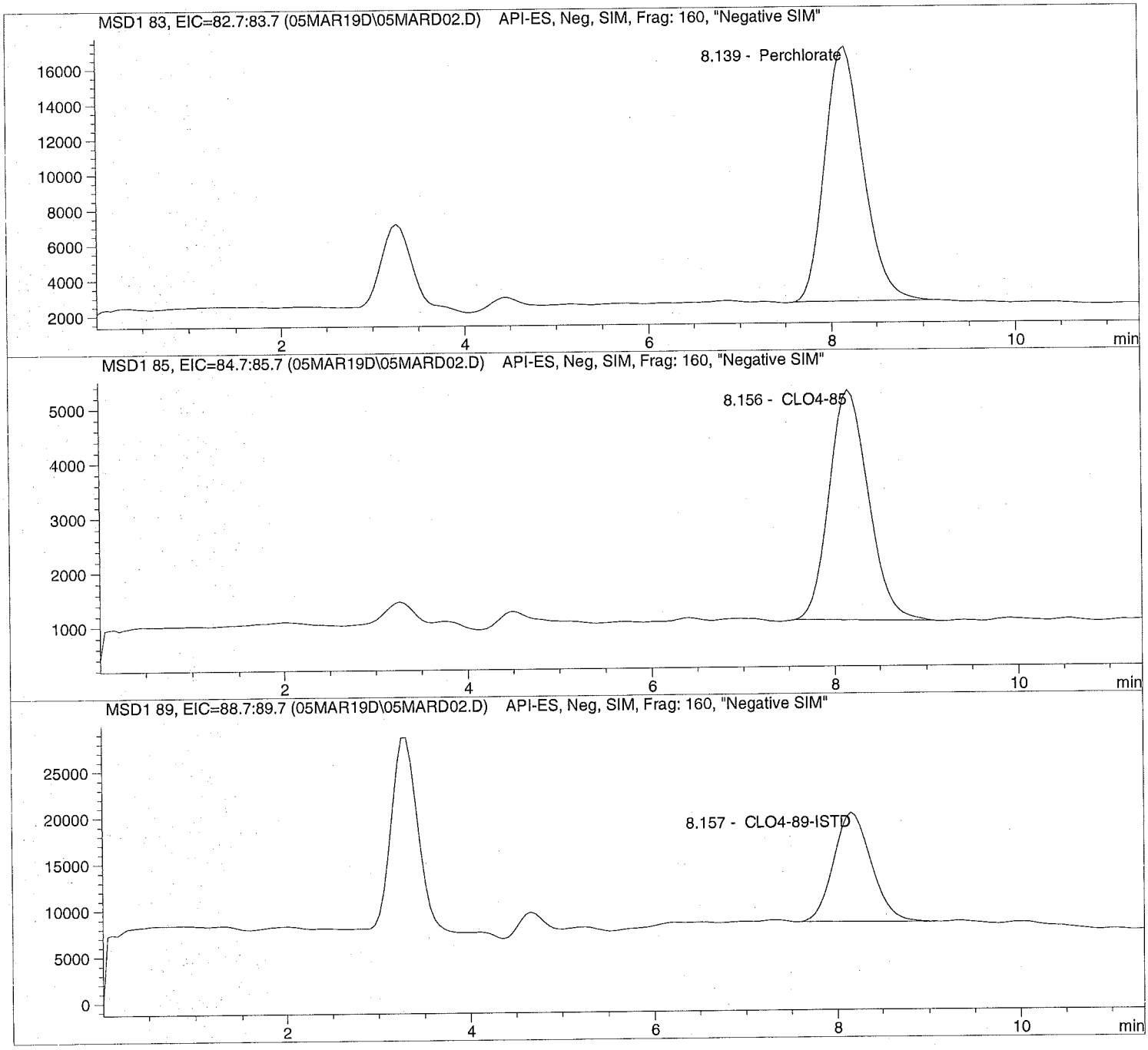
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD02.D Sample Name: 642100 QC@4.0

Injection Date:	3/05/2019 09:00:30	Seq Line:	2
Sample Name:	642100 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD02.D Sample Name: 642100 QC@4.0

Injection Date:	3/05/2019 09:00:30	Seq Line:	2
Sample Name:	642100 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.139	PBA	423307.1	4.1075	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.156	PBA	127412.0	4.4519	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.157	PBA	341038.3	5.0000	CLO4-89-ISTD

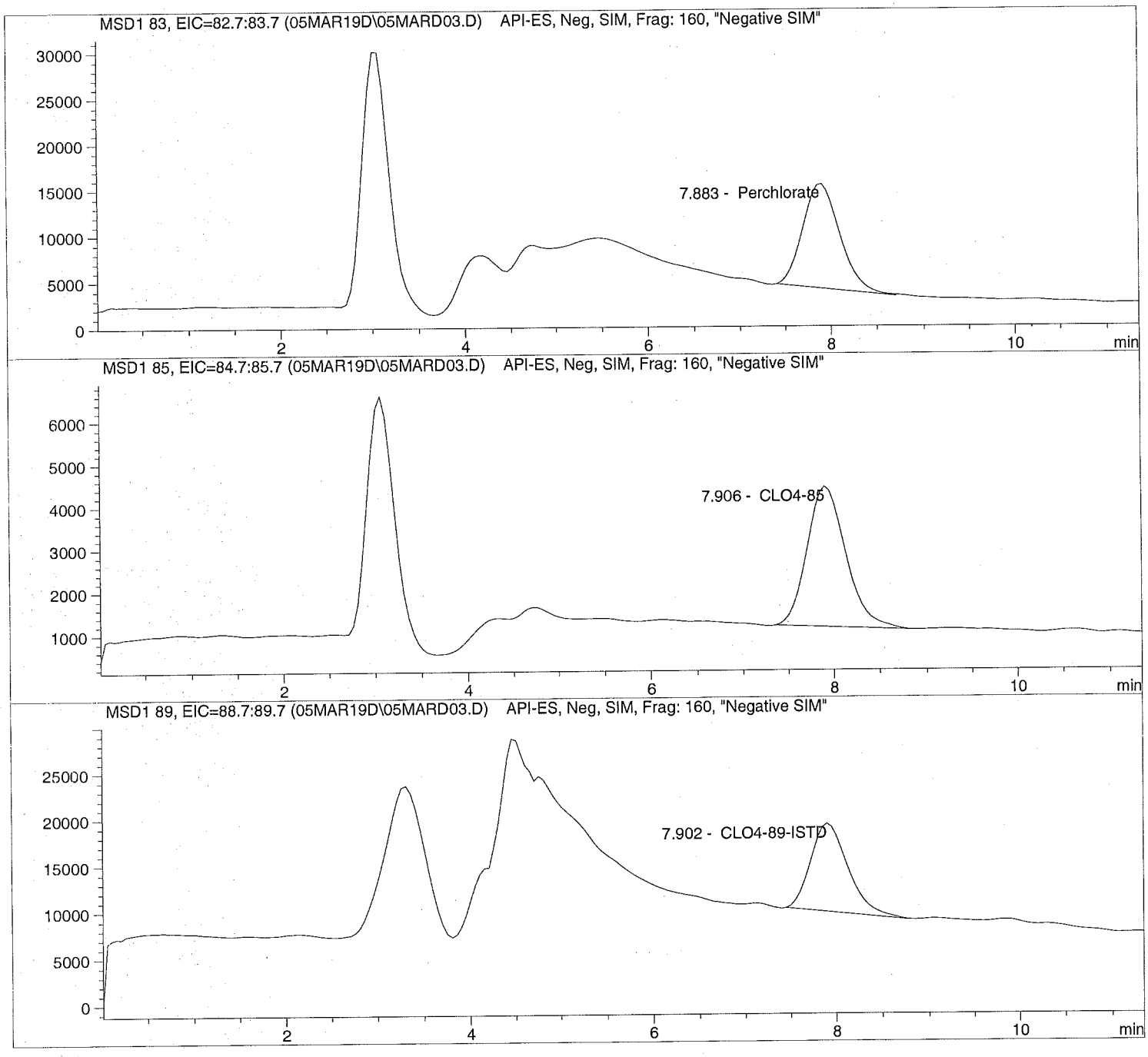
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.883	PBA	317618.9	3.9271	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.906	PBA	96872.1	4.2989	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.902	PBA	268236.7	5.0000	CLO4-89-ISTD

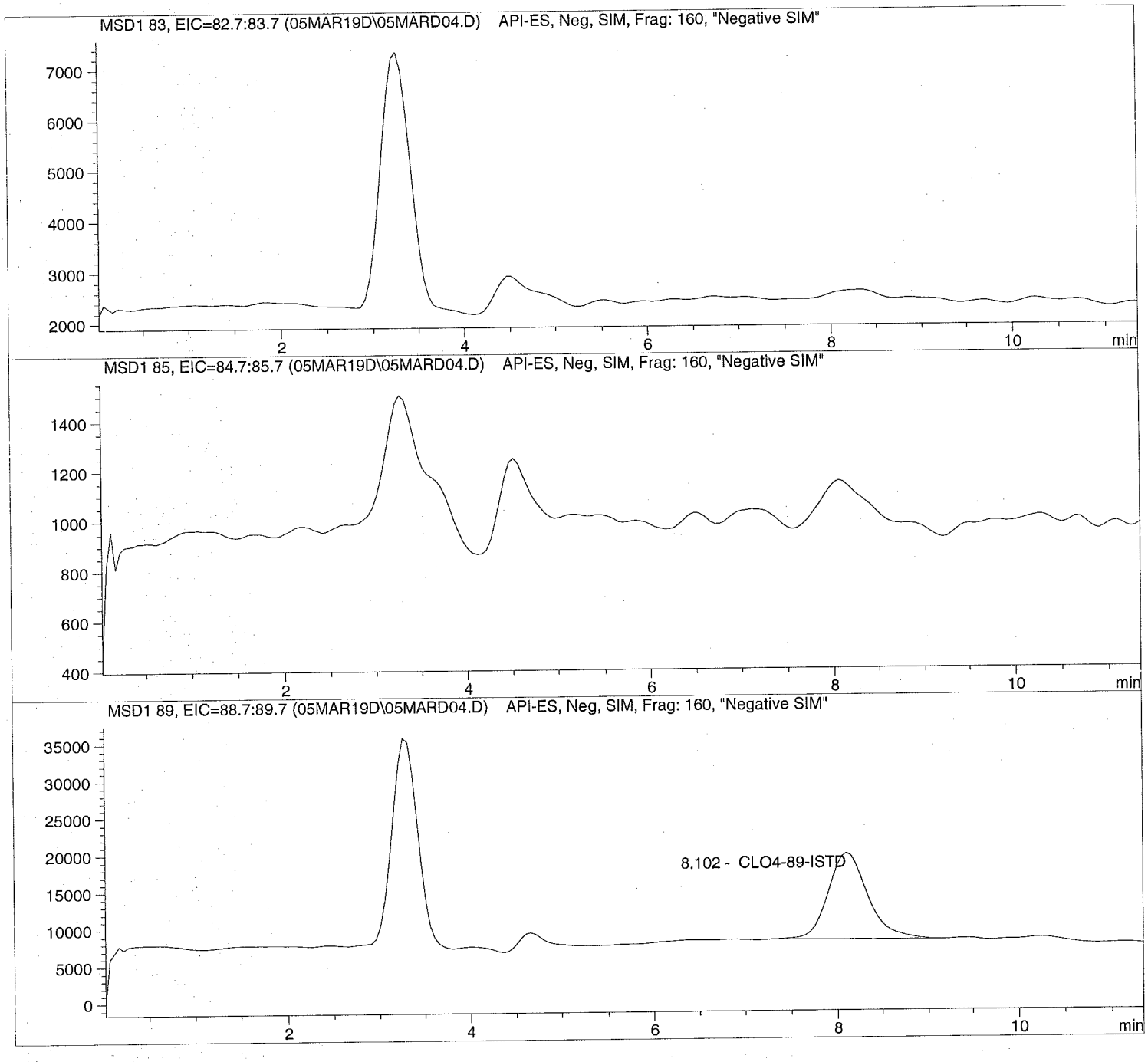
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.102	BBA	353313.1	5.0000	CLO4-89-ISTD

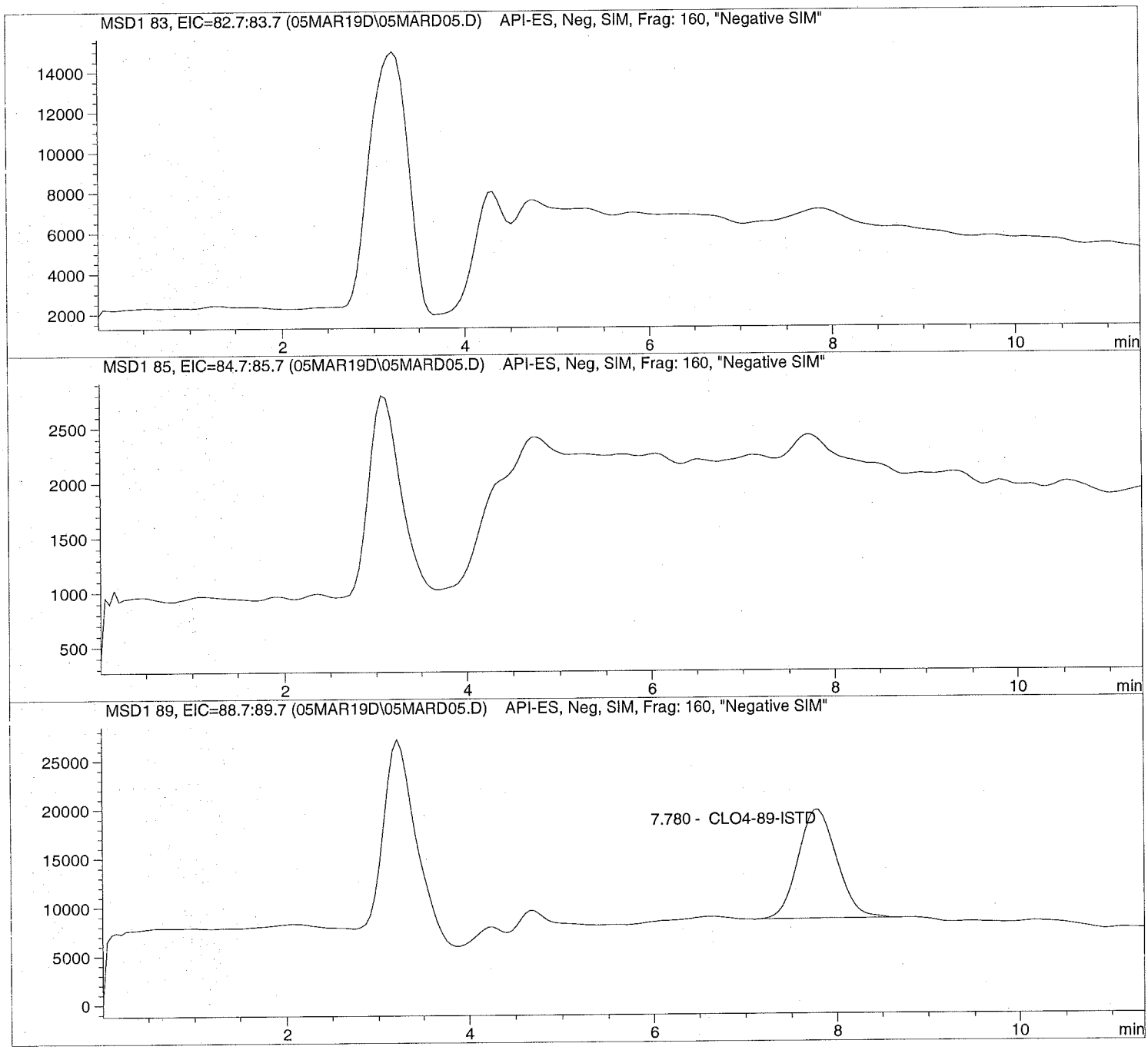
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.780	PBA	326356.2	5.0000	CLO4-89-ISTD

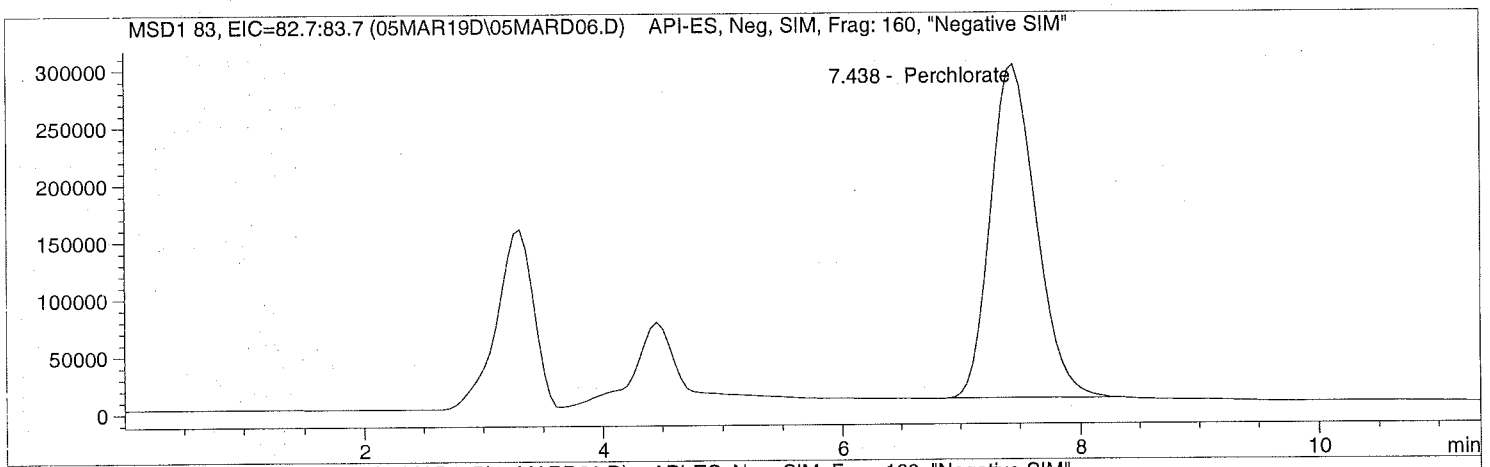
*** End of Report ***

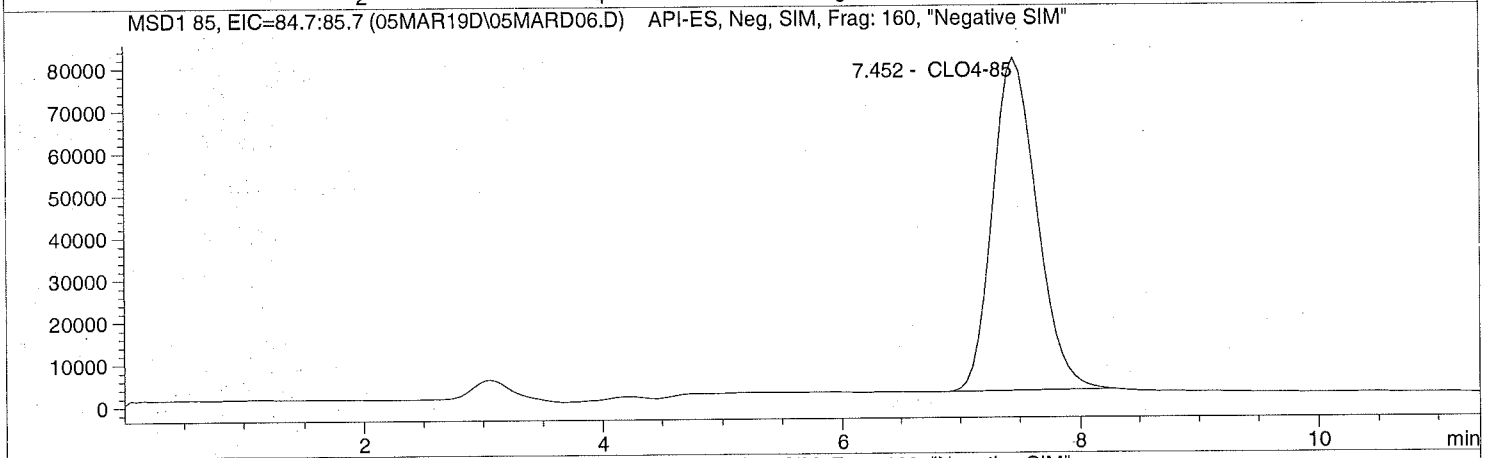
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

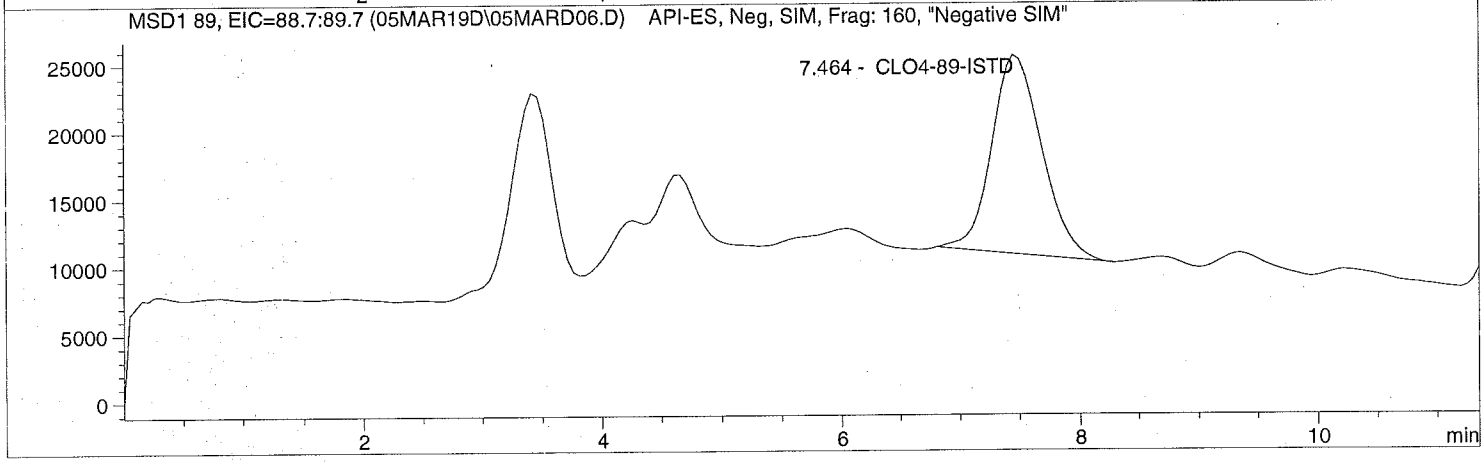
Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.438	PBA	7711270.5	51.2515	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.452	PBA	2027855.1	51.1033	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.464	PB	426473.5	5.0000	CLO4-89-ISTD

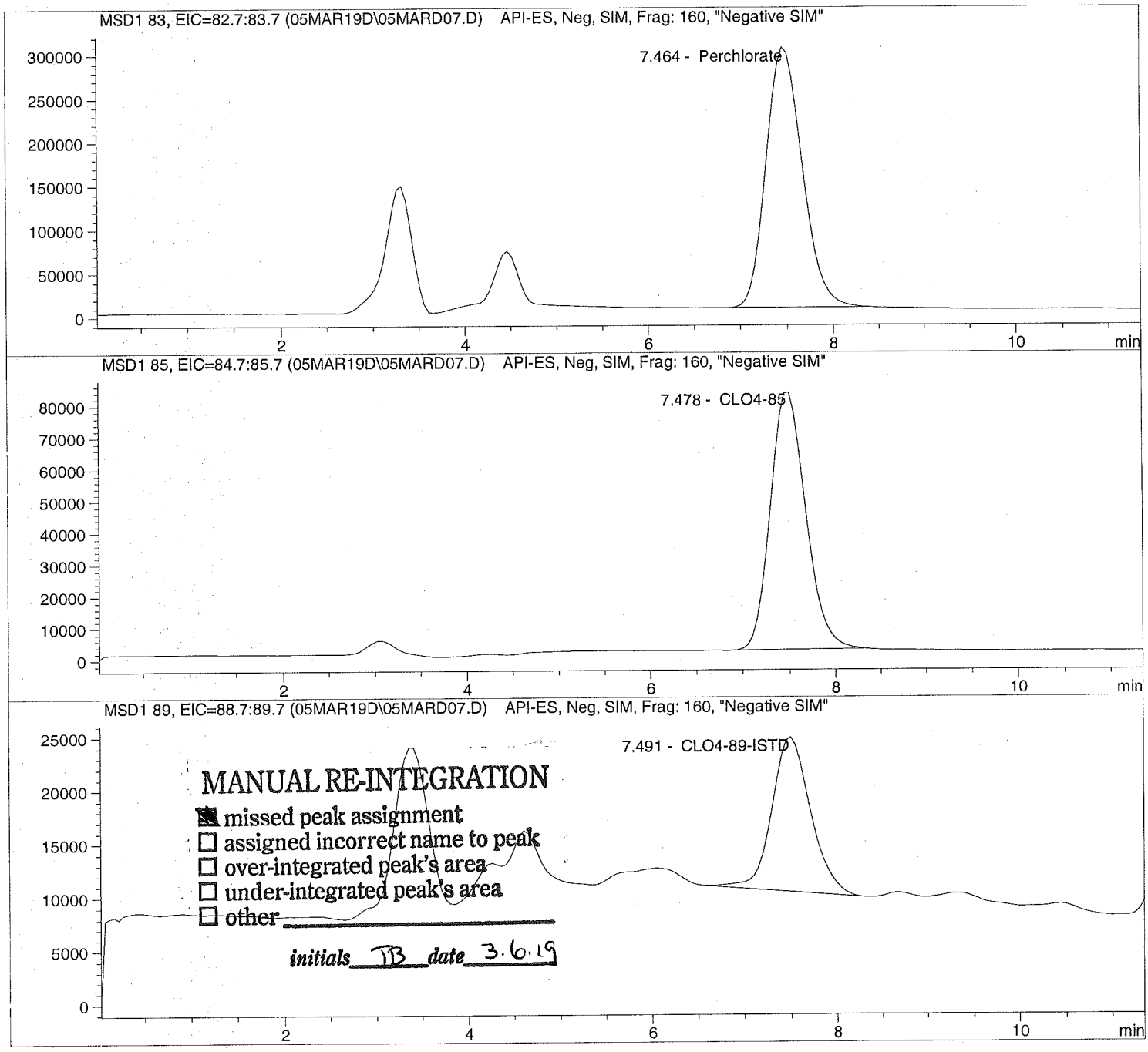
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	53.8797	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	54.4680	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.491	MM	419549.0	5.0000	CLO4-89-ISTD

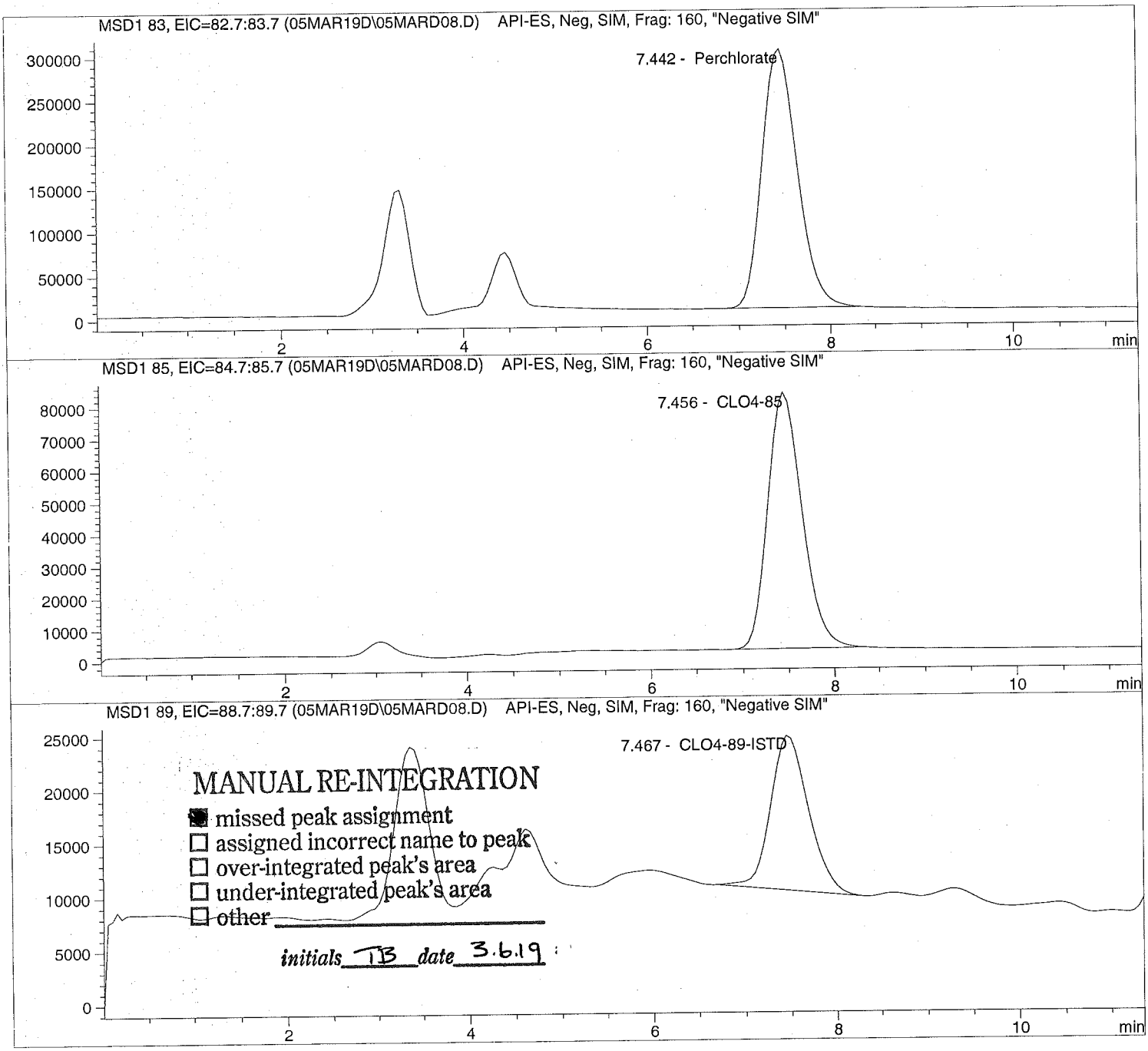
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	53.6994	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	53.9810	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.467	MM	416709.1	5.0000	CLO4-89-ISTD

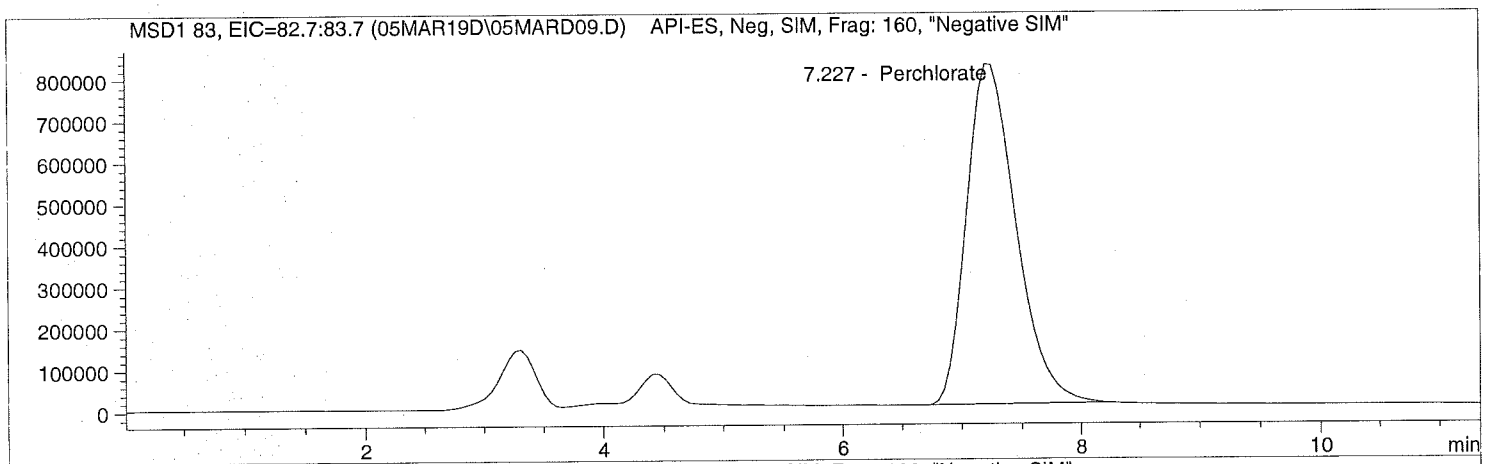
*** End of Report ***

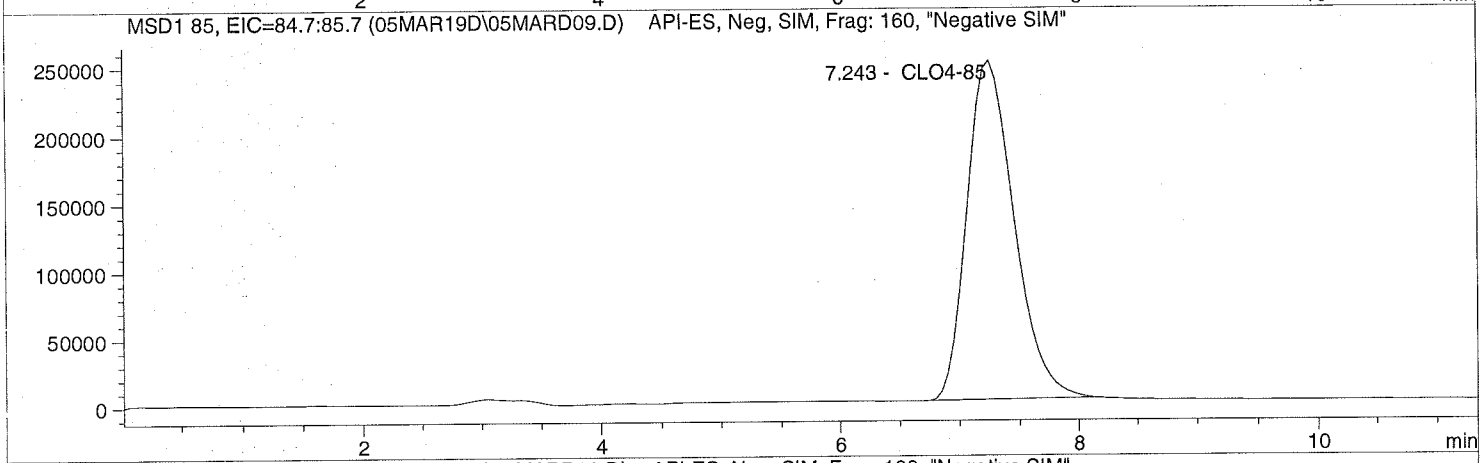
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

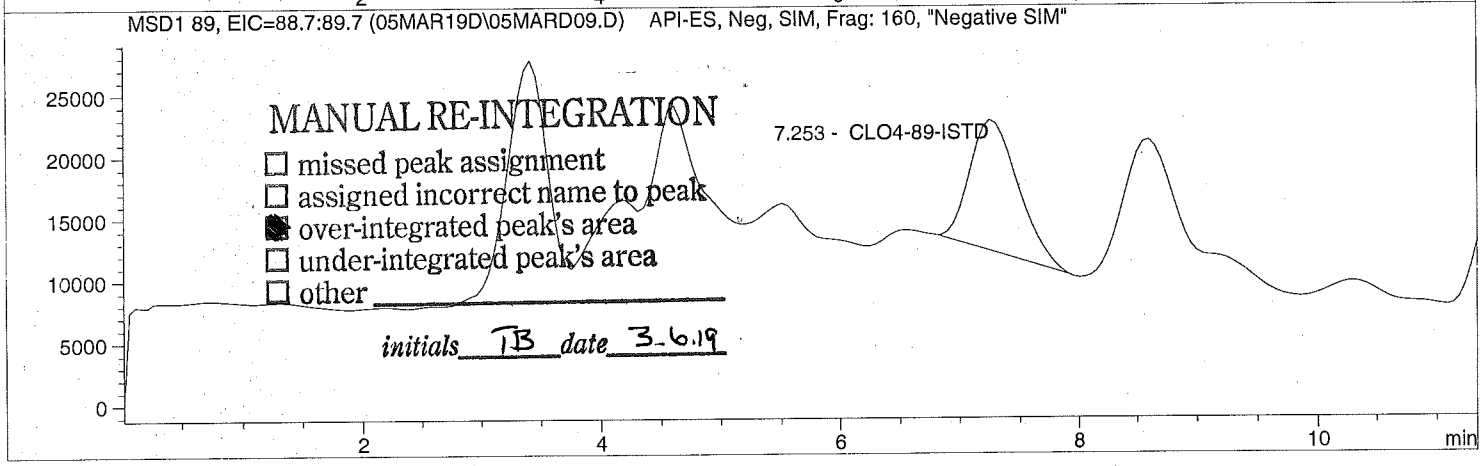
Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____

initials TB *date* 3.6.19

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	172.3652	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	180.4596	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.253	MM	295705.2	5.0000	CLO4-89-ISTD

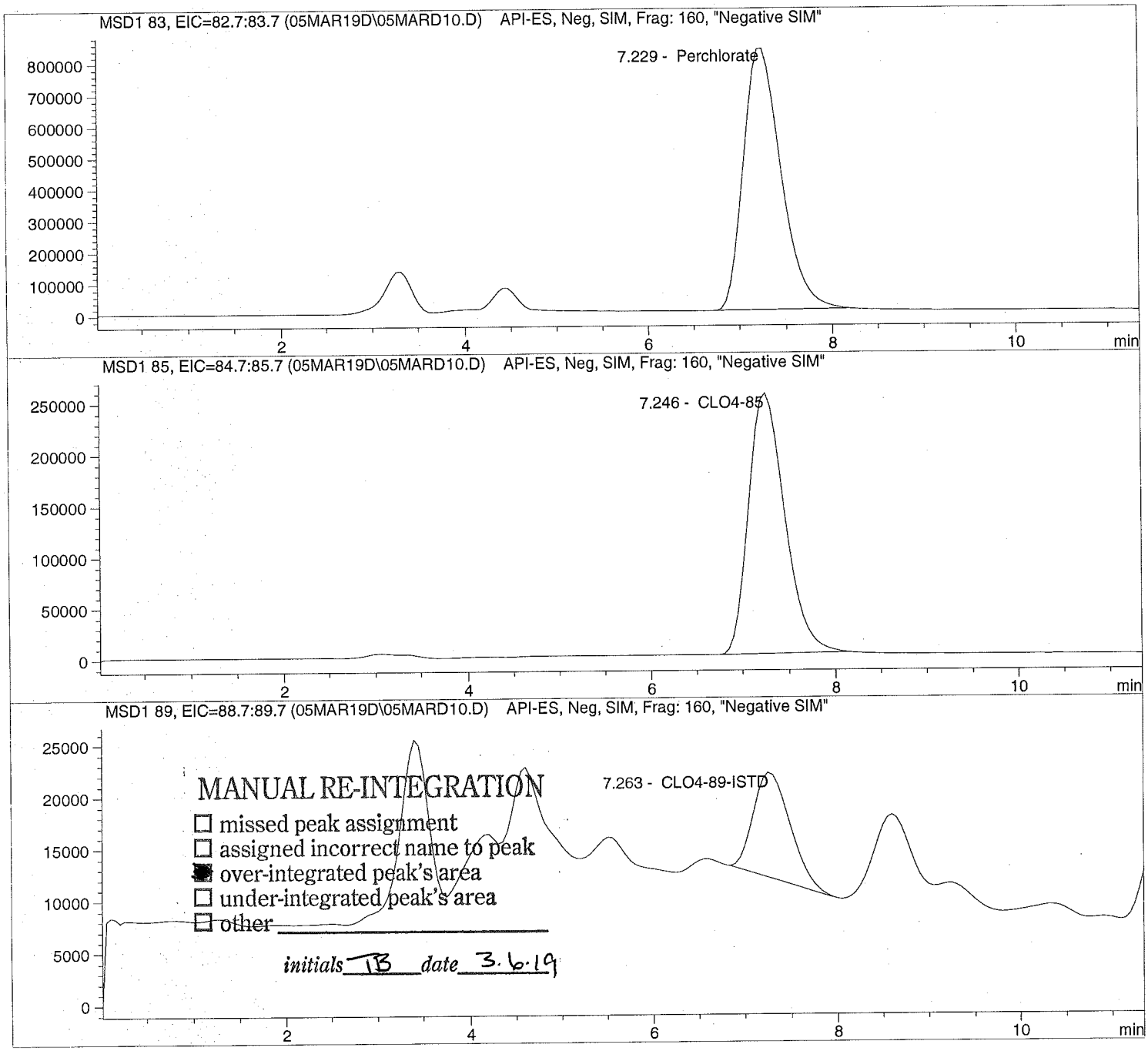
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	180.3857	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	190.3438	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	MM	275946.4	5.0000	CLO4-89-ISTD

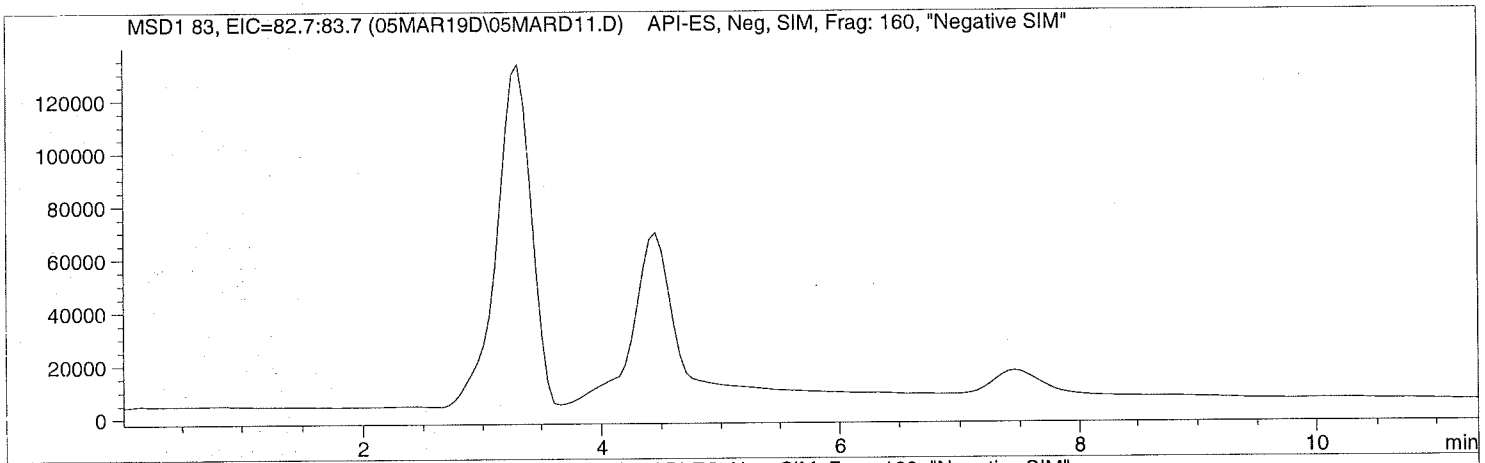
*** End of Report ***

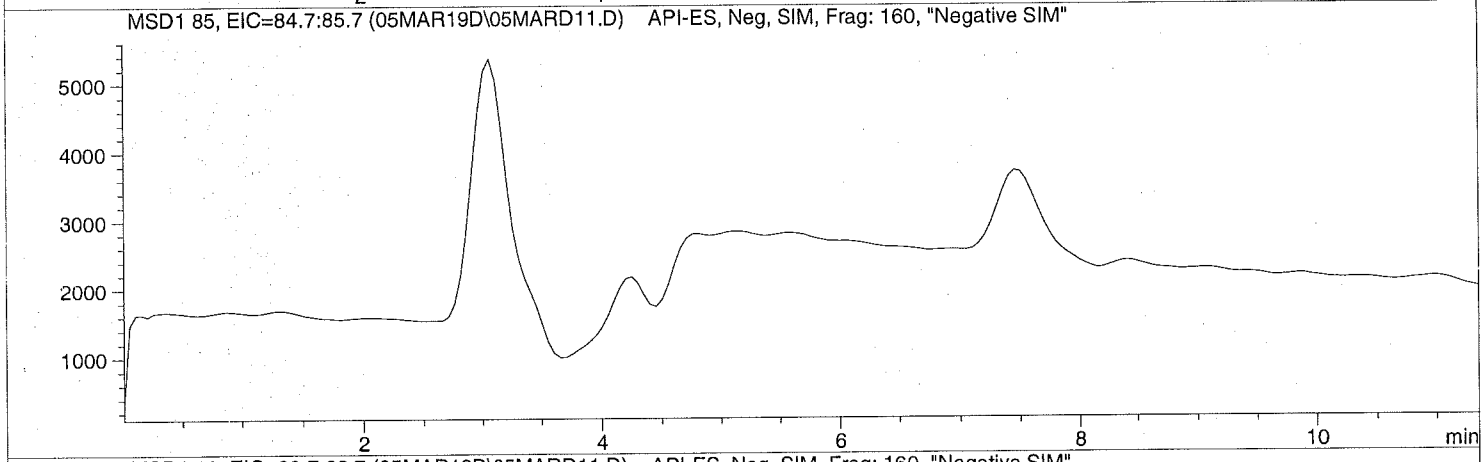
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

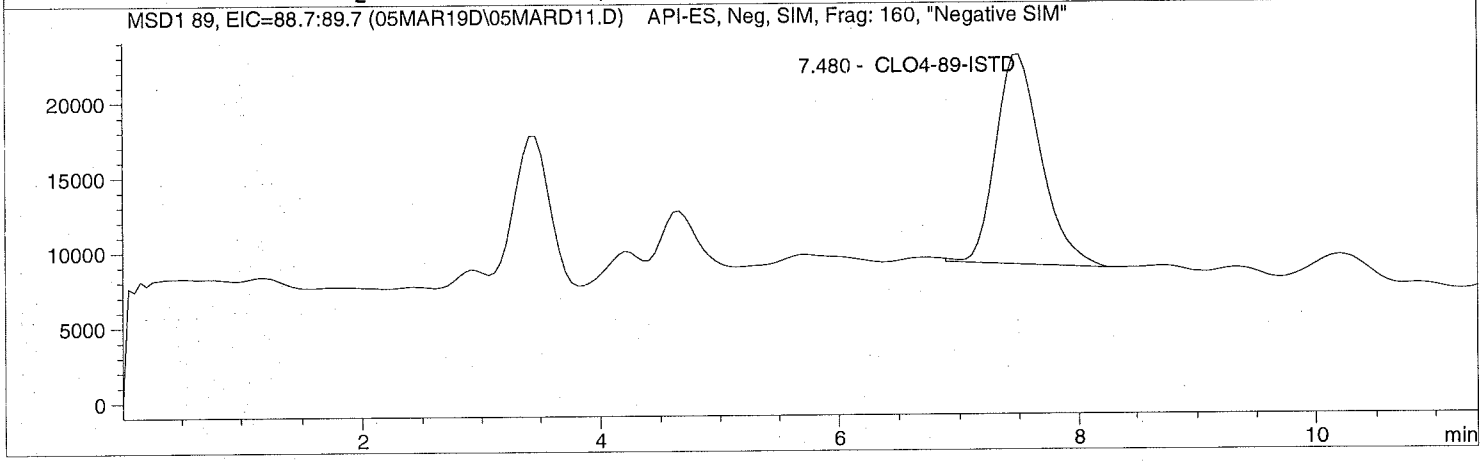
Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.480	BBA	373575.4	5.0000	CLO4-89-ISTD

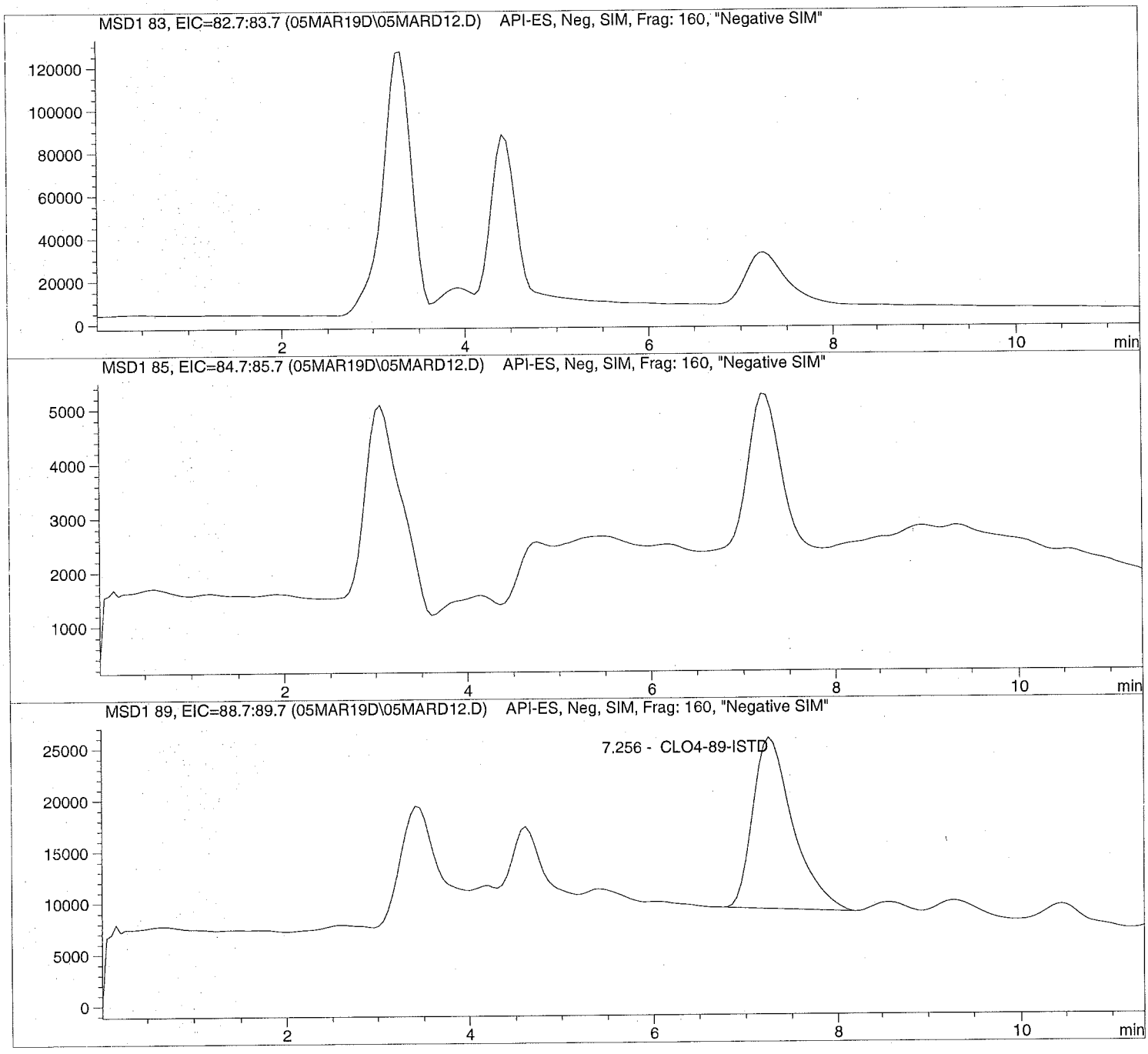
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.256	PB	500532.9	5.0000	CLO4-89-ISTD

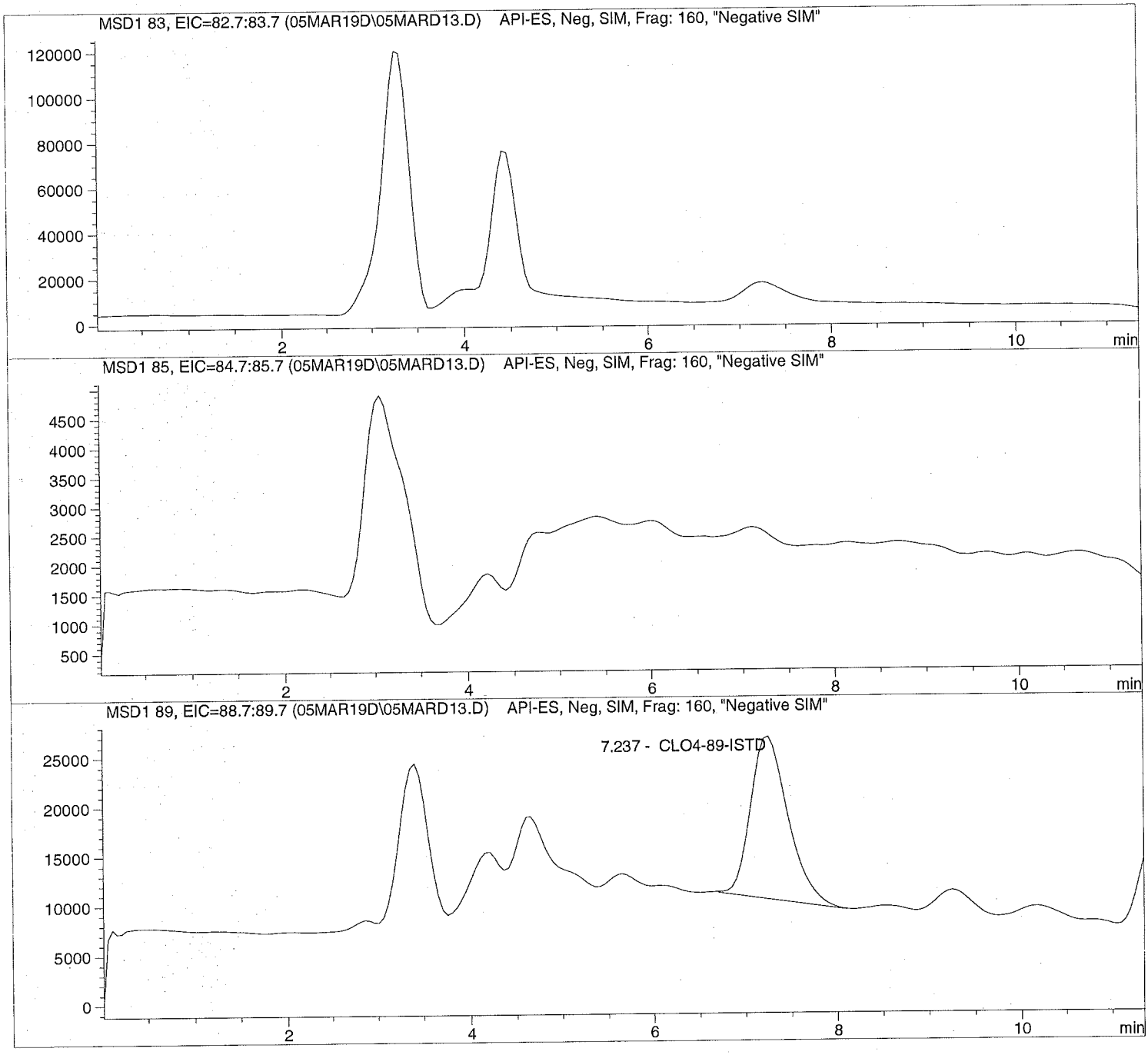
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.237	BBA	465121.2	5.0000	CLO4-89-ISTD

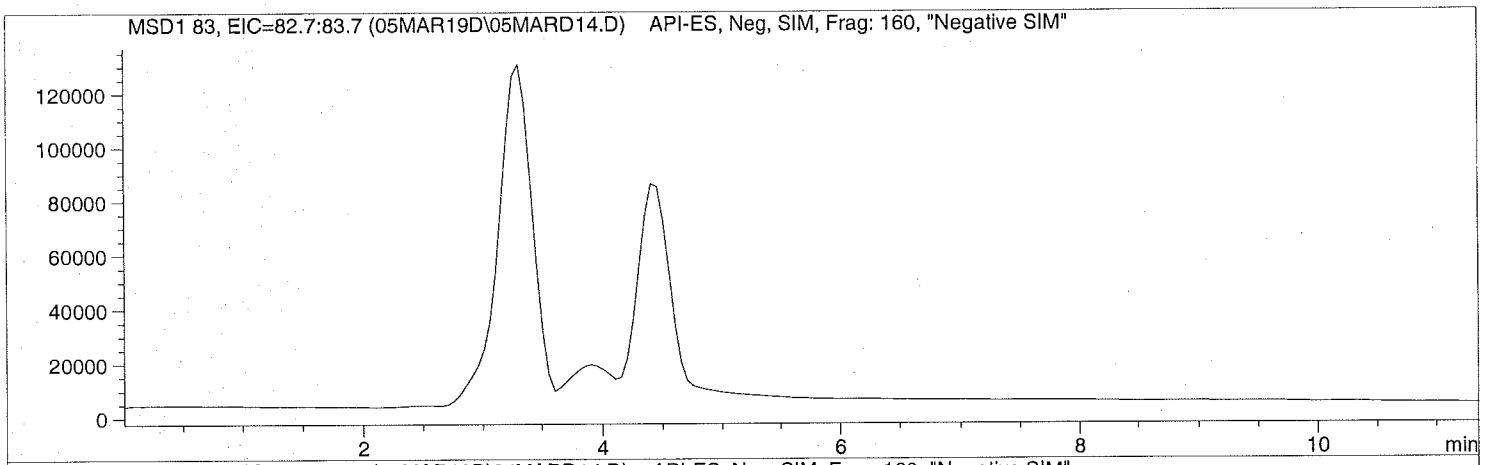
*** End of Report ***

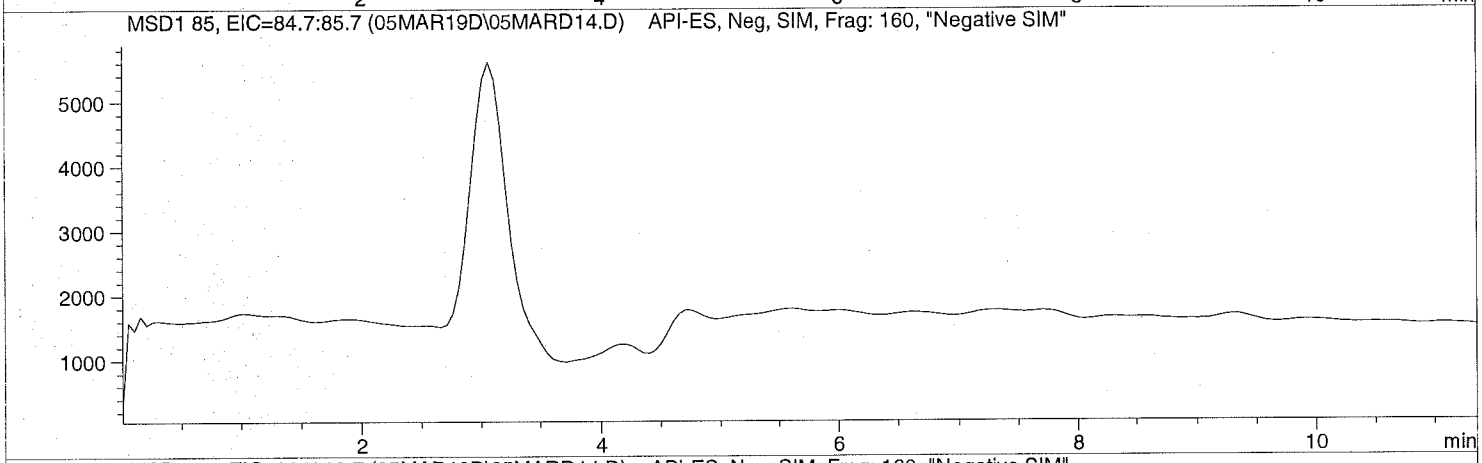
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

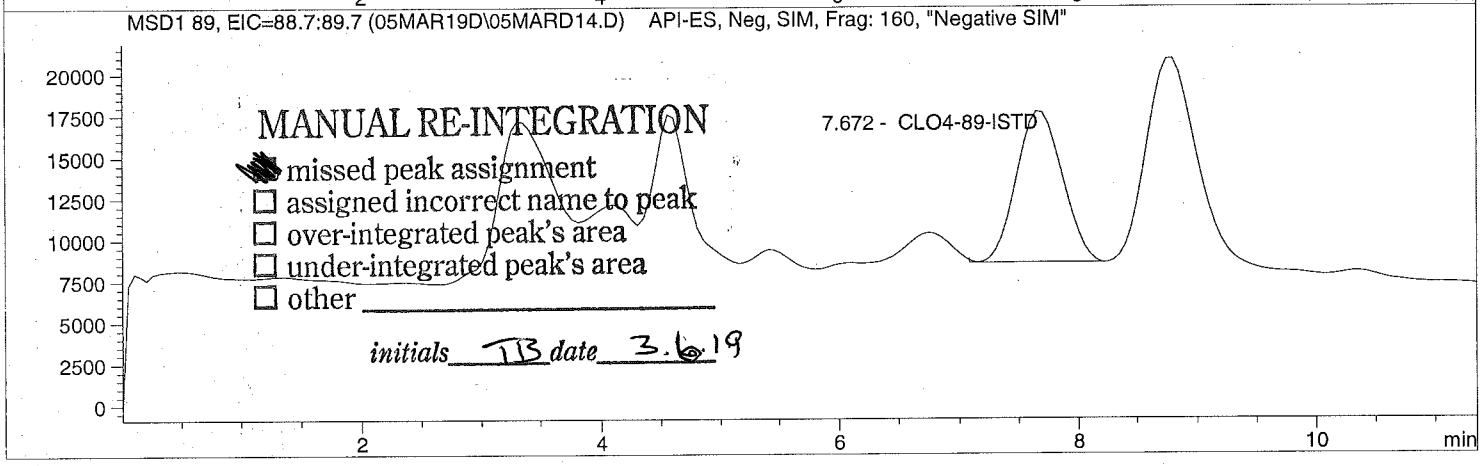
Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	5.0000	CLO4-89-ISTD

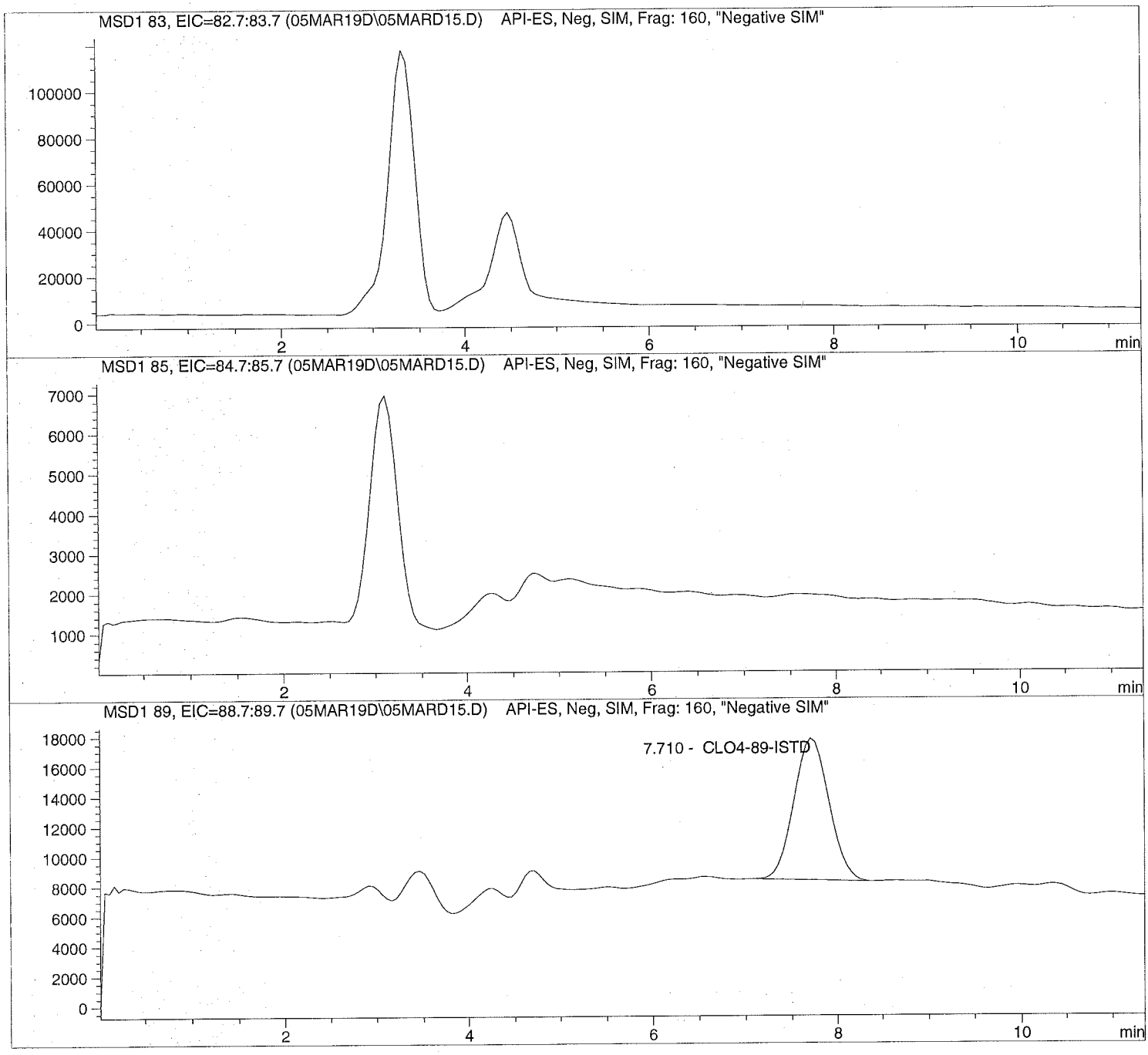
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.710	BBA	251865.4	5.0000	CLO4-89-ISTD

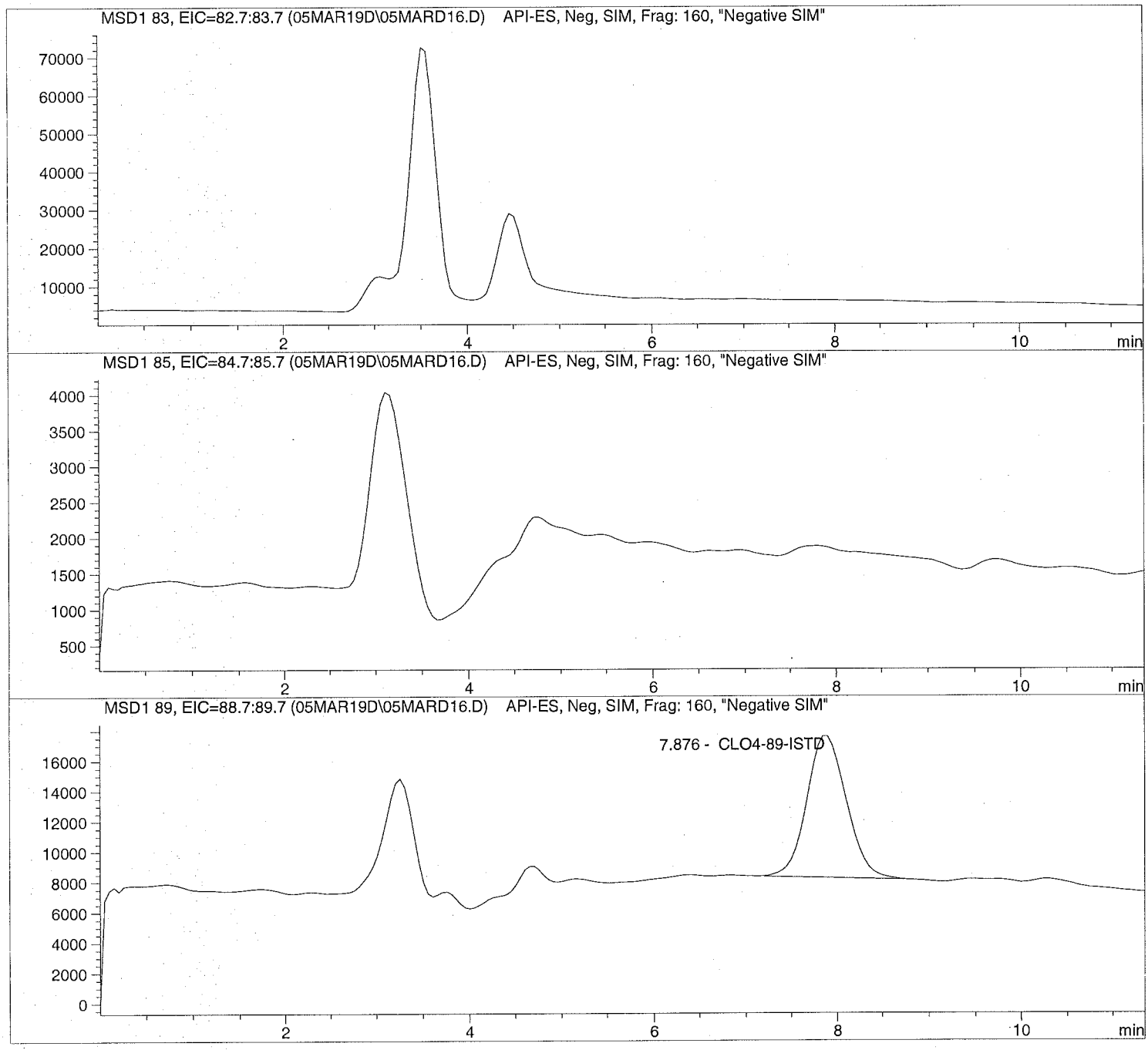
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.876	BBA	280792.2	5.0000	CLO4-89-ISTD

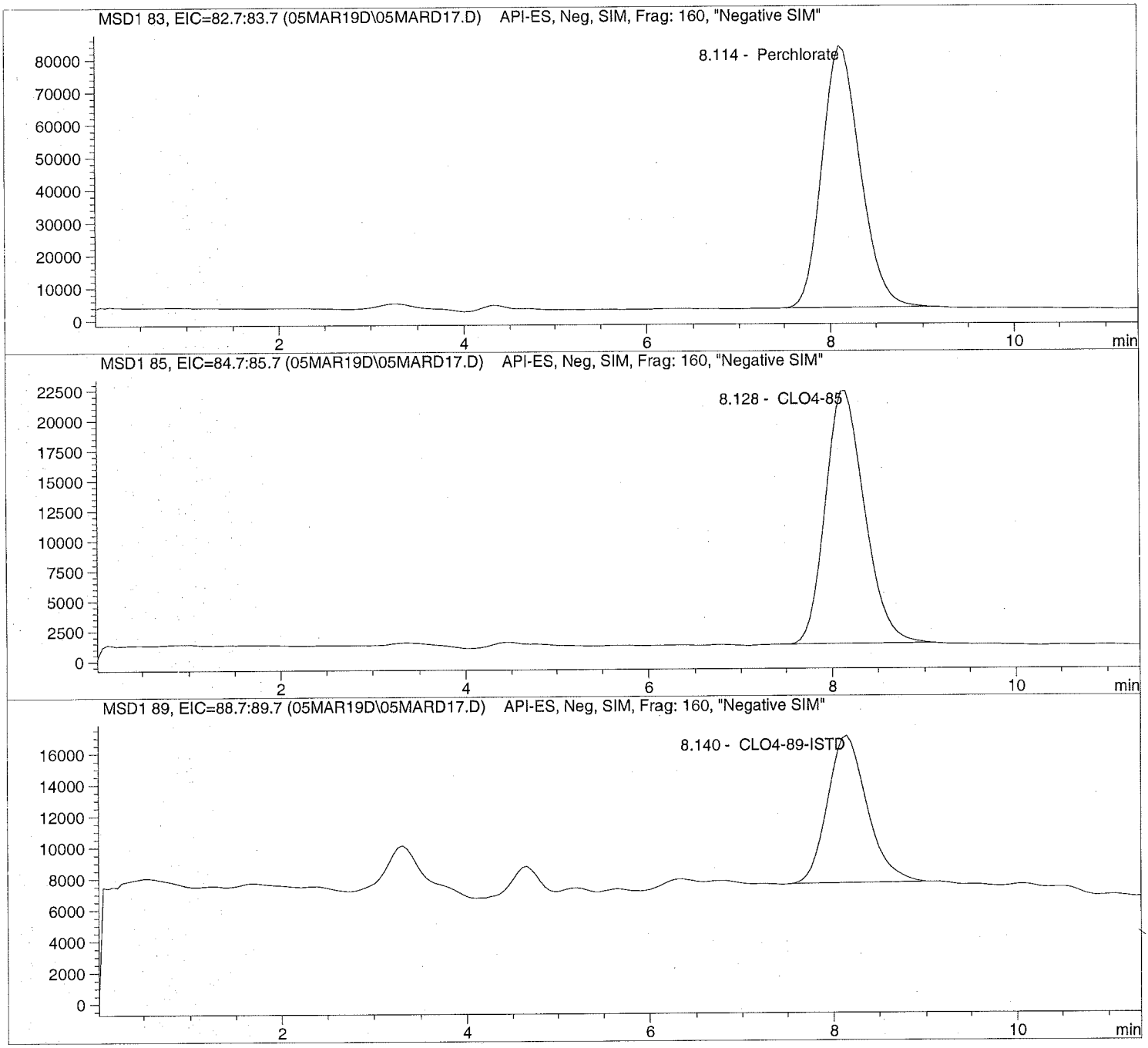
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD17.D Sample Name: 642101 CCV@25

Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	2336112.7	25.0199	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.128	PBA	628961.2	25.6341	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.140	PBA	283460.4	5.0000	CLO4-89-ISTD

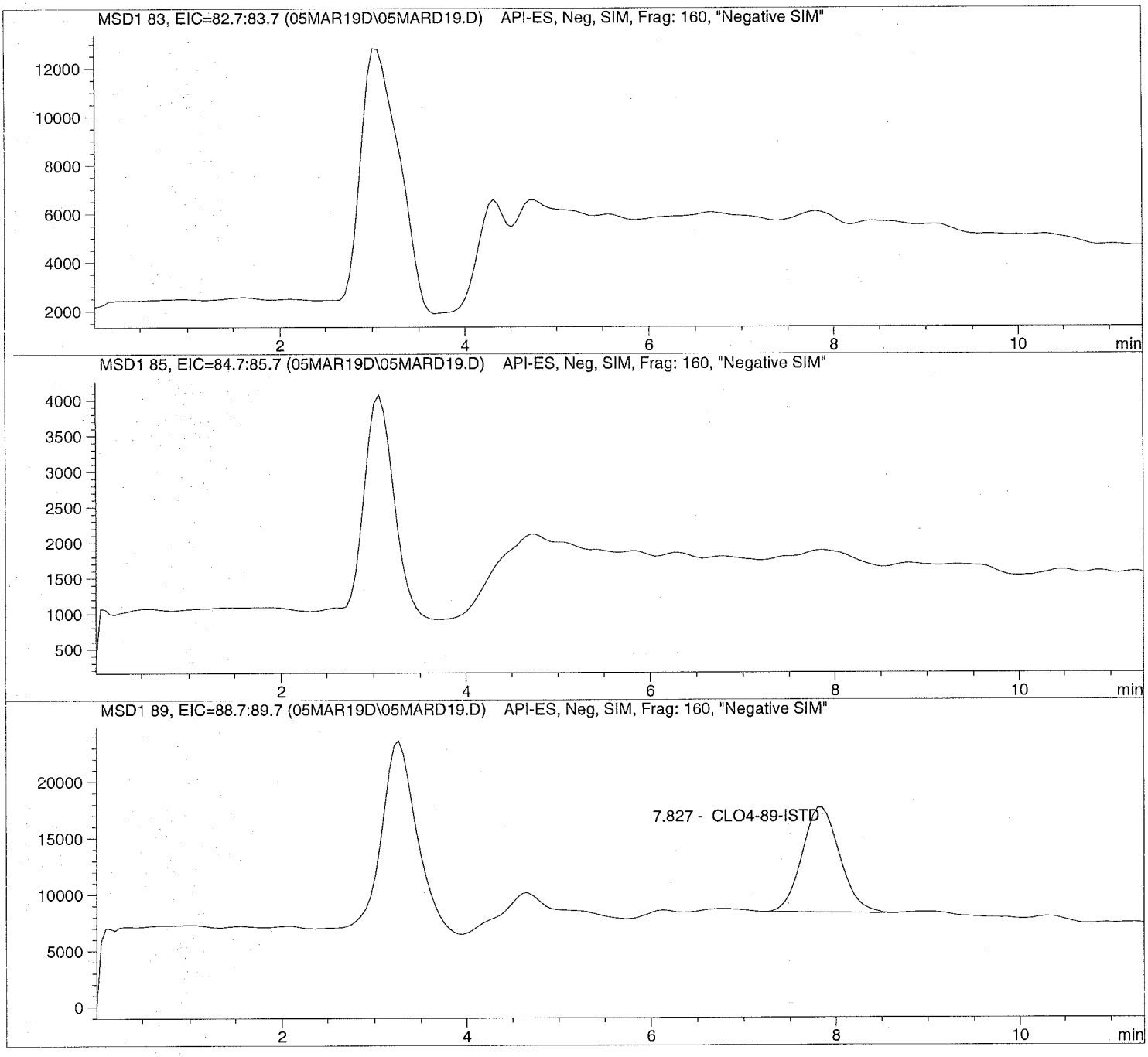
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.827	PBA	264674.3	5.0000	CLO4-89-ISTD

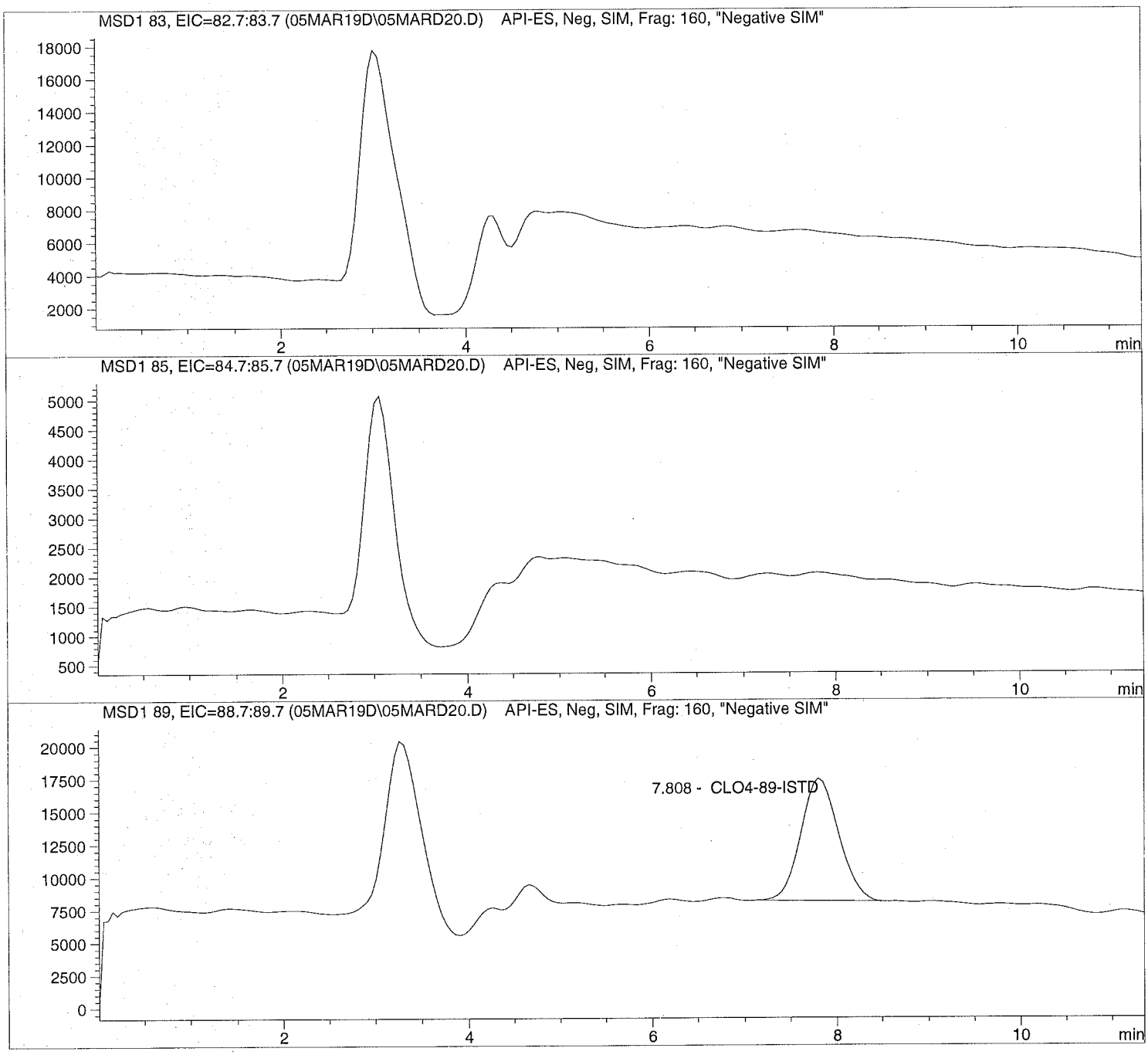
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.808	PBA	265662.0	5.0000	CLO4-89-ISTD

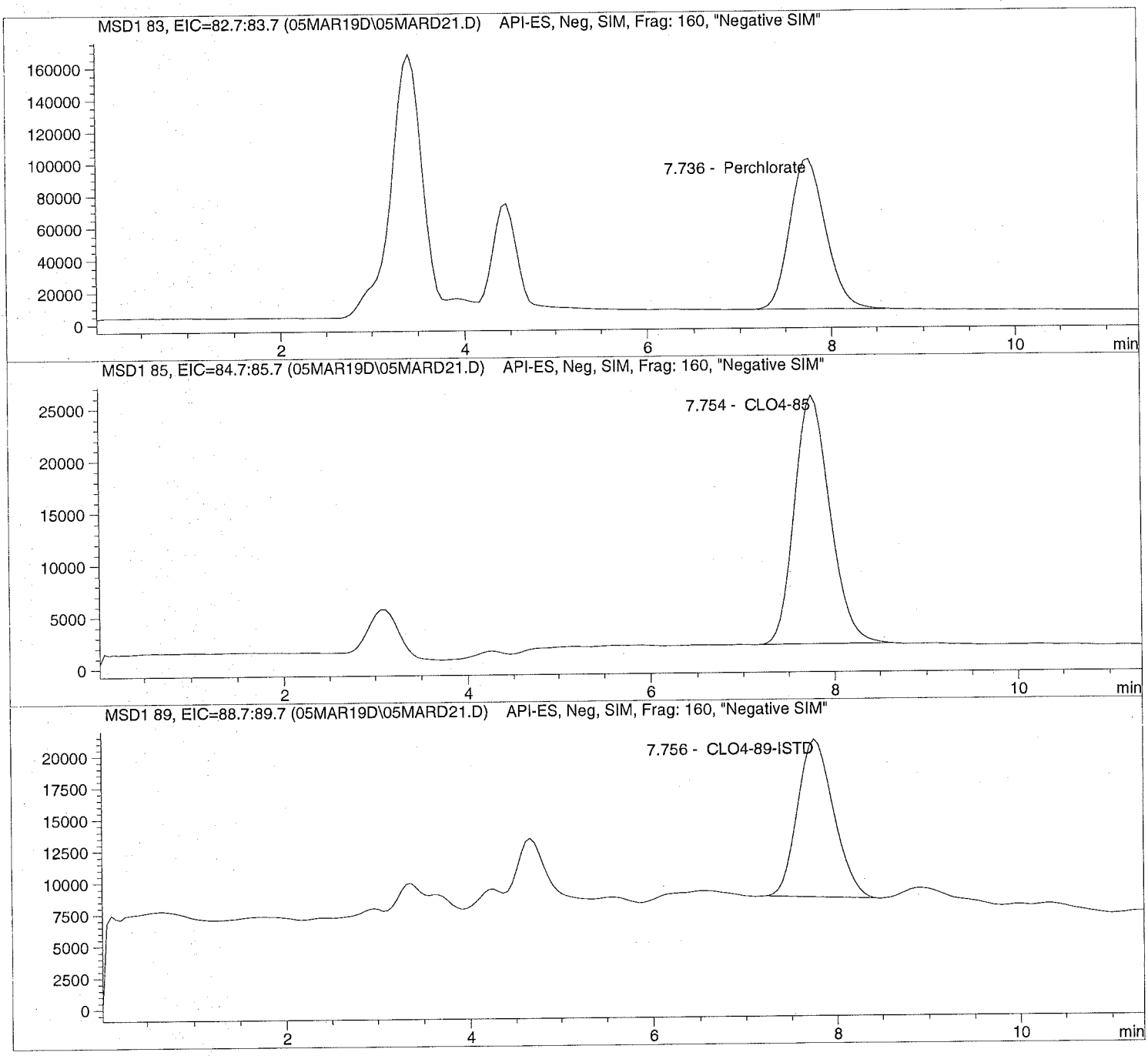
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.736	PBA	2531259.3	226.4815	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.754	PBA	646870.4	220.9191	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	PB	341607.9	50.0000	CLO4-89-ISTD

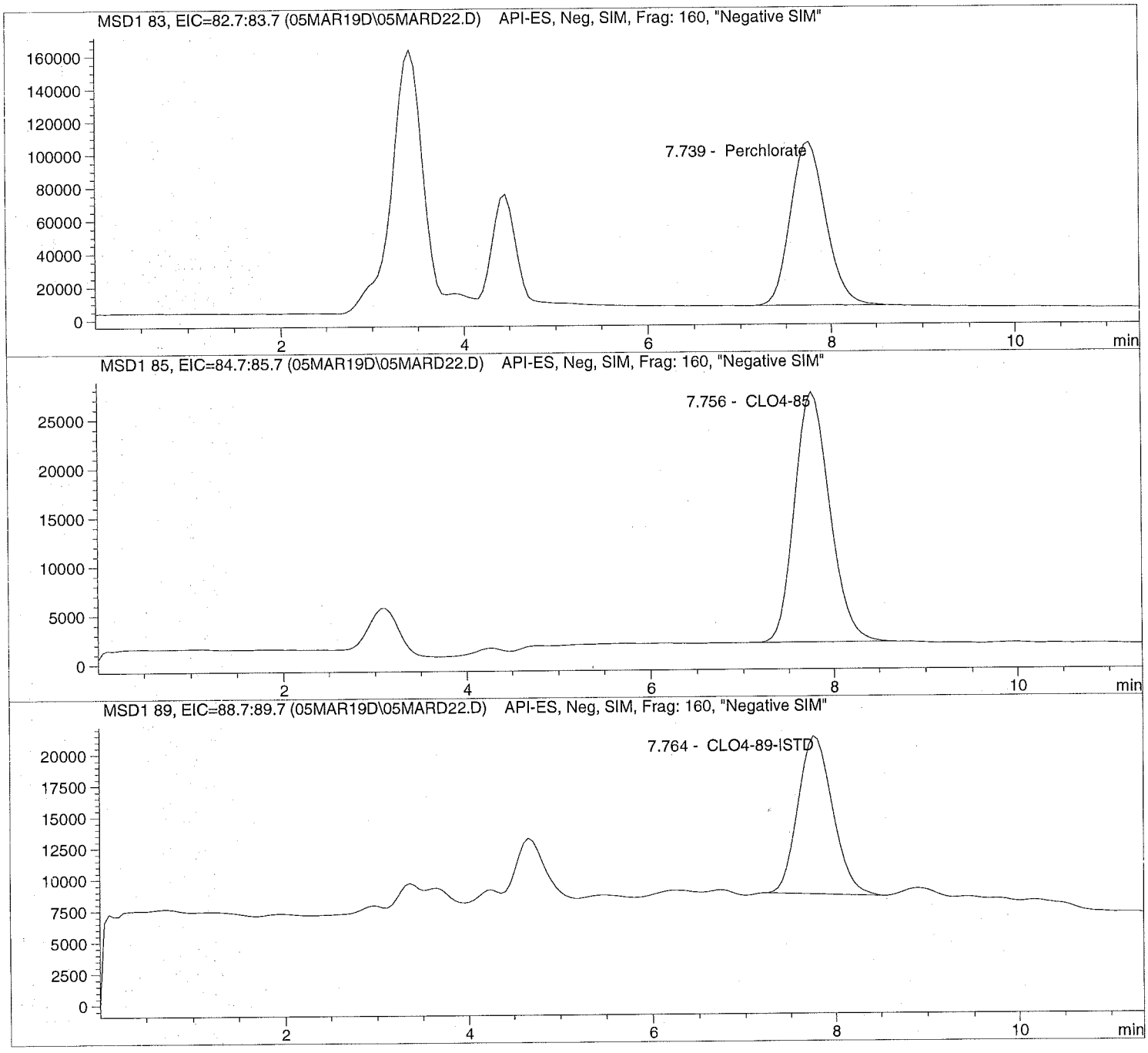
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X 00934455

Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X

Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.739	PBA	2682370.5	241.0371	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	BBA	695643.1	238.4467	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.764	PB	338724.1	50.0000	CLO4-89-ISTD

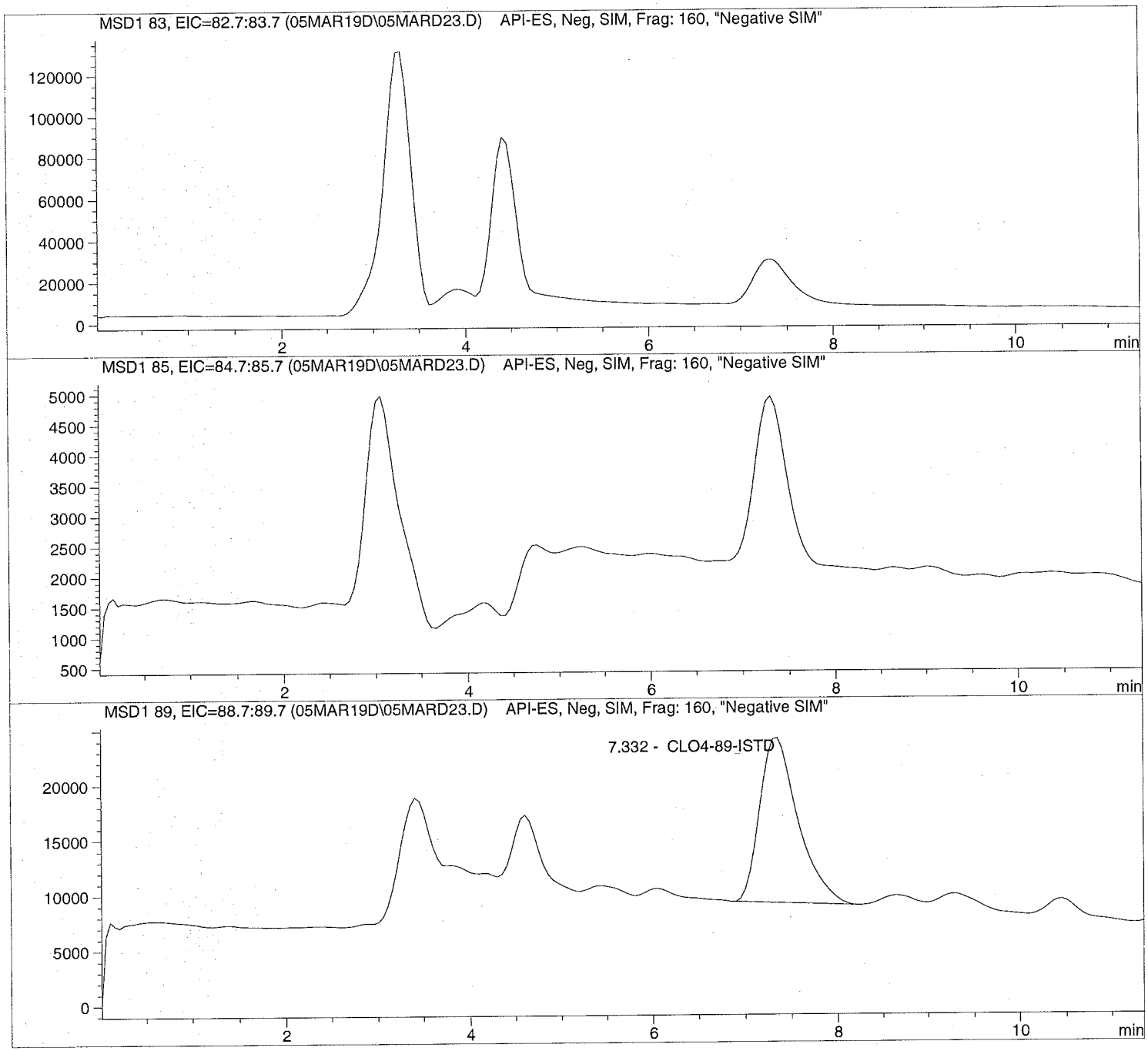
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.332	PB	431134.6	5.0000	CLO4-89-ISTD

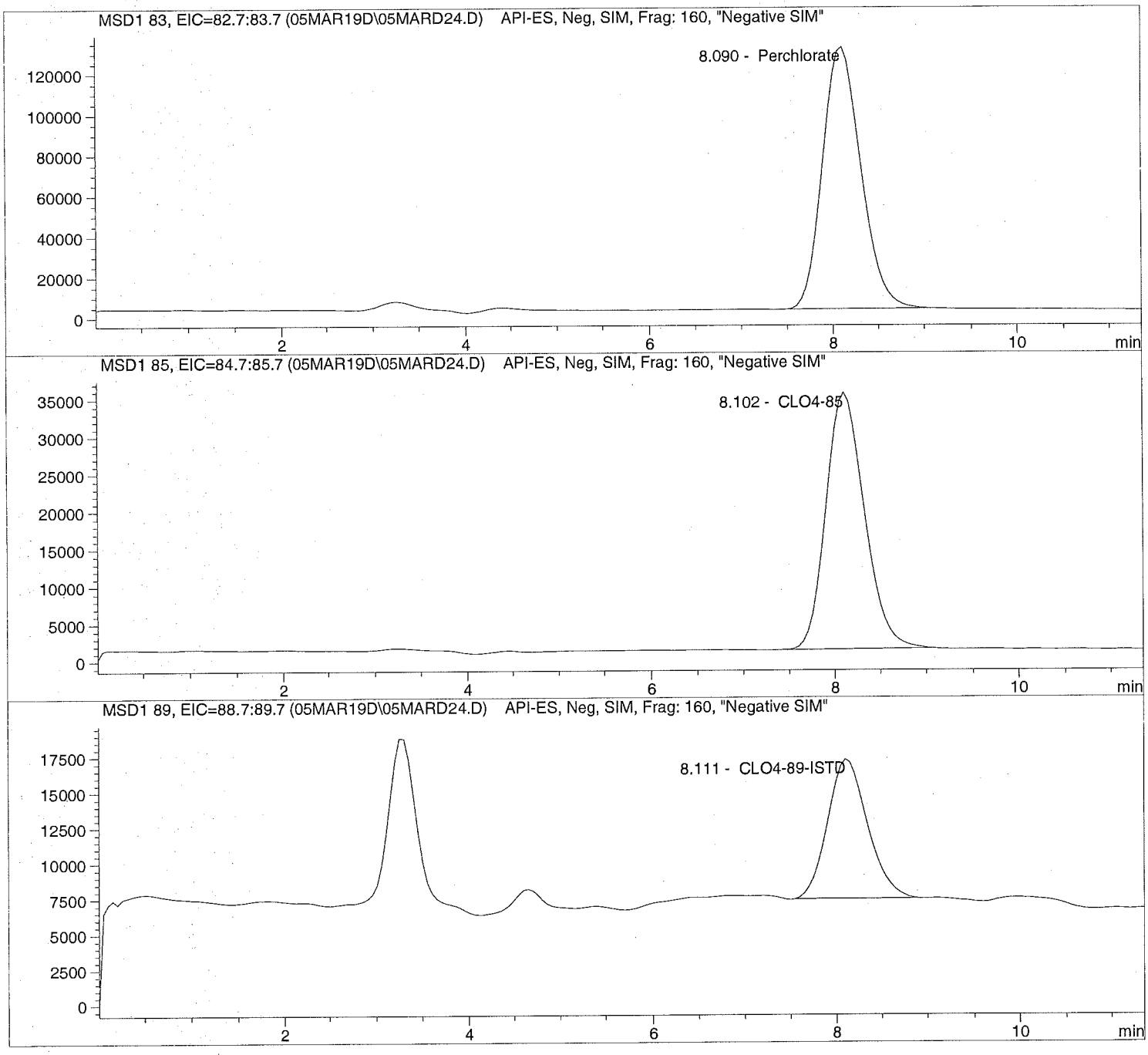
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	100.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.090	PBA	3773628.7	3708.6567	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.102	PBA	1010205.2	3771.6748	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.111	PBA	298984.6	500.0000	CLO4-89-ISTD

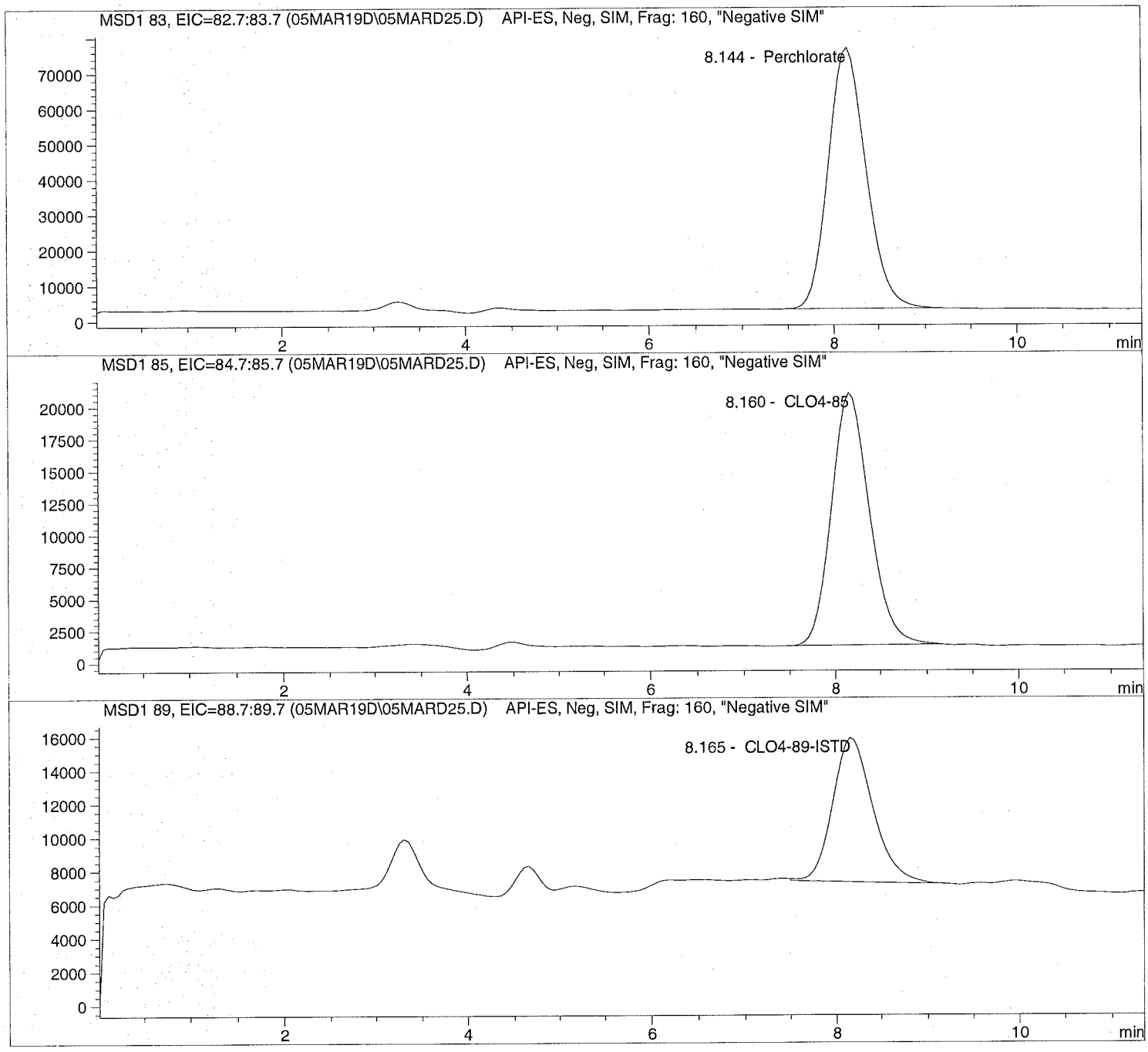
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.144	PBA	2157871.5	24.4553	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.160	PBA	583711.5	25.1665	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.165	BBA	268305.4	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Batch Report: C:\HPCHEM\1\DATA\15FEB19I\15FEB19D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	8.94006e4	7.889	9.89924e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	1.97443e5	8.114	2.26028
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	4.79370e5	7.828	4.65688
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	9.30136e5	7.904	9.14998
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	2.81067e6	7.793	25.52636
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	5.66830e6	7.976	51.07439
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	8.69624e6	7.886	74.30603
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	1.01141e6	7.988	9.46019

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.26121e4	7.914	9.98836e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	5.53134e4	8.127	2.11360
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	1.39247e5	7.842	4.91261
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	2.54396e5	7.923	9.39034
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	7.35969e5	7.811	25.48268
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	1.47152e6	7.993	50.35774
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	2.32809e6	7.900	74.72233
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	2.81230e5	8.007	9.87858

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.41443e5	7.900	5.00000
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	2.99651e5	8.132	5.00000
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	3.38646e5	7.853	5.00000
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	3.25154e5	7.925	5.00000
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	3.33799e5	7.819	5.00000
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	3.14712e5	7.999	5.00000
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	3.13909e5	7.908	5.00000
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	3.41503e5	8.005	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

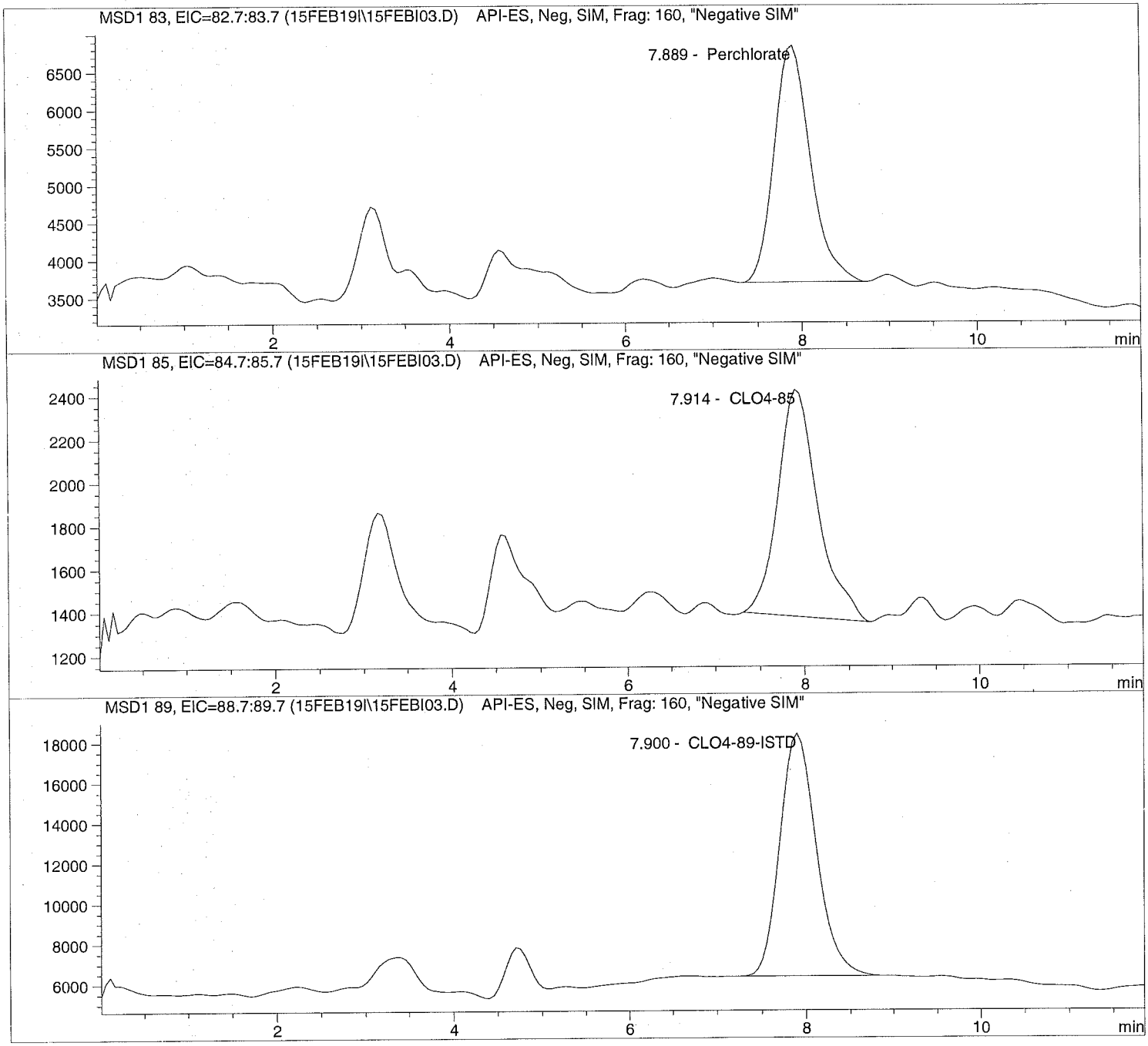
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	CLO4@ .20ug/L	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	CLO4@ 0.5ug/L	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	CLO4@ 1.0ug/L	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	CLO4@ 2.0ug/L	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	CLO4@ 5.0ug/L	CLO4-AQN	1	Ctrl Samp		
6	Vial 76	CLO4@ 10.ug/L	CLO4-AQN	1	Ctrl Samp		
7	Vial 77	CLO4@ 25.ug/L	CLO4-AQN	1	Ctrl Samp		
8	Vial 78	CLO4@ 50.ug/L	CLO4-AQN	1	Ctrl Samp		
9	Vial 79	CLO4@ 75.ug/L	CLO4-AQN	1	Ctrl Samp		
10	Vial 80	ICAL Verf@10ug/L	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.889	PBA	89400.6	0.9899	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.914	BBA	32612.1	0.9988	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	BBA	341443.2	5.0000	CLO4-89-ISTD

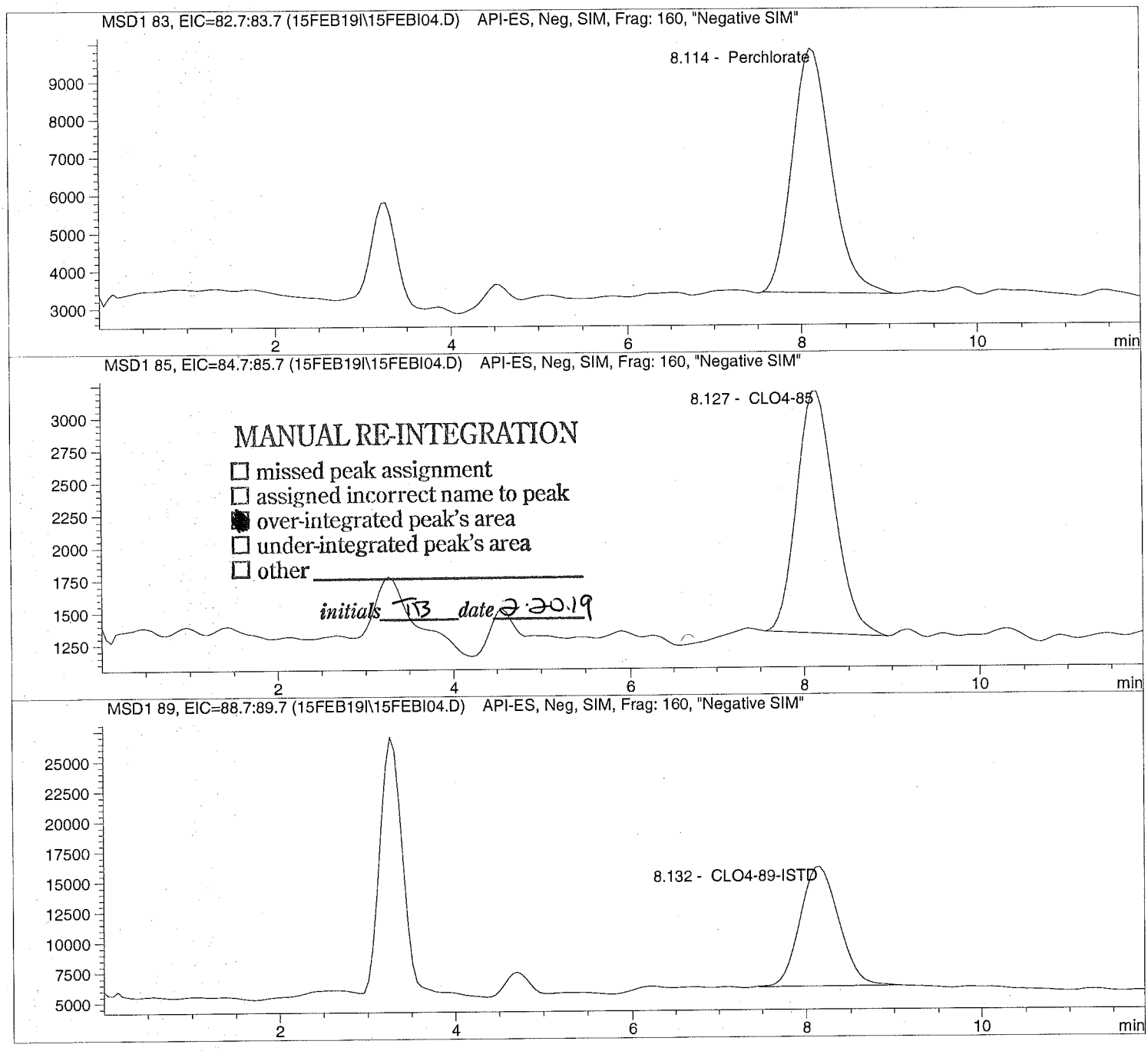
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	MM	55313.4	2.1136	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

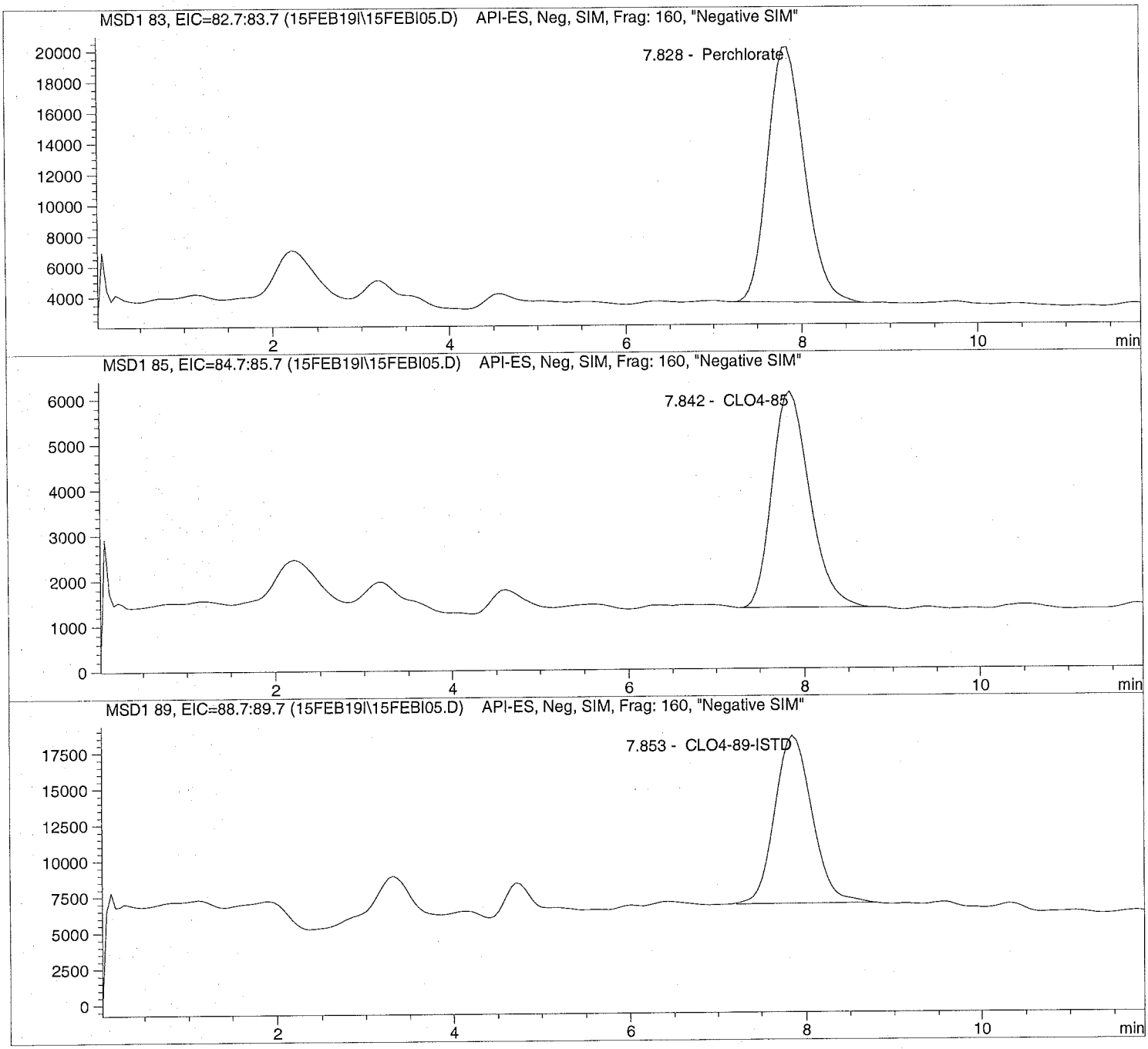
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.828	PBA	479370.4	4.6569	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.842	PBA	139246.9	4.9126	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.853	PBA	338646.3	5.0000	CLO4-89-ISTD

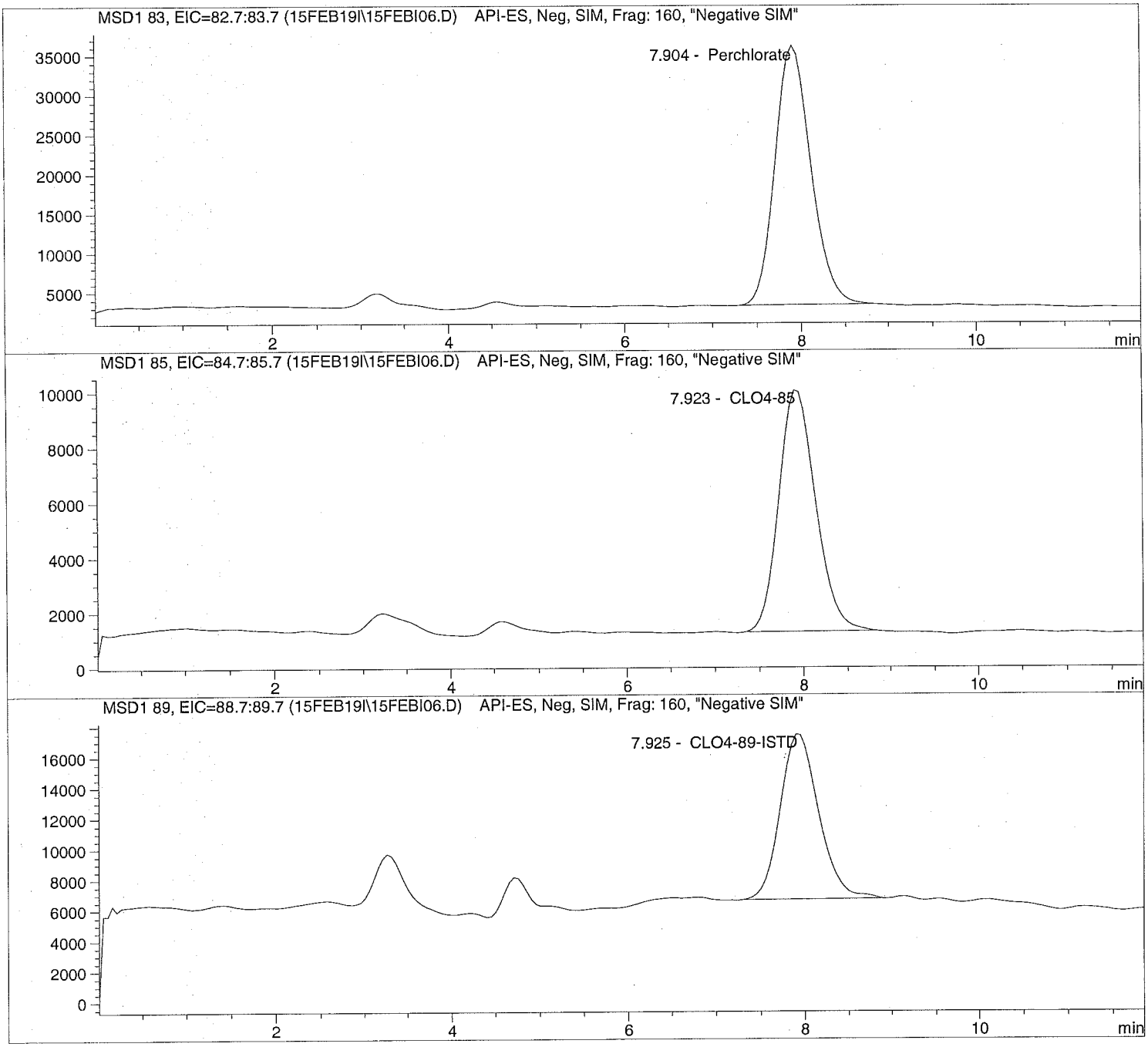
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.904	PBA	930135.8	9.1500	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.923	BBA	254395.6	9.3903	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.925	PBA	325154.4	5.0000	CLO4-89-ISTD

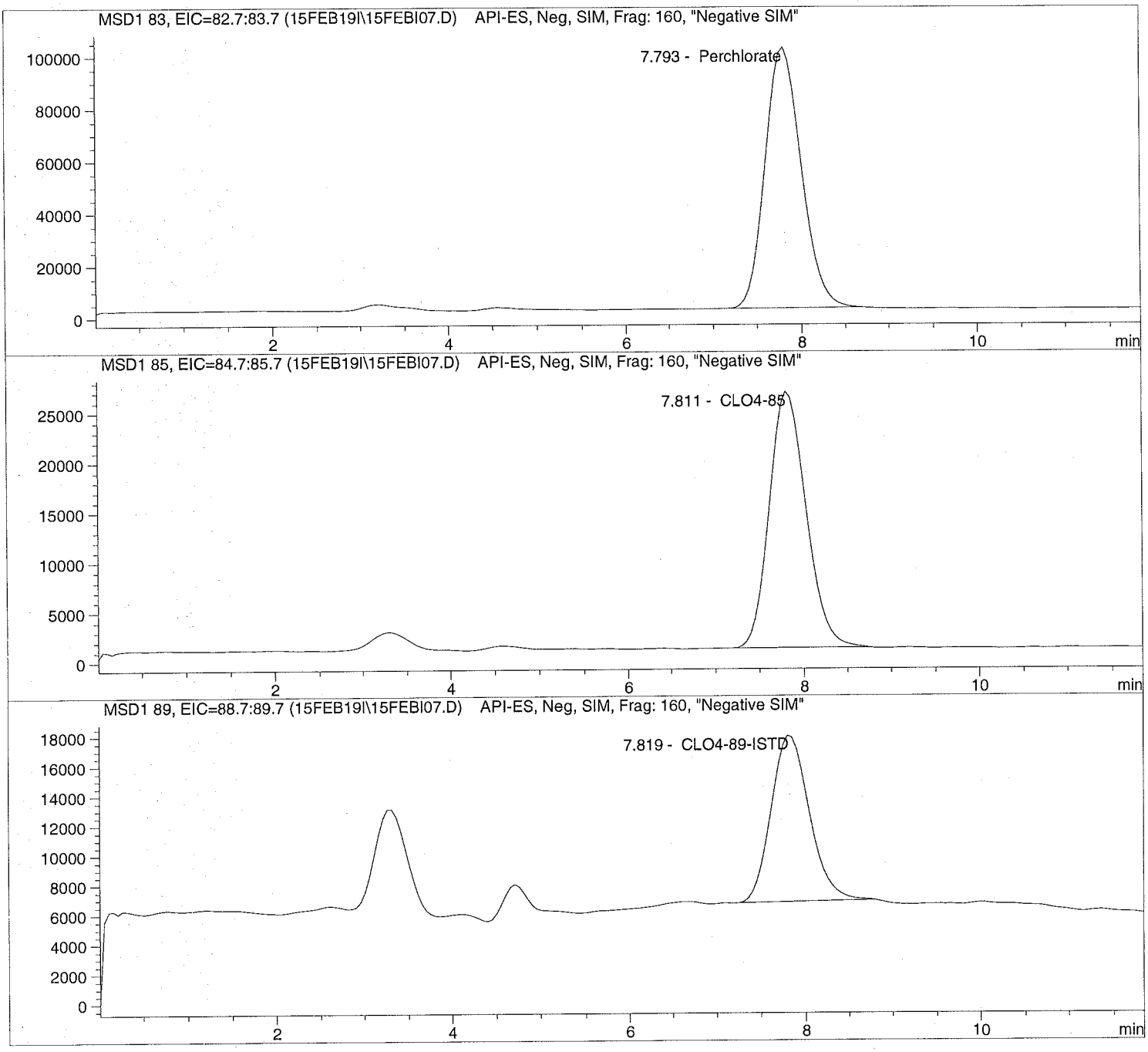
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.793	PBA	2810669.2	25.5264	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.811	BBA	735968.9	25.4827	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.819	PBA	333799.0	5.0000	CLO4-89-ISTD

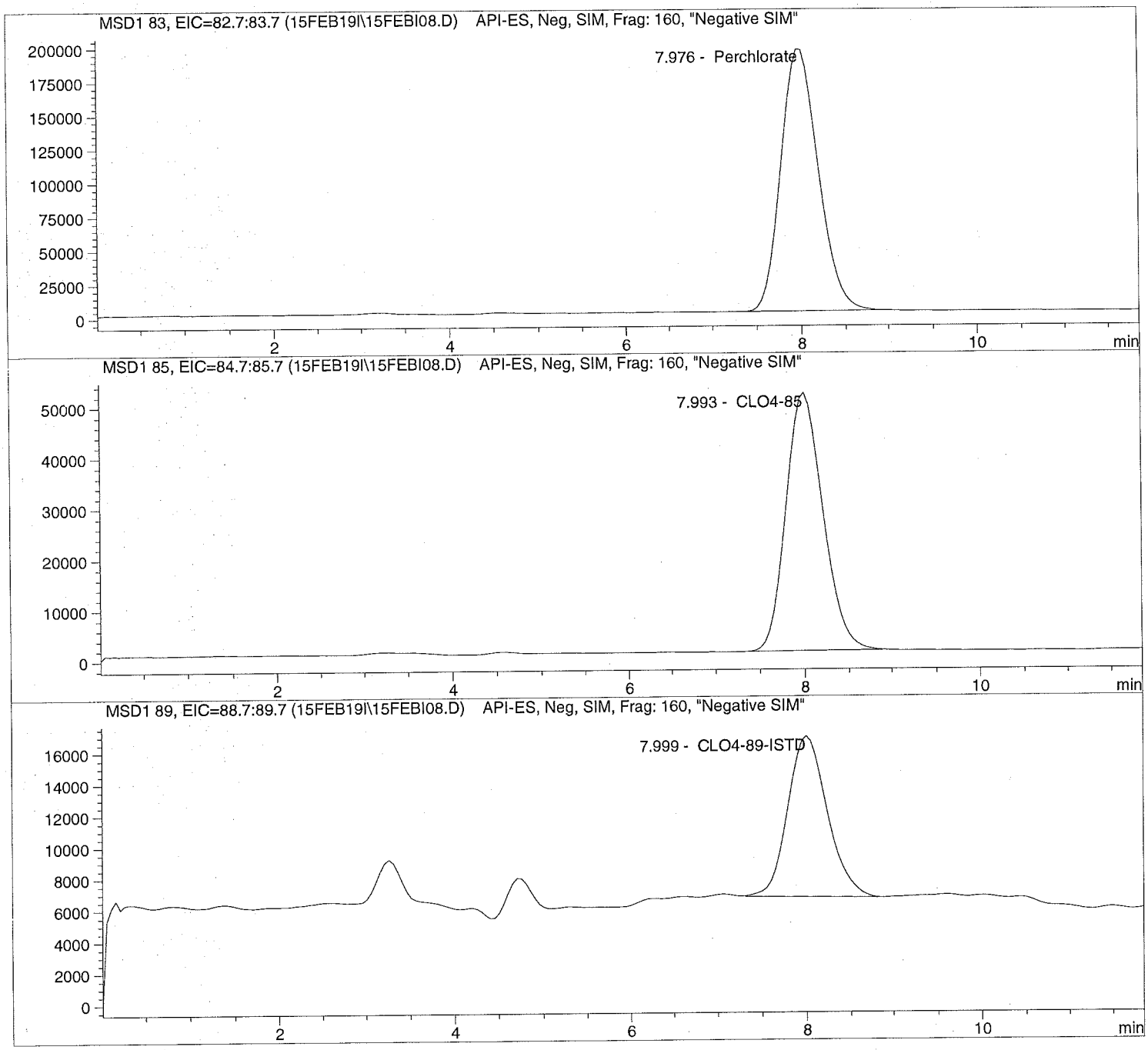
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.976	PBA	5668301.5	51.0744	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.993	PBA	1471522.9	50.3577	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.999	BBA	314711.8	5.0000	CLO4-89-ISTD

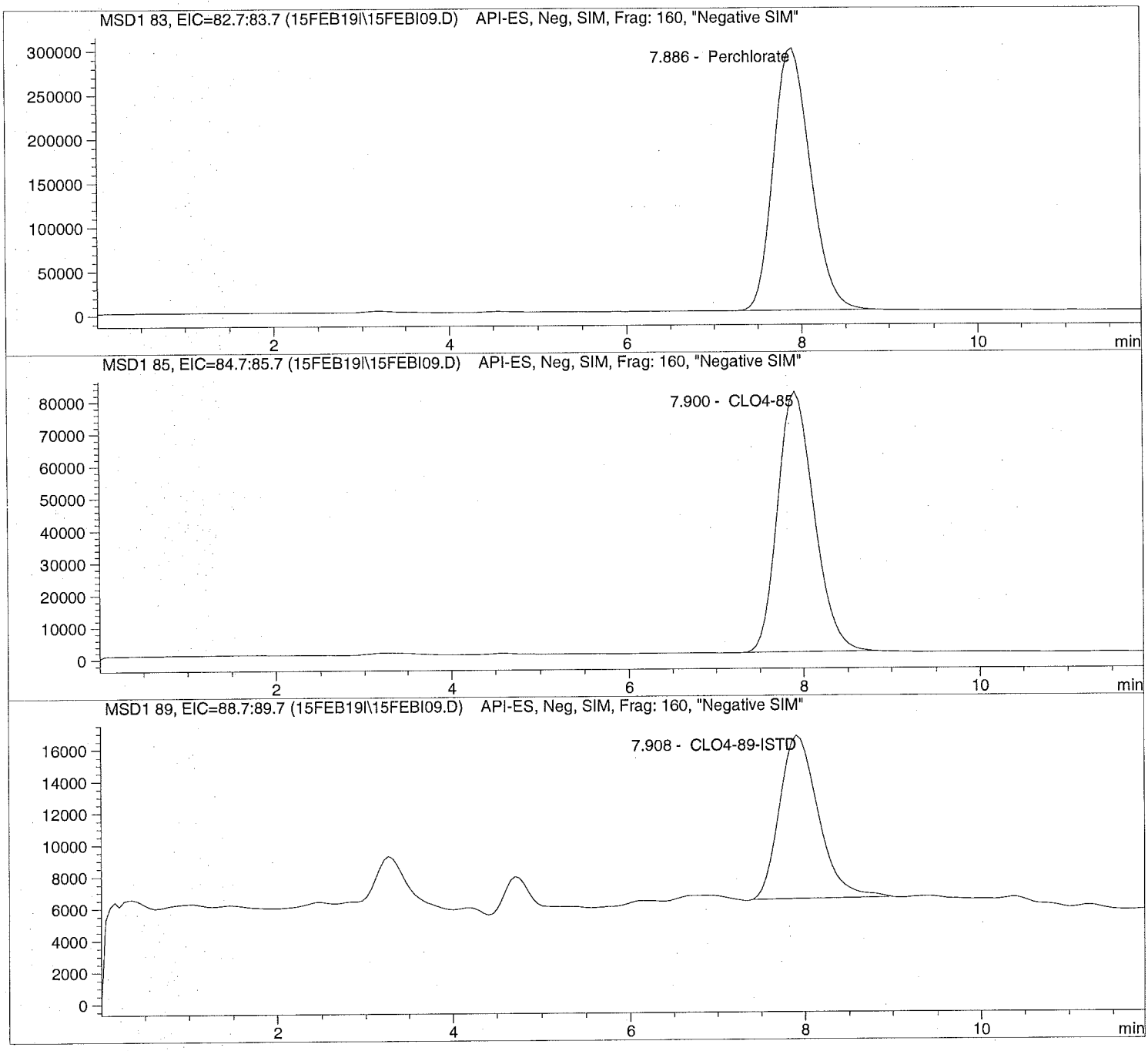
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.886	PBA	8696239.0	74.3060	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	PBA	2328089.5	74.7223	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.908	PBA	313908.9	5.0000	CLO4-89-ISTD

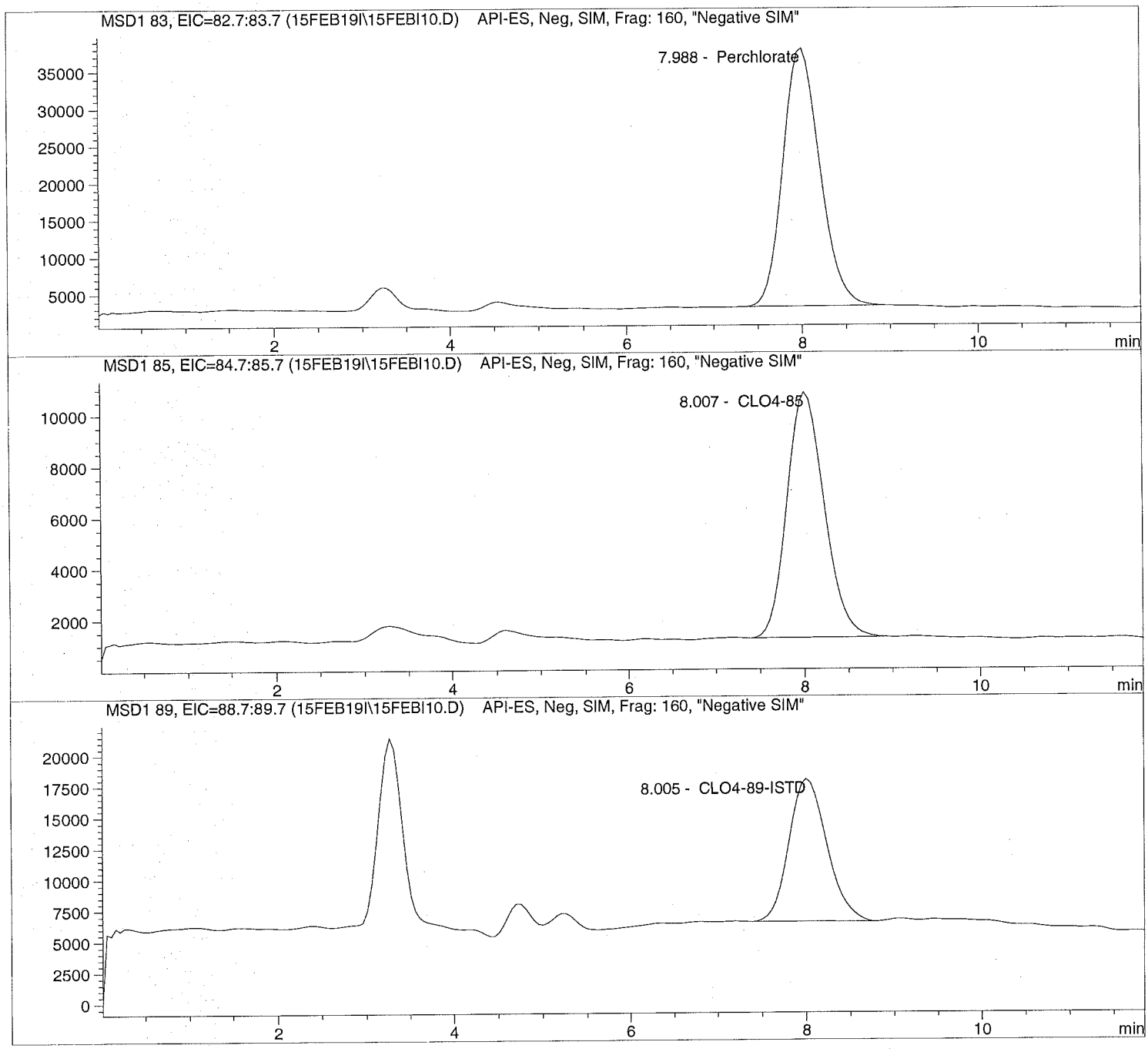
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.988	BBA	1011409.8	9.4602	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.007	BBA	281229.9	9.8786	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.005	BBA	341503.2	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

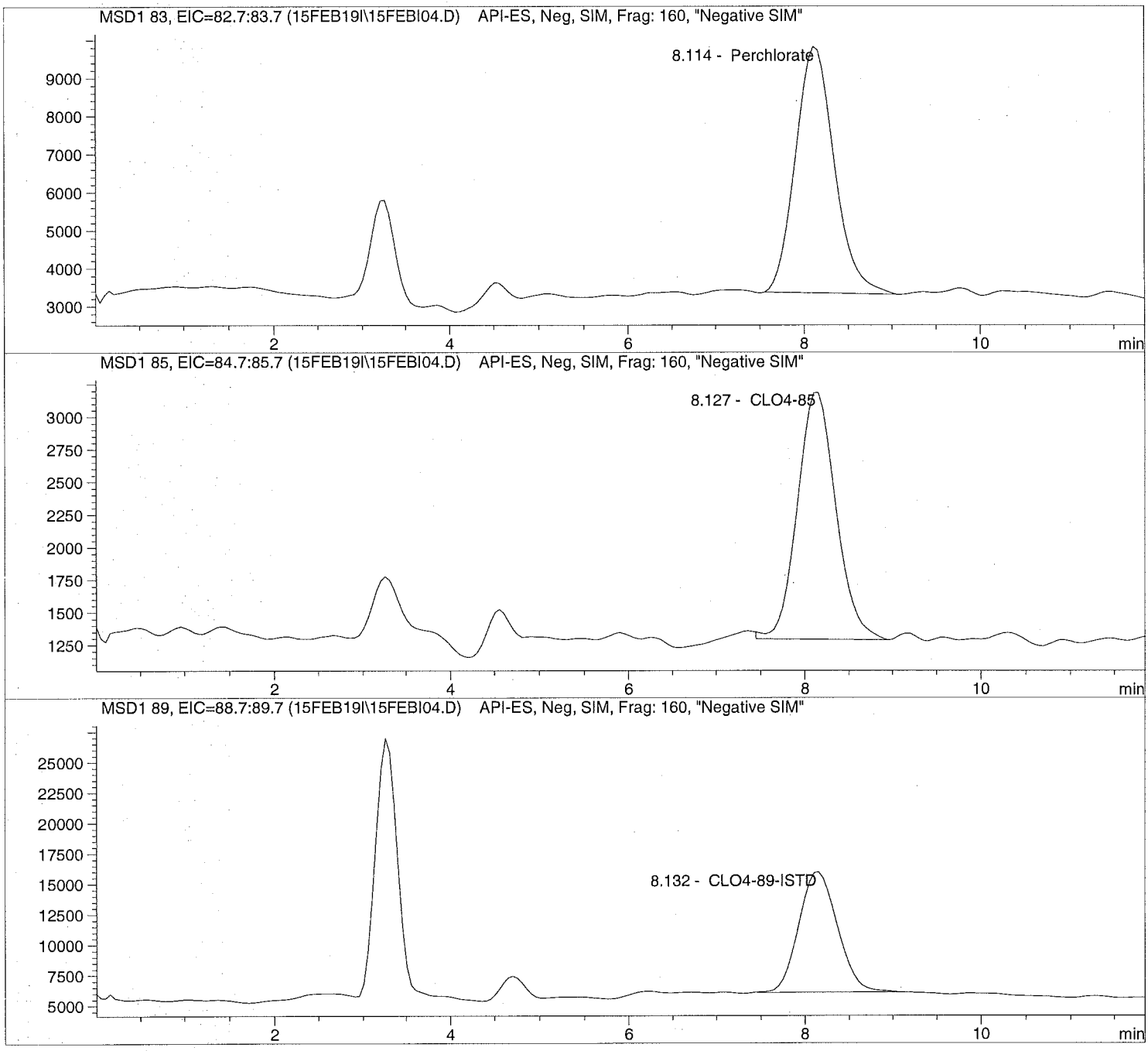
Unmodified

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	BBA	57206.1	2.1923	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

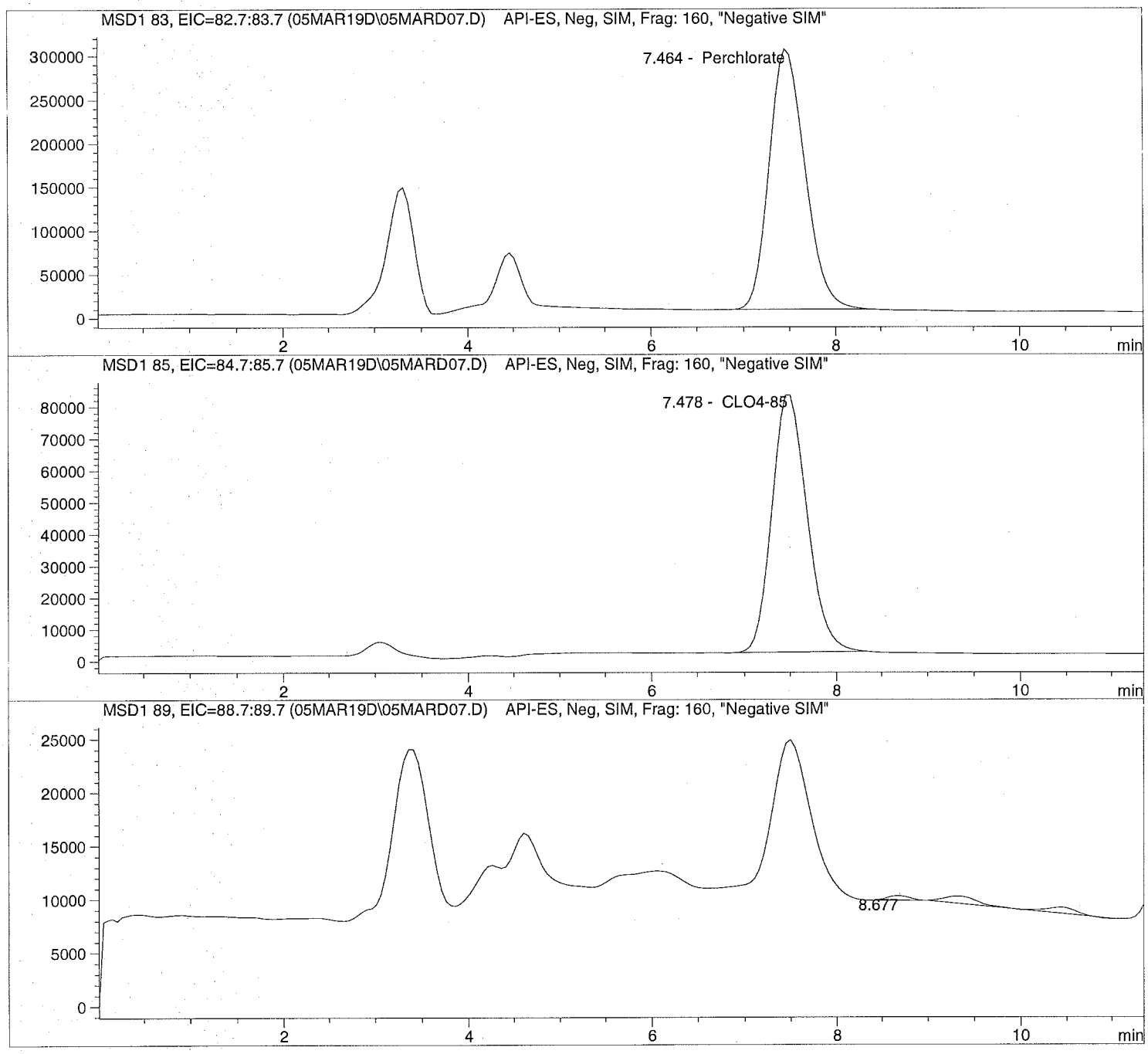
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	419.8794	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	402.6179	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

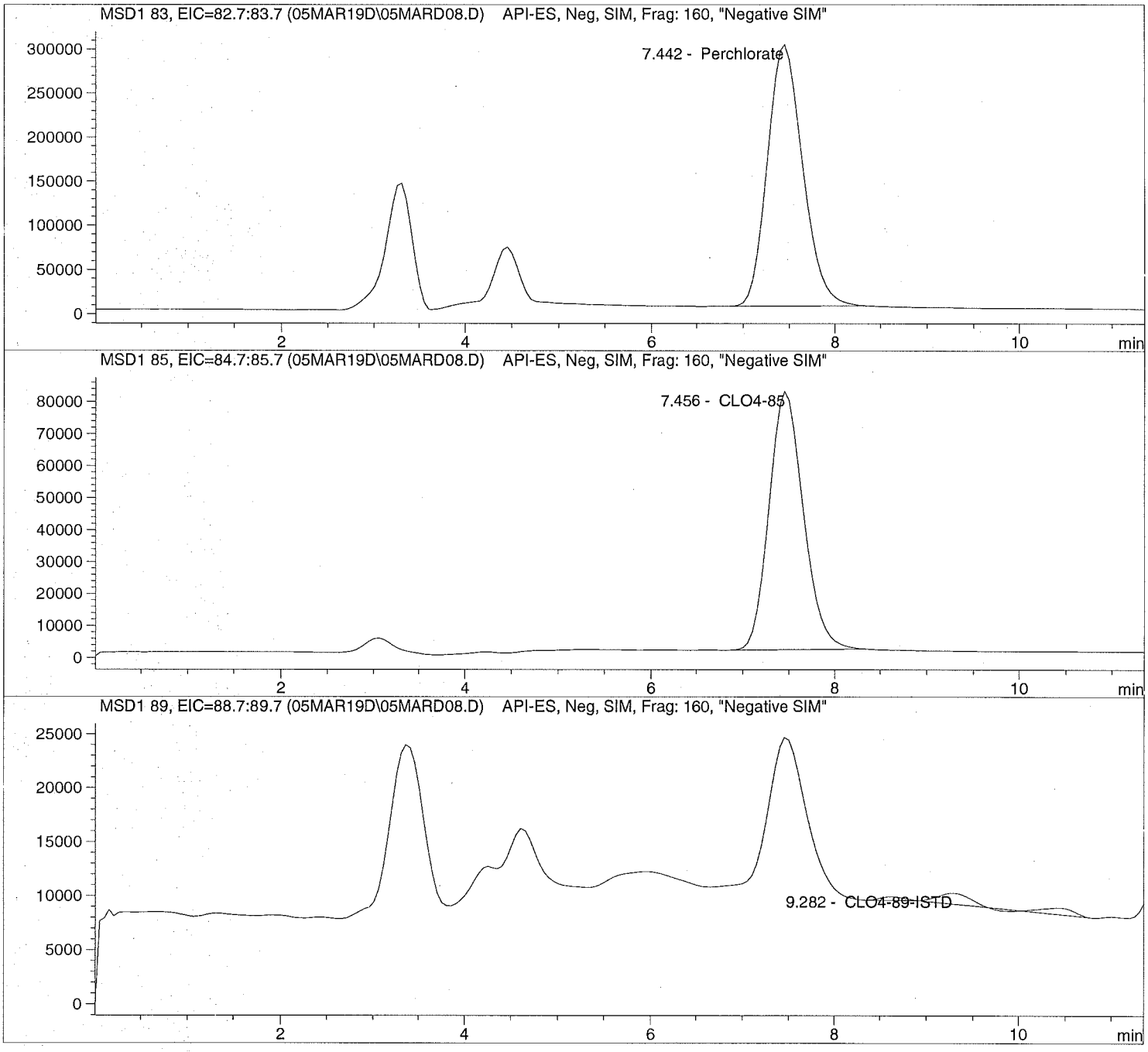
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.677	BB	7208.6	0.0000	
9.316	VBA	28561.1	5.0000	CLO4-89-ISTD

*** End of Report ***

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	359.0996	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	344.2233	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.621	VB	5769.9	0.0000	
9.282	VBA	35831.6	5.0000	CLO4-89-ISTD

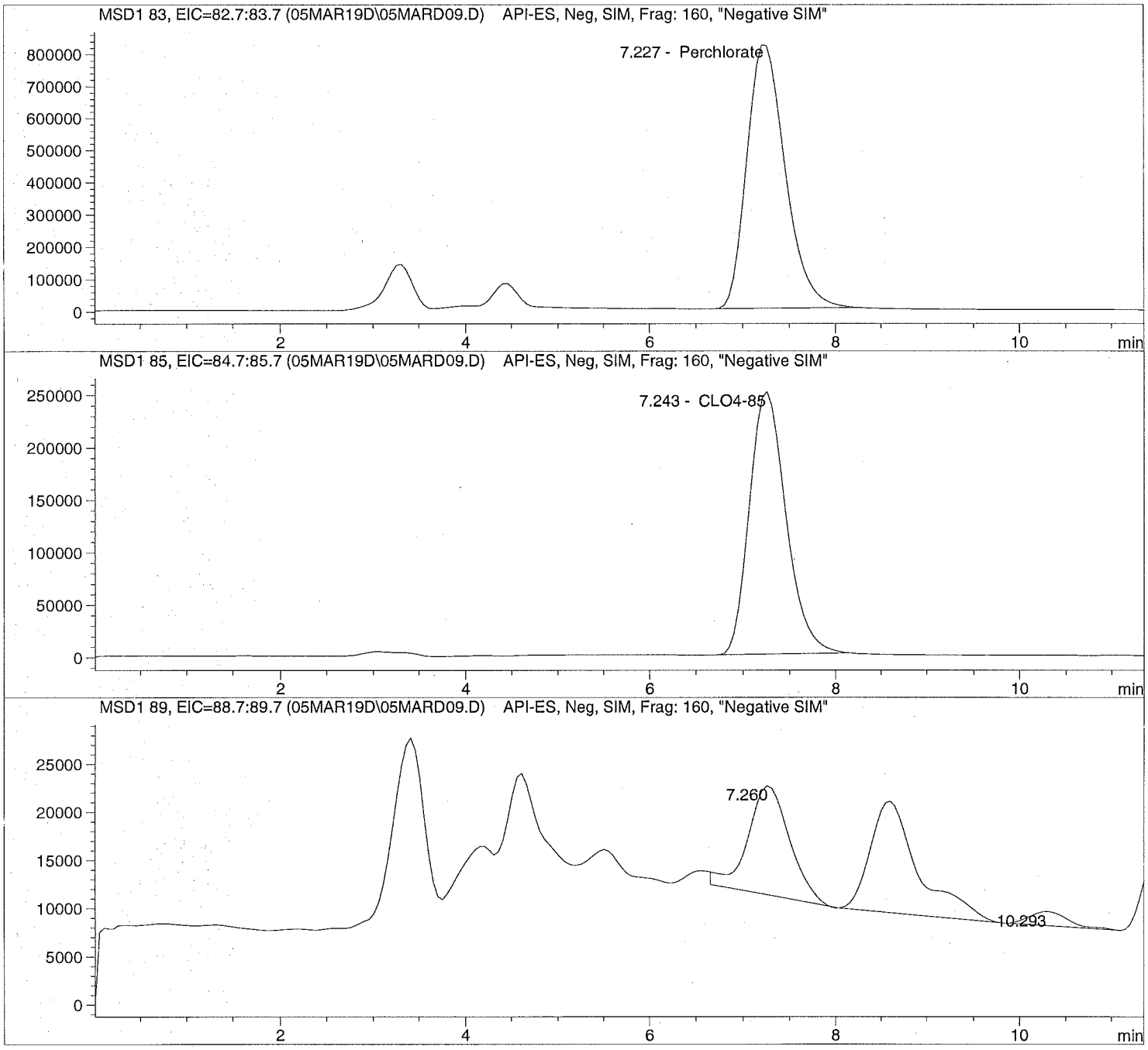
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	131.1742	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	138.8050	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.260	BB	352149.7	0.0000	
8.589	VBA	421141.9	5.0000	CLO4-89-ISTD
10.293	BBA	41603.7	0.0000	

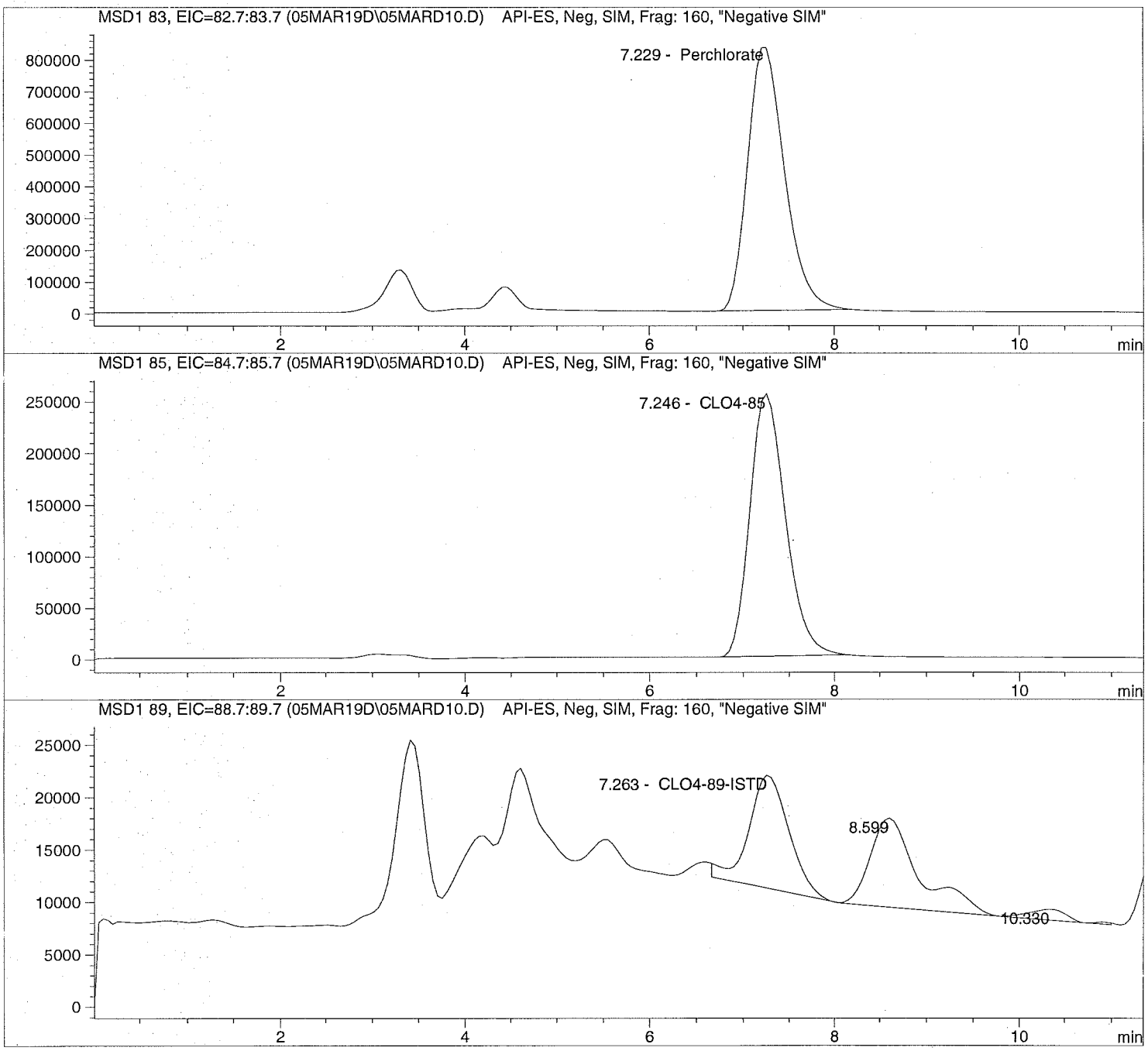
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	159.0418	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	168.6882	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	BB	325841.0	5.0000	CLO4-89-ISTD
8.599	VB	308921.9	0.0000	
10.330	VBA	30210.3	0.0000	

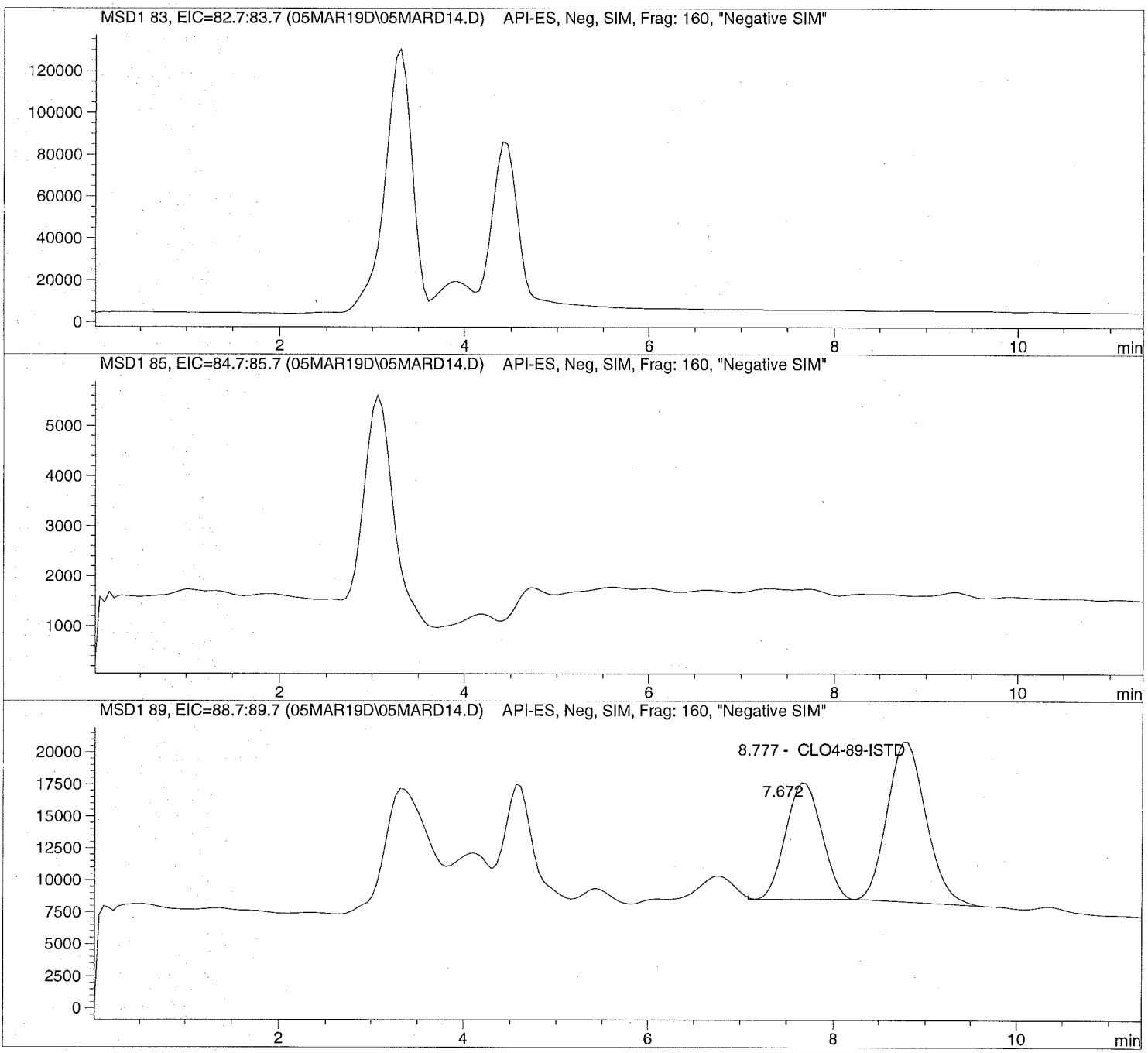
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	0.0000	
8.777	VBA	362717.3	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 08, 2019

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

Work Order: **HS19021165**

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

Dear Marcia,

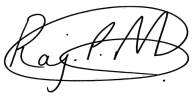
ALS Environmental received 2 sample(s) on Feb 22, 2019 for the analysis presented in the following report.

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 Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS19021165

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19021165-01	LH18/24-SP650_022119	Water		21-Feb-2019 14:00	22-Feb-2019 09:06	☐
HS19021165-02	Trip Blank ALS011119-60	Water		21-Feb-2019 14:00	22-Feb-2019 09:06	☐

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS19021165

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R334099

Sample ID: HS19021185-01MS

- MS and MSD were performed on an unrelated sample

WetChemistry by Method SW9056

Batch ID: R334211

Sample ID: HS19030163-01MSD

- MSD is for an unrelated sample (Chloride,Sulfate)

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_022119
Collection Date: 21-Feb-2019 14:00

ANALYTICAL REPORT
WorkOrder:HS19021165
Lab ID:HS19021165-01
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	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	05-Mar-2019 22:54
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	05-Mar-2019 22:54
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	05-Mar-2019 22:54
Acetone	2.0	U	0.40	2.0	2.0	UG/L	1	05-Mar-2019 22:54
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	05-Mar-2019 22:54
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54

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

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_022119
Collection Date: 21-Feb-2019 14:00

ANALYTICAL REPORT
WorkOrder:HS19021165
Lab ID:HS19021165-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: PC
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
cis-1,2-Dichloroethene	**2.0**		**0.20**	**0.50**	**1.0**	**UG/L**	1	05-Mar-2019 22:54
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	05-Mar-2019 22:54
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	05-Mar-2019 22:54
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	05-Mar-2019 22:54
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:54
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Trichloroethene	**0.70**	J	**0.20**	**0.50**	**1.0**	**UG/L**	1	05-Mar-2019 22:54
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:54
Surr: 1,2-Dichloroethane-d4	*82.0*			**0**	*81-118*	*%REC*	*1*	*05-Mar-2019 22:54*
Surr: 4-Bromofluorobenzene	*104*			**0**	*85-114*	*%REC*	*1*	*05-Mar-2019 22:54*
Surr: Dibromofluoromethane	*84.8*			**0**	*80-119*	*%REC*	*1*	*05-Mar-2019 22:54*
Surr: Toluene-d8	*101*			**0**	*89-112*	*%REC*	*1*	*05-Mar-2019 22:54*
ANIONS BY SW9056A		**Method:SW9056**						Analyst: KMU
Chloride	**320**		**2.00**	**5.00**	**5.00**	**mg/L**	10	05-Mar-2019 22:00
Sulfate	**29.8**		**2.00**	**5.00**	**5.00**	**mg/L**	10	05-Mar-2019 22:00

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

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank ALS011119-60
Collection Date: 21-Feb-2019 14:00

ANALYTICAL REPORT
WorkOrder:HS19021165
Lab ID:HS19021165-02
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	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	05-Mar-2019 22:06
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	05-Mar-2019 22:06
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	05-Mar-2019 22:06
Acetone	2.0	U	0.40	2.0	2.0	UG/L	1	05-Mar-2019 22:06
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	05-Mar-2019 22:06
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06

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

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank ALS011119-60
Collection Date: 21-Feb-2019 14:00

ANALYTICAL REPORT
WorkOrder:HS19021165
Lab ID:HS19021165-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	05-Mar-2019 22:06
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	05-Mar-2019 22:06
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	05-Mar-2019 22:06
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	05-Mar-2019 22:06
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Trichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	05-Mar-2019 22:06
Surr: 1,2-Dichloroethane-d4	*83.7*			**0**	*81-118*	*%REC*	*1*	*05-Mar-2019 22:06*
Surr: 4-Bromofluorobenzene	*97.1*			**0**	*85-114*	*%REC*	*1*	*05-Mar-2019 22:06*
Surr: Dibromofluoromethane	*84.9*			**0**	*80-119*	*%REC*	*1*	*05-Mar-2019 22:06*
Surr: Toluene-d8	*109*			**0**	*89-112*	*%REC*	*1*	*05-Mar-2019 22:06*

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

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R334099	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS19021165-01	LH18/24-SP650_022119	21 Feb 2019 14:00			05 Mar 2019 22:54	1
HS19021165-02	Trip Blank ALS011119-60	21 Feb 2019 14:00			05 Mar 2019 22:06	1
Batch ID R334211	**Test Name :** ANIONS BY SW9056A			**Matrix:** Water		
HS19021165-01	LH18/24-SP650_022119	21 Feb 2019 14:00			05 Mar 2019 22:00	10

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-190305** Units: **UG/L** Analysis Date: **05-Mar-2019 19:18**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977030** 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	2.0	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

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-190305** Units: **UG/L** Analysis Date: **05-Mar-2019 19:18**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977030** 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	1.0	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	0.50	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	*40.72*	*1.0*	*50*	*0*	*81.4*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.56*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*42.1*	*1.0*	*50*	*0*	*84.2*	*80 - 119*				
Surr: Toluene-d8	*53.5*	*1.0*	*50*	*0*	*107*	*89 - 112*				

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-190305** Units: **UG/L** Analysis Date: **05-Mar-2019 18:05**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977029** 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	19.19	1.0	20	0	96.0	78 - 124				
1,1,1-Trichloroethane	18.34	1.0	20	0	91.7	74 - 131				
1,1,2,2-Tetrachloroethane	19.89	1.0	20	0	99.4	71 - 121				
1,1,2-Trichloroethane	19.74	1.0	20	0	98.7	80 - 119				
1,1-Dichloroethane	18.86	1.0	20	0	94.3	77 - 125				
1,1-Dichloroethene	17.9	1.0	20	0	89.5	71 - 131				
1,1-Dichloropropene	18.25	1.0	20	0	91.3	78 - 125				
1,2,3-Trichlorobenzene	22.1	1.0	20	0	111	69 - 129				
1,2,3-Trichloropropane	19.69	1.0	20	0	98.4	73 - 122				
1,2,4-Trichlorobenzene	20.94	1.0	20	0	105	69 - 130				
1,2,4-Trimethylbenzene	18.53	1.0	20	0	92.7	76 - 124				
1,2-Dibromo-3-chloropropane	21.06	1.0	20	0	105	62 - 128				
1,2-Dibromoethane	20.36	1.0	20	0	102	77 - 121				
1,2-Dichlorobenzene	18.97	1.0	20	0	94.8	80 - 119				
1,2-Dichloroethane	19.73	1.0	20	0	98.7	73 - 128				
1,2-Dichloropropane	19.35	1.0	20	0	96.7	78 - 122				
1,3,5-Trimethylbenzene	18.35	1.0	20	0	91.8	75 - 124				
1,3-Dichlorobenzene	18.87	1.0	20	0	94.3	80 - 119				
1,3-Dichloropropane	19.67	1.0	20	0	98.4	80 - 119				
1,4-Dichlorobenzene	18.61	1.0	20	0	93.0	79 - 118				
2,2-Dichloropropane	18.33	1.0	20	0	91.6	60 - 139				
2-Butanone	43.52	2.0	40	0	109	56 - 143				
2-Chlorotoluene	18.21	1.0	20	0	91.1	79 - 122				
2-Hexanone	40.29	2.0	40	0	101	57 - 139				
4-Chlorotoluene	18.65	1.0	20	0	93.3	78 - 122				
4-Isopropyltoluene	17.75	1.0	20	0	88.7	77 - 127				
4-Methyl-2-pentanone	40.53	2.0	40	0	101	67 - 130				
Acetone	42.24	2.0	40	0	106	39 - 160				
Benzene	18.9	1.0	20	0	94.5	79 - 120				
Bromobenzene	19.12	1.0	20	0	95.6	80 - 120				
Bromochloromethane	19.26	1.0	20	0	96.3	78 - 123				
Bromodichloromethane	19.32	1.0	20	0	96.6	79 - 125				
Bromoform	20.19	1.0	20	0	101	66 - 130				
Bromomethane	23.44	1.0	20	0	117	53 - 141				

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-190305** Units: **UG/L** Analysis Date: **05-Mar-2019 18:05**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977029** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	36.19	2.0	40	0	90.5	64 - 133				
Carbon tetrachloride	18.61	1.0	20	0	93.0	72 - 136				
Chlorobenzene	19.07	1.0	20	0	95.4	82 - 118				
Chloroethane	18.68	1.0	20	0	93.4	60 - 138				
Chloroform	19.06	1.0	20	0	95.3	79 - 124				
Chloromethane	18.78	1.0	20	0	93.9	50 - 139				
cis-1,2-Dichloroethene	18.62	1.0	20	0	93.1	78 - 123				
cis-1,3-Dichloropropene	19.79	1.0	20	0	99.0	75 - 124				
Dibromochloromethane	20.2	1.0	20	0	101	74 - 126				
Dibromomethane	19.92	1.0	20	0	99.6	79 - 123				
Dichlorodifluoromethane	17.63	1.0	20	0	88.2	32 - 152				
Ethylbenzene	18.79	1.0	20	0	93.9	79 - 121				
Hexachlorobutadiene	19.81	1.0	20	0	99.1	66 - 134				
Isopropylbenzene	18.42	1.0	20	0	92.1	72 - 131				
m,p-Xylene	36.96	2.0	40	0	92.4	80 - 121				
Methylene chloride	19.77	2.0	20	0	98.9	74 - 124				
Naphthalene	20.69	1.0	20	0	103	61 - 128				
n-Butylbenzene	17.4	1.0	20	0	87.0	75 - 128				
n-Propylbenzene	17.93	1.0	20	0	89.7	76 - 126				
o-Xylene	19.4	1.0	20	0	97.0	78 - 122				
sec-Butylbenzene	17.21	1.0	20	0	86.1	77 - 126				
Styrene	19.77	1.0	20	0	98.8	78 - 123				
tert-Butylbenzene	17.51	1.0	20	0	87.5	78 - 124				
Tetrachloroethene	18.09	1.0	20	0	90.4	74 - 129				
Toluene	19.07	1.0	20	0	95.3	80 - 121				
trans-1,2-Dichloroethene	19.09	1.0	20	0	95.4	75 - 124				
trans-1,3-Dichloropropene	19.92	1.0	20	0	99.6	73 - 127				
Trichloroethene	19.04	1.0	20	0	95.2	79 - 123				
Trichlorofluoromethane	17.17	1.0	20	0	85.8	65 - 141				
Vinyl chloride	17.04	1.0	20	0	85.2	58 - 137				
Surr: 1,2-Dichloroethane-d4	*52.42*	*1.0*	*50*	*0*	*105*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*52.66*	*1.0*	*50*	*0*	*105*	*85 - 114*				
Surr: Dibromofluoromethane	*51.95*	*1.0*	*50*	*0*	*104*	*80 - 119*				
Surr: Toluene-d8	*49.26*	*1.0*	*50*	*0*	*98.5*	*89 - 112*				

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS19021185-01MS** Units: **UG/L** Analysis Date: **06-Mar-2019 00:06**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977037** 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	17.93	1.0	20	0	89.7	78 - 124				
1,1,1-Trichloroethane	16.57	1.0	20	0	82.9	74 - 131				
1,1,2,2-Tetrachloroethane	19.71	1.0	20	0	98.5	71 - 121				
1,1,2-Trichloroethane	18.65	1.0	20	0	93.2	80 - 119				
1,1-Dichloroethane	15.53	1.0	20	0	77.7	77 - 125				
1,1-Dichloroethene	17.08	1.0	20	0	85.4	71 - 131				
1,1-Dichloropropene	18.65	1.0	20	0	93.3	78 - 125				
1,2,3-Trichlorobenzene	21.52	1.0	20	0	108	69 - 129				
1,2,3-Trichloropropane	19.51	1.0	20	0	97.6	73 - 122				
1,2,4-Trichlorobenzene	21.02	1.0	20	0	105	69 - 130				
1,2,4-Trimethylbenzene	18.65	1.0	20	0	93.3	76 - 124				
1,2-Dibromo-3-chloropropane	21.04	1.0	20	0	105	62 - 128				
1,2-Dibromoethane	18.83	1.0	20	0	94.2	77 - 121				
1,2-Dichlorobenzene	18.46	1.0	20	0	92.3	80 - 119				
1,2-Dichloroethane	16.99	1.0	20	0	85.0	73 - 128				
1,2-Dichloropropane	17.07	1.0	20	0	85.4	78 - 122				
1,3,5-Trimethylbenzene	19.18	1.0	20	0	95.9	75 - 124				
1,3-Dichlorobenzene	18.39	1.0	20	0	91.9	80 - 119				
1,3-Dichloropropane	18.51	1.0	20	0	92.5	80 - 119				
1,4-Dichlorobenzene	18.05	1.0	20	0	90.3	79 - 118				
2,2-Dichloropropane	14.97	1.0	20	0	74.9	60 - 139				
2-Butanone	36.36	2.0	40	0	90.9	56 - 143				
2-Chlorotoluene	18.19	1.0	20	0	91.0	79 - 122				
2-Hexanone	41.7	2.0	40	0	104	57 - 139				
4-Chlorotoluene	18.42	1.0	20	0	92.1	78 - 122				
4-Isopropyltoluene	19.79	1.0	20	0	98.9	77 - 127				
4-Methyl-2-pentanone	40.54	2.0	40	0	101	67 - 130				
Acetone	35.14	2.0	40	0	87.8	39 - 160				
Benzene	17.3	1.0	20	0	86.5	79 - 120				
Bromobenzene	18.25	1.0	20	0	91.3	80 - 120				
Bromochloromethane	14.52	1.0	20	0	72.6	78 - 123				S
Bromodichloromethane	16.54	1.0	20	0	82.7	79 - 125				
Bromoform	18.9	1.0	20	0	94.5	66 - 130				
Bromomethane	17.83	1.0	20	0	89.1	53 - 141				

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS19021185-01MS** Units: **UG/L** Analysis Date: **06-Mar-2019 00:06**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977037** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	32.12	2.0	40	0	80.3	64 - 133				
Carbon tetrachloride	19.97	1.0	20	0	99.9	72 - 136				
Chlorobenzene	17.86	1.0	20	0	89.3	82 - 118				
Chloroethane	18.44	1.0	20	0	92.2	60 - 138				
Chloroform	15.26	1.0	20	0	76.3	79 - 124				S
Chloromethane	13.37	1.0	20	0	66.8	50 - 139				
cis-1,2-Dichloroethene	15.51	1.0	20	0	77.6	78 - 123				S
cis-1,3-Dichloropropene	16.22	1.0	20	0	81.1	75 - 124				
Dibromochloromethane	18.81	1.0	20	0	94.0	74 - 126				
Dibromomethane	17.29	1.0	20	0	86.4	79 - 123				
Dichlorodifluoromethane	12.17	1.0	20	0	60.9	32 - 152				
Ethylbenzene	18.62	1.0	20	0	93.1	79 - 121				
Hexachlorobutadiene	20.45	1.0	20	0	102	66 - 134				
Isopropylbenzene	19.69	1.0	20	0	98.4	72 - 131				
m,p-Xylene	37	2.0	40	0	92.5	80 - 121				
Methylene chloride	14.99	2.0	20	0	75.0	74 - 124				
Naphthalene	20.55	1.0	20	0	103	61 - 128				
n-Butylbenzene	19.41	1.0	20	0	97.0	75 - 128				
n-Propylbenzene	19.38	1.0	20	0	96.9	76 - 126				
o-Xylene	18.61	1.0	20	0	93.0	78 - 122				
sec-Butylbenzene	19.94	1.0	20	0	99.7	77 - 126				
Styrene	18.38	1.0	20	0	91.9	78 - 123				
tert-Butylbenzene	19.72	1.0	20	0	98.6	78 - 124				
Tetrachloroethene	20.08	1.0	20	0	100	74 - 129				
Toluene	18.67	1.0	20	0	93.3	80 - 121				
trans-1,2-Dichloroethene	16.03	1.0	20	0	80.2	75 - 124				
trans-1,3-Dichloropropene	16.42	1.0	20	0	82.1	73 - 127				
Trichloroethene	31.05	1.0	20	13.06	90.0	79 - 123				
Trichlorofluoromethane	17.41	1.0	20	0	87.1	65 - 141				
Vinyl chloride	14.49	1.0	20	0	72.4	58 - 137				
Surr: 1,2-Dichloroethane-d4	*42.2*	*1.0*	*50*	*0*	*84.4*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.35*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*42.74*	*1.0*	*50*	*0*	*85.5*	*80 - 119*				
Surr: Toluene-d8	*52.15*	*1.0*	*50*	*0*	*104*	*89 - 112*				

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS19021185-01MSD** Units: **UG/L** Analysis Date: **06-Mar-2019 00:30**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977038** 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	20.63	1.0	20	0	103	78 - 124	17.93	14	20	
1,1,1-Trichloroethane	19	1.0	20	0	95.0	74 - 131	16.57	13.6	20	
1,1,2,2-Tetrachloroethane	20.17	1.0	20	0	101	71 - 121	19.71	2.32	20	
1,1,2-Trichloroethane	20.67	1.0	20	0	103	80 - 119	18.65	10.3	20	
1,1-Dichloroethane	18.29	1.0	20	0	91.4	77 - 125	15.53	16.3	20	
1,1-Dichloroethene	19.12	1.0	20	0	95.6	71 - 131	17.08	11.3	20	
1,1-Dichloropropene	21.28	1.0	20	0	106	78 - 125	18.65	13.2	20	
1,2,3-Trichlorobenzene	26.24	1.0	20	0	131	69 - 129	21.52	19.8	20	S
1,2,3-Trichloropropane	19.76	1.0	20	0	98.8	73 - 122	19.51	1.25	20	
1,2,4-Trichlorobenzene	24.54	1.0	20	0	123	69 - 130	21.02	15.5	20	
1,2,4-Trimethylbenzene	21.44	1.0	20	0	107	76 - 124	18.65	13.9	20	
1,2-Dibromo-3-chloropropane	21.31	1.0	20	0	107	62 - 128	21.04	1.26	20	
1,2-Dibromoethane	20.46	1.0	20	0	102	77 - 121	18.83	8.3	20	
1,2-Dichlorobenzene	20.89	1.0	20	0	104	80 - 119	18.46	12.3	20	
1,2-Dichloroethane	19.77	1.0	20	0	98.9	73 - 128	16.99	15.1	20	
1,2-Dichloropropane	19.99	1.0	20	0	100.0	78 - 122	17.07	15.8	20	
1,3,5-Trimethylbenzene	21.94	1.0	20	0	110	75 - 124	19.18	13.4	20	
1,3-Dichlorobenzene	20.85	1.0	20	0	104	80 - 119	18.39	12.6	20	
1,3-Dichloropropane	20.52	1.0	20	0	103	80 - 119	18.51	10.3	20	
1,4-Dichlorobenzene	20.5	1.0	20	0	103	79 - 118	18.05	12.7	20	
2,2-Dichloropropane	17.36	1.0	20	0	86.8	60 - 139	14.97	14.8	20	
2-Butanone	38.53	2.0	40	0	96.3	56 - 143	36.36	5.79	20	
2-Chlorotoluene	20.59	1.0	20	0	103	79 - 122	18.19	12.4	20	
2-Hexanone	42.3	2.0	40	0	106	57 - 139	41.7	1.43	20	
4-Chlorotoluene	20.9	1.0	20	0	105	78 - 122	18.42	12.6	20	
4-Isopropyltoluene	23.18	1.0	20	0	116	77 - 127	19.79	15.8	20	
4-Methyl-2-pentanone	41.93	2.0	40	0	105	67 - 130	40.54	3.38	20	
Acetone	37.85	2.0	40	0	94.6	39 - 160	35.14	7.44	20	
Benzene	20.02	1.0	20	0	100	79 - 120	17.3	14.6	20	
Bromobenzene	20.38	1.0	20	0	102	80 - 120	18.25	11	20	
Bromochloromethane	17.38	1.0	20	0	86.9	78 - 123	14.52	17.9	20	
Bromodichloromethane	19.99	1.0	20	0	99.9	79 - 125	16.54	18.9	20	
Bromoform	20.79	1.0	20	0	104	66 - 130	18.9	9.53	20	
Bromomethane	22	1.0	20	0	110	53 - 141	17.83	21	20	R

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334099 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS19021185-01MSD** Units: **UG/L** Analysis Date: **06-Mar-2019 00:30**
Client ID: Run ID: **VOA6_334099** SeqNo: **4977038** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	37.14	2.0	40	0	92.8	64 - 133	32.12	14.5	20	
Carbon tetrachloride	22.02	1.0	20	0	110	72 - 136	19.97	9.75	20	
Chlorobenzene	20.93	1.0	20	0	105	82 - 118	17.86	15.8	20	
Chloroethane	13.33	1.0	20	0	66.7	60 - 138	18.44	32.1	20	R
Chloroform	18.11	1.0	20	0	90.6	79 - 124	15.26	17.1	20	
Chloromethane	16.37	1.0	20	0	81.8	50 - 139	13.37	20.2	20	R
cis-1,2-Dichloroethene	18.3	1.0	20	0	91.5	78 - 123	15.51	16.5	20	
cis-1,3-Dichloropropene	19.4	1.0	20	0	97.0	75 - 124	16.22	17.9	20	
Dibromochloromethane	21.17	1.0	20	0	106	74 - 126	18.81	11.8	20	
Dibromomethane	19.86	1.0	20	0	99.3	79 - 123	17.29	13.9	20	
Dichlorodifluoromethane	12.96	1.0	20	0	64.8	32 - 152	12.17	6.28	20	
Ethylbenzene	21.52	1.0	20	0	108	79 - 121	18.62	14.4	20	
Hexachlorobutadiene	26.55	1.0	20	0	133	66 - 134	20.45	26	20	R
Isopropylbenzene	22.98	1.0	20	0	115	72 - 131	19.69	15.4	20	
m,p-Xylene	42.92	2.0	40	0	107	80 - 121	37	14.8	20	
Methylene chloride	18.35	2.0	20	0	91.7	74 - 124	14.99	20.1	20	R
Naphthalene	23.3	1.0	20	0	116	61 - 128	20.55	12.5	20	
n-Butylbenzene	23.15	1.0	20	0	116	75 - 128	19.41	17.6	20	
n-Propylbenzene	22.25	1.0	20	0	111	76 - 126	19.38	13.8	20	
o-Xylene	21.83	1.0	20	0	109	78 - 122	18.61	15.9	20	
sec-Butylbenzene	23.19	1.0	20	0	116	77 - 126	19.94	15	20	
Styrene	21.46	1.0	20	0	107	78 - 123	18.38	15.5	20	
tert-Butylbenzene	22.67	1.0	20	0	113	78 - 124	19.72	13.9	20	
Tetrachloroethene	22.98	1.0	20	0	115	74 - 129	20.08	13.5	20	
Toluene	21.26	1.0	20	0	106	80 - 121	18.67	13	20	
trans-1,2-Dichloroethene	18.95	1.0	20	0	94.8	75 - 124	16.03	16.7	20	
trans-1,3-Dichloropropene	19.37	1.0	20	0	96.9	73 - 127	16.42	16.5	20	
Trichloroethene	36.16	1.0	20	13.06	115	79 - 123	31.05	15.2	20	
Trichlorofluoromethane	18.94	1.0	20	0	94.7	65 - 141	17.41	8.37	20	
Vinyl chloride	16.23	1.0	20	0	81.1	58 - 137	14.49	11.3	20	
Surr: 1,2-Dichloroethane-d4	*41.82*	*1.0*	*50*	*0*	*83.6*	*81 - 118*	*42.2*	*0.909*	*20*	
Surr: 4-Bromofluorobenzene	*51.21*	*1.0*	*50*	*0*	*102*	*85 - 114*	*50.35*	*1.7*	*20*	
Surr: Dibromofluoromethane	*42.43*	*1.0*	*50*	*0*	*84.9*	*80 - 119*	*42.74*	*0.725*	*20*	
Surr: Toluene-d8	*51.03*	*1.0*	*50*	*0*	*102*	*89 - 112*	*52.15*	*2.17*	*20*	

ALS Houston, US Date: 08-Mar-19

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant
WorkOrder:	HS19021165

QC BATCH REPORT

Batch ID:	**R334099**	**Instrument:**	**VOA6**	**Method:**	**SW8260**

The following samples were analyzed in this batch:	HS19021165-01	HS19021165-02

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334211 **Instrument: ICS2100** **Method: SW9056**

MBLK Sample ID: **WBLKW1-030519** Units: **mg/L** Analysis Date: **05-Mar-2019 18:30**
Client ID: Run ID: **ICS2100_334211** SeqNo: **4979542** PrepDate: DF: **1**

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

LCS Sample ID: **WLCSW1-030519** Units: **mg/L** Analysis Date: **05-Mar-2019 18:44**
Client ID: Run ID: **ICS2100_334211** SeqNo: **4979543** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.24	0.500	20	0	101	80 - 120				
Sulfate	19.49	0.500	20	0	97.4	80 - 120				

LCSD Sample ID: **WLCSDW1-030519** Units: **mg/L** Analysis Date: **05-Mar-2019 18:59**
Client ID: Run ID: **ICS2100_334211** SeqNo: **4979544** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.35	0.500	20	0	102	80 - 120	20.24	0.567	20	
Sulfate	19.55	0.500	20	0	97.7	80 - 120	19.49	0.292	20	

MS Sample ID: **HS19030163-01MS** Units: **mg/L** Analysis Date: **05-Mar-2019 23:42**
Client ID: Run ID: **ICS2100_334211** SeqNo: **4979557** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	292.6	5.00	100	187.6	105	80 - 120				
Sulfate	199.7	5.00	100	98.43	101	80 - 120				

MS Sample ID: **HS19030163-01MS** Units: **mg/L** Analysis Date: **05-Mar-2019 22:58**
Client ID: Run ID: **ICS2100_334211** SeqNo: **4979554** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	202.7	0.500	10	192.4	104	80 - 120				EO
Sulfate	117.6	0.500	10	107.3	102	80 - 120				EO

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS19021165

QC BATCH REPORT

Batch ID: R334211 **Instrument: ICS2100** **Method: SW9056**

MSD Sample ID: **HS19030163-01MSD** Units: **mg/L** Analysis Date: **05-Mar-2019 23:57**
Client ID: Run ID: **ICS2100_334211** SeqNo: **4979558** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	278.4	5.00	100	187.6	90.8	80 - 120	292.6	4.96	20	
Sulfate	188.6	5.00	100	98.43	90.2	80 - 120	199.7	5.7	20	

MSD Sample ID: **HS19030163-01MSD** Units: **mg/L** Analysis Date: **05-Mar-2019 23:13**
Client ID: Run ID: **ICS2100_334211** SeqNo: **4979555** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	209.7	0.500	10	192.4	173	80 - 120	202.7	3.39	20	SEO
Sulfate	120.8	0.500	10	107.3	135	80 - 120	117.6	2.7	20	SEO

The following samples were analyzed in this batch: HS19021165-01

ALS Houston, US Date: 08-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: **HS19021165**

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 Houston, US Date: 08-Mar-19

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	20-Dec-2021
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019
North Carolina	624-2019	31-Dec-2019
California	2919, 2018-2019	30-Apr-2019
Maryland	343, 2018-2019	30-Jun-2019

00934516

ALS Houston, US Date: 08-Mar-19

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS19021165
Date/Time Received: **22-Feb-2019 09:06**
Received by: **RPG**

Checklist completed by: *Raegen Giga* eSignature 22-Feb-2019 Date
Reviewed by: *RJ Modashia* eSignature 22-Feb-2019 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 ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	1.6c/1.6c uc/c	IR 11
Cooler(s)/Kit(s):	24406	
Date/Time sample(s) sent to storage:	02/22/2019 11:59	

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:

00934517

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210, Houston, Tx. 77099 ATTN: R.J. Modashia

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

HS19021165

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

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_022119	Water	02/21/19 / 14:00		3	3		HCL	
LH18/24-SP650_022119	Water	02/21/19 / 14:00		1		1	NONE	
Trip Blank	Water	02/21/19		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	02/21/19	14:30				R Cuges 2/21/19	2/22/19	09:06			

9For Lab Use Only

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

Remarks

Cooler # 24406 TEMP .. 1.3c.
IR 11 CF0

(Word) S:\1-ces\Forms\Chain of Custody - BiWeekly

00934518

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

CUSTODY SEAL
Date: 2/21/19 Time: 1430
Name: [illegible]
Company: [illegible]

Seal Broken By:
2/21/19

TRK# 0221 4380 9530 9467

RETURNS MON-SAT
PRIORITY OVERNIGHT

FedEx
TRK# 0221 4380 9530 9467

FRI - 22 FEB 10:30A
PRIORITY OVERNIGHT

77099
TX-US
IAH

AB SGRA

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

March 12, 2019

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

Work Order: **HS19030011**

Laboratory Results for: **LH18/24 GW Treatment Plant Monthly Influent Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Mar 01, 2019 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 Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
Work Order: HS19030011

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19030011-01	LH18/24-SP140_022819	Water		28-Feb-2019 14:00	01-Mar-2019 08:50	☐

ALS Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
Work Order: HS19030011

Work Order Comments

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

Metals by Method SW6020

Batch ID: 138281

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

WetChemistry by Method SW7196

Batch ID: R334254

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

ALS Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**

Project: LH18/24 GW Treatment Plant Monthly Influent Samples WorkOrder:HS19030011

Sample ID: LH18/24-SP140_022819 Lab ID:HS19030011-01

Collection Date: 28-Feb-2019 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**				Prep:SW3010A / 01-Mar-2019		Analyst: JHD
Selenium	0.00250	U	0.00110	0.00250	0.00200	mg/L	1	04-Mar-2019 22:47
Silver	0.000500	U	0.000200	0.000500	0.00200	mg/L	1	04-Mar-2019 22:47
HEXAVALENT CHROMIUM BY SW7196A		**Method:SW7196**						Analyst: MZD
Chromium, Hexavalent	0.0100	U	0.00600	0.0100	0.0100	mg/L	1	01-Mar-2019 11:42
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	07-Mar-2019 17:47

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

ALS Houston, US

Date: 12-Mar-19

WEIGHT LOG

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
WorkOrder: HS19030011

Batch ID: 138281 **Method:** ICP-MS METALS BY SW6020A **Prep:** 3010A

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS19030011-01	1	10	10 (mL)	1

ALS Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
WorkOrder: HS19030011

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 138281	**Test Name :** ICP-MS METALS BY SW6020A			**Matrix:** Water		
HS19030011-01	LH18/24-SP140_022819	28 Feb 2019 14:00		01 Mar 2019 10:30	04 Mar 2019 22:47	1
Batch ID R334176	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS19030011-01	LH18/24-SP140_022819	28 Feb 2019 14:00			07 Mar 2019 17:47	1
Batch ID R334254	**Test Name :** HEXAVALENT CHROMIUM BY SW7196A			**Matrix:** Water		
HS19030011-01	LH18/24-SP140_022819	28 Feb 2019 14:00			01 Mar 2019 11:42	1

ALS Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
WorkOrder: HS19030011

QC BATCH REPORT

Batch ID: 138281 **Instrument: ICPMS05** **Method: SW6020**

MBLK Sample ID: **MBLK-138281** Units: **mg/L** Analysis Date: **04-Mar-2019 21:51**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974208** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.00250	0.00200								U
Silver	0.000500	0.00200								U

LCS Sample ID: **LCS-138281** Units: **mg/L** Analysis Date: **04-Mar-2019 21:53**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974209** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.05168	0.00200	0.05	0	103	80 - 120				
Silver	0.05504	0.00200	0.05	0	110	80 - 120				

MS Sample ID: **HS19021441-01MS** Units: **mg/L** Analysis Date: **04-Mar-2019 22:00**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974212** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.04948	0.00200	0.05	0	99.0	80 - 120				
Silver	0.0515	0.00200	0.05	0	103	80 - 120				

MSD Sample ID: **HS19021441-01MSD** Units: **mg/L** Analysis Date: **04-Mar-2019 22:02**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974213** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.04959	0.00200	0.05	0	99.2	80 - 120	0.04948	0.218	20	
Silver	0.05174	0.00200	0.05	0	103	80 - 120	0.0515	0.473	20	

PDS Sample ID: **HS19021441-01PDS** Units: **mg/L** Analysis Date: **04-Mar-2019 22:04**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974214** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.09793	0.00200	0.1	0	97.9	75 - 125				
Silver	0.09993	0.00200	0.1	0	99.9	75 - 125				

ALS Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
WorkOrder: HS19030011

QC BATCH REPORT

Batch ID: 138281 **Instrument: ICPMS05** **Method: SW6020**

SD Sample ID: **HS19021441-01SD** Units: **mg/L** Analysis Date: **04-Mar-2019 21:57**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974211** PrepDate: **01-Mar-2019** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Selenium	0.0125	0.0100					0.000452	0	10	U
Silver	0.00250	0.0100					0.00002	0	10	U

The following samples were analyzed in this batch: HS19030011-01

ALS Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
WorkOrder: HS19030011

QC BATCH REPORT

Batch ID: R334254 **Instrument: UV-2450** **Method: SW7196**

MBLK Sample ID: **MBLK-334254** Units: **mg/L** Analysis Date: **01-Mar-2019 11:42**
Client ID: Run ID: **UV-2450_334254** SeqNo: **4986763** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.0100	0.0100								U

LCS Sample ID: **LCS-334254** Units: **mg/L** Analysis Date: **01-Mar-2019 11:42**
Client ID: Run ID: **UV-2450_334254** SeqNo: **4986764** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.249	0.0100	0.25	0	99.6	90 - 111				

LCSD Sample ID: **LCSD-334254** Units: **mg/L** Analysis Date: **01-Mar-2019 11:42**
Client ID: Run ID: **UV-2450_334254** SeqNo: **4986765** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.241	0.0100	0.25	0	96.4	90 - 111	0.249	3.27	20	

The following samples were analyzed in this batch: HS19030011-01

ALS Houston, US Date: 12-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 GW Treatment Plant Monthly Influent Samples
WorkOrder: **HS19030011**

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 Houston, US Date: 12-Mar-19

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	20-Dec-2021
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019
North Carolina	624-2019	31-Dec-2019
California	2919, 2018-2019	30-Apr-2019
Maryland	343, 2018-2019	30-Jun-2019

00934530

ALS Houston, US Date: 12-Mar-19

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS19030011
Date/Time Received: **01-Mar-2019 08:50**
Received by: **JRM**

Checklist completed by: *Jared R. Makan* 1-Mar-2019
eSignature | Date

Reviewed by: *RJ Modashia* 1-Mar-2019
eSignature | Date

Matrices: **Water**
Carrier name: **ALS Courier**

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 ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:N/A
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.8c/1.8c UC/C	IR25	
Cooler(s)/Kit(s):	43795		
Date/Time sample(s) sent to storage:	03/01/2019 10:30		
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:

00934531

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd., Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: RJ Modshia

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_022819	Water	02/28/19 / 14:00		1	X			HNO3	
LH18/24-SP140_022819	Water	02/28/19 / 14:00		2		X	X	NONE	

HS19030011
Bhate Environmental Associates, Inc.
18/24 GW Treatment Plant Monthly Influent Samples

Additional Remarks: **STANDARD TURN AROUND TIME**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	02/28/19	14:30	J. Summers	3/1/19	08:50						

For Lab Use Only

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

Remarks: Cooler 43795 Temp 1.8
1125 COC.0

(Word) S:\1-ces\Forms\Chain of Custody - Bi\Weekly

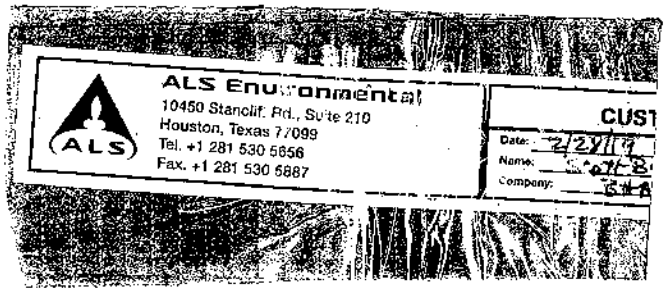
FRI - 01 MAR 10:30A
PRIORITY OVERNIGHT

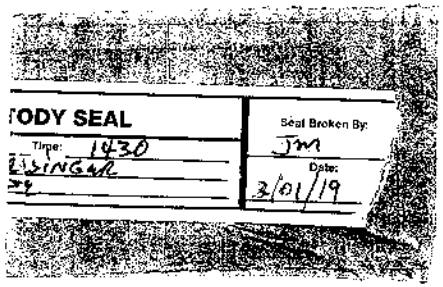
TRK# 0221 4380 9530 9423

77099
TX-US
IAH

AB SGRA

3646088 01Mar 00:38 AFWH 5472/0F3D/A17C





Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1905651; 1906112; 1906330; 1906332; 1906334

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2223 (233911)

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: Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 642099) was less than 1/2 the CRDL. The recovery for the LCS (642100) was within acceptable parameters.

MS/MSD Analysis: MS/MSD was performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 4.µg/L. The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

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 5.1.1. The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level of 4.0µg/L. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported. Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

Thomas Bosch March 06, 2019
Analyst Date

ANALYTICAL REPORT

Report Date: March 07, 2019

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1906330**
Project ID: HS19030011
Purchase Order: HS19030011
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP140_022819	1906330001	02/28/19	03/02/19	

ANALYTICAL REPORT

Workorder: 34-1906330
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP140_022819**	Sampling Site: NA	Collected: 02/28/2019
Lab ID: 1906330001	Media: 125 mL Nalgene	Received: 03/02/2019
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/2223 (HBN: 233911)	**Percent Solid:** NA
	Analyzed: 03/05/2019 13:54	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**3700**	100	200	400	100	

Comments

Quality Control: EPA 6850, DoD QSM - (HBN: 233911)

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 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 03/06/2019 09:17	/S/ Stephen Brose 03/07/2019 11:04

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: 34-1906330
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	PJLA (DoD ELAP)	L17-506	http://www.pjlabs.com
	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com
	Utah (TNI)	UT00953	http://lams.nelac-institute.org/search
	Nevada (TNI)	UT00953201-1	https://ndep.nv.gov/water/lab-certification
	Iowa (TNI)	IA# 376	http://www.shl.uiowa.edu/labcert/idnr/
	Kansas	E-10416	http://www.kdheks.gov/envlab/disclaimer.html
	Oklahoma (TNI)	IJ# 9980	http://www.deq.state.ok.us/CSDnew/labcert.htm
	Texas (TNI)	T104704456-18-9	https://www.tceq.texas.gov/assets/public/compliance/compliance_support/qa/txnelap_lab_list.pdf
Industrial Hygiene	AIHA (ISO 17025 & AIHA IHLAP)	101574	http://www.aihaaccreditedlabs.org
	DOECAP-AP	L18-606	http://www.pjlabs.com
	Washington	C596	https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Laboratory-Accreditation
Dietary Supplements	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com

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.
< Means 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: 1906330

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 642099
Analyzed: 03/05/2019 09:26
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 642100
Analyzed: 03/05/2019 09:00
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.11	4.00	103	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample:	1906112001	**MS:**	1906112002	**MSD:**	1906112003
Analyzed:	03/05/2019 09:54	**Analyzed:**	03/05/2019 10:07	**Analyzed:**	03/05/2019 10:20
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	4	▲ 65.7	78.8	123.8	53.7	▲ 61.2	0.337	0.0	20.0

Continuing Calibration Verification

CCV:	642096	**CCV:**	642101	**CCV:**	642102
Analyzed:	03/05/2019 08:44	**Analyzed:**	03/05/2019 12:18	**Analyzed:**	03/05/2019 14:07
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	25.0	25.0	100	25.0	25.0	100	24.5	25.0	97.8

Interference Check Sample

ICSA: 642098
Analyzed: 03/05/2019 09:13
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	3.93	4.00	98.2

Comments

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Quality Control Sample
Batch Report

Analysis Information

Workorder: **1906330**

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		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
03/06/2019 13:45	03/07/2019 11:04

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

00934540

(18698/#2

ALS

W 1906330

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: 10853

1906330

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: HS19030011
TSR: Danielle Winnings

	LAB SAMPLE ID / ANALYSIS REQUESTED	CLIENT SAMPLE ID	MATRIX	COLLECT DATE / DUE DATE
1.	**HS19030011-01**	**LH18/24-SP140_022819**	**Water**	**28 Feb 2019 14:00**
	SUB_Perch-6850			15 Mar 2019

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:	3/1/19 1800
Received By:	Meredyl Slaw[signature]	Date/Time:	3/2/19 1903
Cooler ID(s):	7283	Temperature(s):	3

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS19030011	***Split:***	**Workorder ID:** 1906330	**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	02/28/2019 14:00	LH18/24-SP140_022819	1906330001		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	03/02/2019 09:03	ALS Sample Receiving	Sample Login
Julie Warath 3/4/19 1400		13B	storage
B.33.1	03.04.19/16:10	T.Bazil	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

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

1906330

Client Name: ALS Houston

Project/Task/Site:

Date/Time of Receipt: 3/2/17 903

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	C19 9203	3 °C	4	C19	°C	7	C19	°C
2	C19	°C	5	C19	°C	8	C19	°C
3	C19	°C	6	C19	°C	9	C19	°C

Taken By: [signature] (Signature) Meredith Edens (Printed Name) 3/2/17 (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: _____

00934543

Must Deliver Next Business Day
Time and Tempature Sensitive!

Part # 159469-434 RIT2 EXP 11/19

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

SHIP DATE: 01MAR19
ACTWGT: 8.55 LB
CAD: 300130/CAFE3211
DIMS: 14x11x10 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS19030011/12/14 - RJ

JC401/4E3C/2C15S

FedEx Express

TRK# 0201 4809 7831 2469

SATURDAY 12:00P
PRIORITY OVERNIGHT

XO BTFA

84123
UT-US SLC

FedEx Express

FedEx® Saturday Delivery

SDR

151966 10/04 MWI

RT B639 1
ST F1 12:00

ALS
10450
Houst
Tel. +1
Fax. +1

Batch Worklist

Batch: ELMS/ 2223 **Created:** 3/5/2019 08:21 **Instrument:** **HBN:** 233911

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

Workorder: 1905651 [ENV_LVL4]
Workorder: 1906112 [ENV_LVL4]
Workorder: 1906330 [ENV_LVL4]
Workorder: 1906332 [ENV_LVL4]
Workorder: 1906334 [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	642096	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
2	642097	RLVS for HBN 233911 [ELMS/2223				RLVS	3		E685041C3Q	5311		3/7/2019	
3	642098	ICS for HBN 233911 [ELMS/2223]				ICS	3		E6850..D3Q	5311		3/7/2019	
4	642099	LMB for HBN 233911 [ELMS/2223]				LMB	3		E6850Q413Q	5311		3/7/2019	
5	642100	LCS for HBN 233911 [ELMS/2223]				LCS	3		E6850Q413Q	5311		3/7/2019	
6	1905651001	HS19021158-02/LH18/24-SP650_02				SAMPLE	3	1905651001-A	E6850Q41.3	5480	3/21/2019	3/7/2019	
7	1906112001	EW01_022619				SAMPLE	3	1906112001-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
8	1906112002	EW01_022619MS				MS	3	1906112002-A	E6850Q413Q	5480		3/7/2019	
9	1906112003	EW01_022619MSD				MSD	3	1906112003-A	E6850Q413Q	5480		3/7/2019	
10	1906112004	EW05_022619				SAMPLE	3	1906112004-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
11	1906112005	EW05_022619_FD				FLDDUP	3	1906112005-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
12	1906112006	EW02_022619				SAMPLE	3	1906112006-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
13	1906112007	EW06_022619				SAMPLE	3	1906112007-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
14	1906112008	EW03_022619				SAMPLE	3	1906112008-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
15	1906112009	EW07_022619				SAMPLE	3	1906112009-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
16	642101	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
17	1906112010	EW04_022619				SAMPLE	3	1906112010-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
18	1906112011	EW08_022619				SAMPLE	3	1906112011-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
19	1906330001	LH18/24-SP140_022819				SAMPLE	3	1906330001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
20	1906332001	LH18/24-SP650_022819_BIX				SAMPLE	3	1906332001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
21	1906334001	LH18-24-SP650_022819_BIX				SAMPLE	3	1906334001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
22	642102	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1905651 (001); 1906112 (001-11); 1906330 (001); 1906332 (001); 1906334 (001) ELMS Batch/HBN ID: 2223 (233911)
Prep Date: 03/04/2019 Analysis Date: 03/05/2019 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2019\MAR\05MAR19D.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 AH015-4)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot AH015-4)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 43730. Dilutions of Working Standard Solution ID 43702 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/15/2019, sequence 15FEB19D.s Offline Quantitation Method: CLO4-DP1.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-AQN.M Fragmentor: 160 Output Gain: 3 Injection Volume: 30µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.65
5.8	0.65
5.9	0.25
10.3	0.25
10.5	0.65
12.0	0.65

QC DATA: 4.0µL of QC Solution Horizon ID 41830 was used for LCS 642100; Target = 4.0µg/L. ASTM type II water was used for LMB 642099.

MS/MSD: The Matrix Spike and duplicate (MS/MSD) were performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. Spike target = 4.0µg/L.

COMMENTS:

1) Results reported in µg/L. Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2019\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2019\23911-DoD-ALS-Hstn LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#
5) The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level 4.0µg/L.
6) Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

5.5 Chromatography (GC, HPLC and LC/MS) Technical Review

Note: It is the peer reviewer's responsibility to ensure that appropriate criteria are used as defined in the HORIZON PROFILE. The evaluation criteria are prioritized as per Section 2.2 of this SOP. These items must be checked for all projects. The following checklist will be completed by both the analyst and the peer reviewer and scanned into the HBN folder with the raw data.

Chromatography (GC, HPLC, LC/MS) Technical Review Criteria Batch(es)/SDG: ELMS: 2223 HBN: 233911 Sample Set IDs if Applicable: 1905651/1906912/1906330 1906332/1906334	Analyst Initials	Reviewer Initials
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
For method 8081A, Endrin/DDT Breakdown is checked for compliance	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR#	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 43702
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 WRK

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
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK — Description - 6850 Stock AccStd 1,000ug/mL

Standard: 43659
MFG: AccuStandard
MFG Lot: 218065075
Part ID: IC-PER-10X-1

Created By: Thomas Bosch
Create Date: 09/17/2018 09:09AM

Amount: 100 mL
Expires: 07/25/2020
Usable: No
Lab Lot: CLO4 STOCK

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: 43701
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 INT

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
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020

STANDARD REPORT

Working Standard - CLO4 QC WRK

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

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

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
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

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

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

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: 43730	**Created By:** Thomas Bosch	**Amount:** 25 mL
MFG: ALS/SLC	**Create Date:** 09/20/2018 09:09AM	**Expires:** 09/20/2019
MFG Lot: TNB: 05/09/2018	**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
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK — Description - Perchlorate ISTD Stock

Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date:	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

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

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

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

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

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

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®

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

CERTIFICATE OF ANALYSIS

S 43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 218065075
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Date Certified: Jun 25, 2018
Expiration: Jul 25, 2020
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO 17034 Scope of Accreditation: Yes

Signal Word: None

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

The gravimetric uncertainty for this product is ±0.24%.
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.

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 (1804, 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 Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
*	642096 CCV@25	Vial 71	1	Control	1	2.57589e6	8.017	25.04585
*	642100 QC@4.0	Vial 72	1	Control	2	4.23307e5	8.139	4.10749
*	642098 ICS@4.0	Vial 73	1	Control	3	3.17619e5	7.883	3.92708
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	7.71127e6	7.438	51.25151
*	1906112002 MS	Vial 77	1	Sample	7	8.02696e6	7.464	53.87972
*	1906112003 MSD	Vial 78	1	Sample	8	7.94242e6	7.442	53.69940
*	1906112004	Vial 79	1	Sample	9	2.33017e7	7.227	172.36522
*	1906112005	Vial 80	1	Sample	10	2.30991e7	7.229	180.38568
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	2.33611e6	8.114	25.01987
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	2.53126e6	7.736	226.48155
*	1906112005 10X	Vial 91	1	Sample	22	2.68237e6	7.739	241.03710
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	3.77363e6	8.090	3708.65666
*	642102 CCV@25	Vial 71	1	Control	25	2.15787e6	8.144	24.45533

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	642096 CCV@25	Vial 71	1	Control	1	6.79028e5	8.036	25.15984
*	642100 QC@4.0	Vial 72	1	Control	2	1.27412e5	8.156	4.45187
*	642098 ICS@4.0	Vial 73	1	Control	3	9.68721e4	7.906	4.29888
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	2.02786e6	7.452	51.10329
*	1906112002 MS	Vial 77	1	Sample	7	2.14637e6	7.478	54.46797
*	1906112003 MSD	Vial 78	1	Sample	8	2.10991e6	7.456	53.98100
*	1906112004	Vial 79	1	Sample	9	6.79668e6	7.243	180.45962
*	1906112005	Vial 80	1	Sample	10	6.82834e6	7.246	190.34382
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	6.28961e5	8.128	25.63410
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	6.46870e5	7.754	220.91905
*	1906112005 10X	Vial 91	1	Sample	22	6.95643e5	7.756	238.44674
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	1.01021e6	8.102	3771.67475
*	642102 CCV@25	Vial 71	1	Control	25	5.83711e5	8.160	25.16652

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
*	642096 CCV@25	Vial 71	1	Control	1	3.12207e5	8.043	5.00000
*	642100 QC@4.0	Vial 72	1	Control	2	3.41038e5	8.157	5.00000
*	642098 ICS@4.0	Vial 73	1	Control	3	2.68237e5	7.902	5.00000
*	642099 LMB	Vial 74	1	Control	4	3.53313e5	8.102	5.00000
*	1905651001	Vial 75	1	Sample	5	3.26356e5	7.780	5.00000
*	1906112001	Vial 76	1	Sample	6	4.26473e5	7.464	5.00000
*	1906112002 MS	Vial 77	1	Sample	7	4.19549e5	7.491	5.00000
*	1906112003 MSD	Vial 78	1	Sample	8	4.16709e5	7.467	5.00000
*	1906112004	Vial 79	1	Sample	9	2.95705e5	7.253	5.00000
*	1906112005	Vial 80	1	Sample	10	2.75946e5	7.263	5.00000
*	1906112006	Vial 81	1	Sample	11	3.73575e5	7.480	5.00000
*	1906112007	Vial 82	1	Sample	12	5.00533e5	7.256	5.00000
*	1906112008	Vial 83	1	Sample	13	4.65121e5	7.237	5.00000
*	1906112009	Vial 84	1	Sample	14	2.43675e5	7.672	5.00000
*	1906112010	Vial 85	1	Sample	15	2.51865e5	7.710	5.00000
*	1906112011	Vial 86	1	Sample	16	2.80792e5	7.876	5.00000
*	642101 CCV@25	Vial 71	1	Control	17	2.83460e5	8.140	5.00000
*	1906332001	Vial 88	1	Sample	19	2.64674e5	7.827	5.00000
*	1906334001	Vial 89	1	Sample	20	2.65662e5	7.808	5.00000
*	1906112004 10X	Vial 90	1	Sample	21	3.41608e5	7.756	50.00000
*	1906112005 10X	Vial 91	1	Sample	22	3.38724e5	7.764	50.00000
*	1906112007 RE	Vial 82	1	Sample	23	4.31135e5	7.332	5.00000
*	1906330001 100	Vial 92	1	Sample	24	2.98985e5	8.111	500.00000
*	642102 CCV@25	Vial 71	1	Control	25	2.68305e5	8.165	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

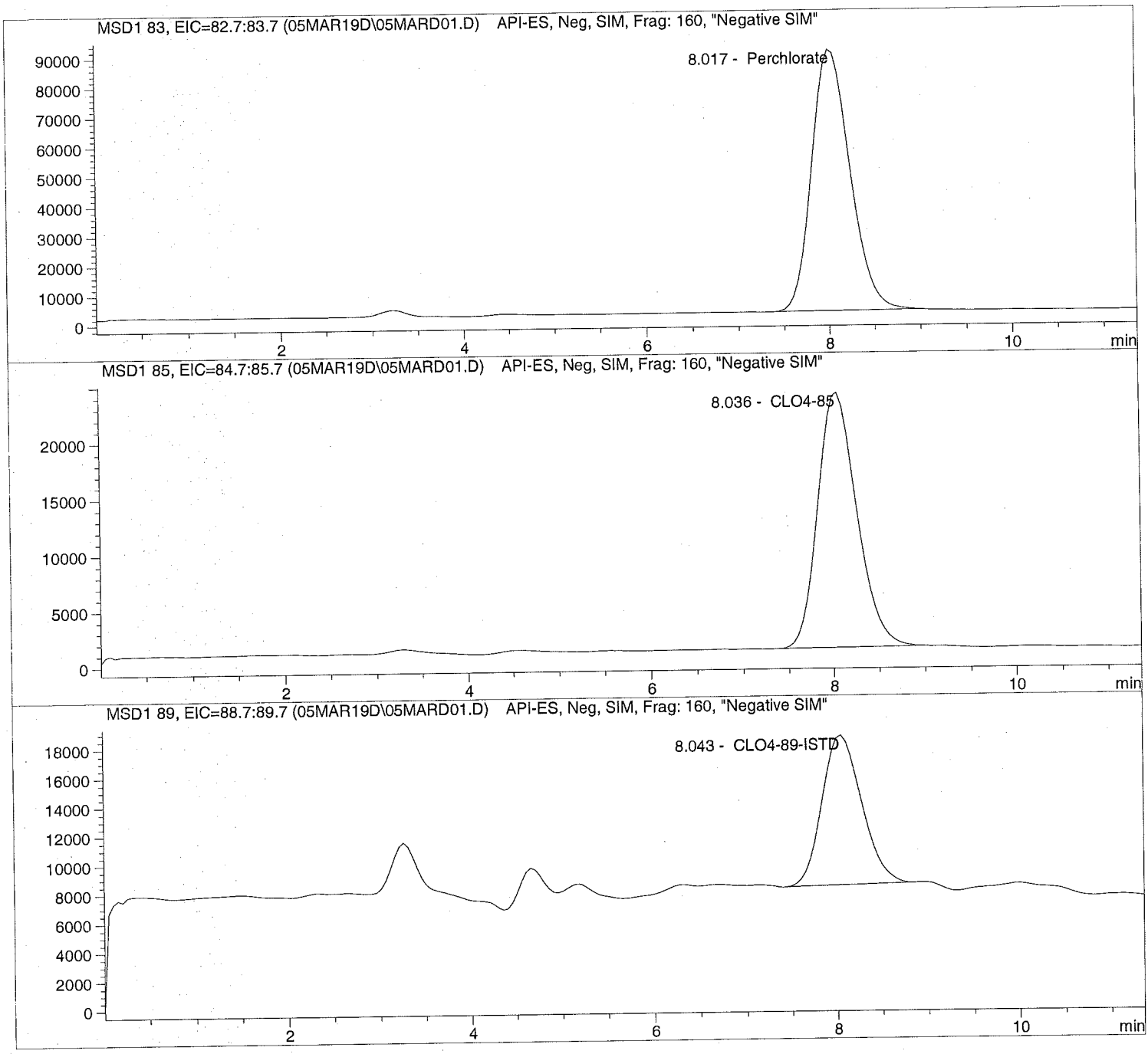
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	642096	CCV@25	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	642100	QC@4.0	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	642098	ICS@4.0	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	642099	LMB	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	1905651001		CLO4-AQN	1	Sample		
6	Vial 76	1906112001		CLO4-AQN	1	Sample		
7	Vial 77	1906112002	MS	CLO4-AQN	1	Sample		
8	Vial 78	1906112003	MSD	CLO4-AQN	1	Sample		
9	Vial 79	1906112004		CLO4-AQN	1	Sample		
10	Vial 80	1906112005		CLO4-AQN	1	Sample		
11	Vial 81	1906112006		CLO4-AQN	1	Sample		
12	Vial 82	1906112007		CLO4-AQN	1	Sample		
13	Vial 83	1906112008		CLO4-AQN	1	Sample		
14	Vial 84	1906112009		CLO4-AQN	1	Sample		
15	Vial 85	1906112010		CLO4-AQN	1	Sample		
16	Vial 86	1906112011		CLO4-AQN	1	Sample		
17	Vial 71	642101	CCV@25	CLO4-AQN	1	Ctrl Samp		
18	Vial 87	1906330001	1K	CLO4-AQN	1	Sample		
19	Vial 88	1906332001		CLO4-AQN	1	Sample		
20	Vial 89	1906334001		CLO4-AQN	1	Sample		
21	Vial 90	1906112004	10X	CLO4-AQN	1	Sample		
22	Vial 91	1906112005	10X	CLO4-AQN	1	Sample		
23	Vial 82	1906112007	RE	CLO4-AQN	1	Sample		
24	Vial 92	1906330001	100	CLO4-AQN	1	Sample		
25	Vial 71	642102	CCV@25	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.017	PBA	2575886.3	25.0459	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.036	PBA	679028.4	25.1598	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.043	PBA	312206.9	5.0000	CLO4-89-ISTD

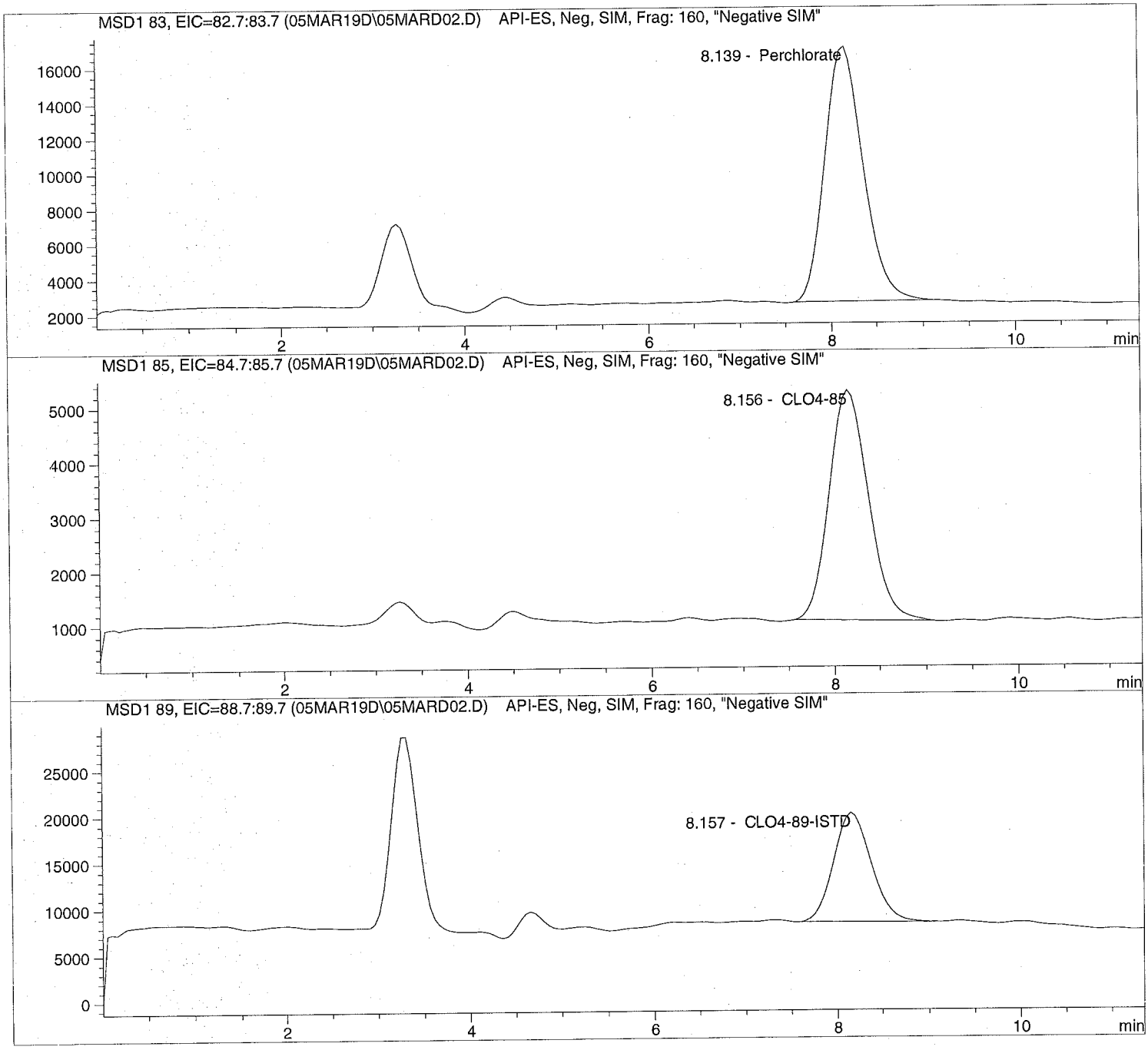
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD02.D Sample Name: 642100 QC@4.0

Injection Date:	3/05/2019 09:00:30	Seq Line:	2
Sample Name:	642100 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Injection Date: 3/05/2019 09:00:30
Sample Name: 642100 QC@4.0
Acq Operator: TNB

Seq Line: 2
Location: Vial 72
Inj. No.: 1
Inj. Vol.: 20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Tue, 19. Feb. 2019,09:07:33 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.139	PBA	423307.1	4.1075	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.156	PBA	127412.0	4.4519	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.157	PBA	341038.3	5.0000	CLO4-89-ISTD

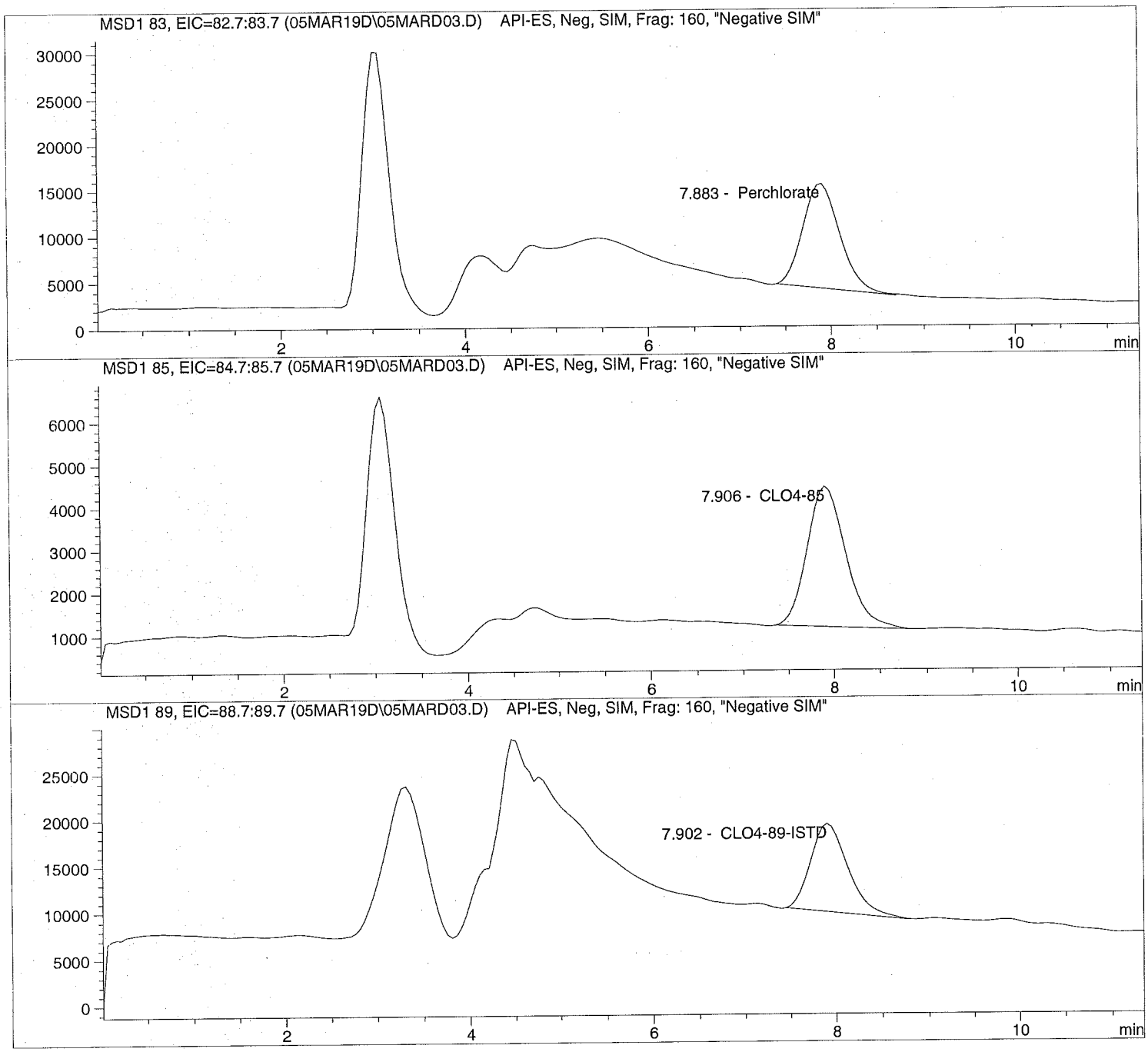
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0 00934570

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.883	PBA	317618.9	3.9271	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.906	PBA	96872.1	4.2989	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.902	PBA	268236.7	5.0000	CLO4-89-ISTD

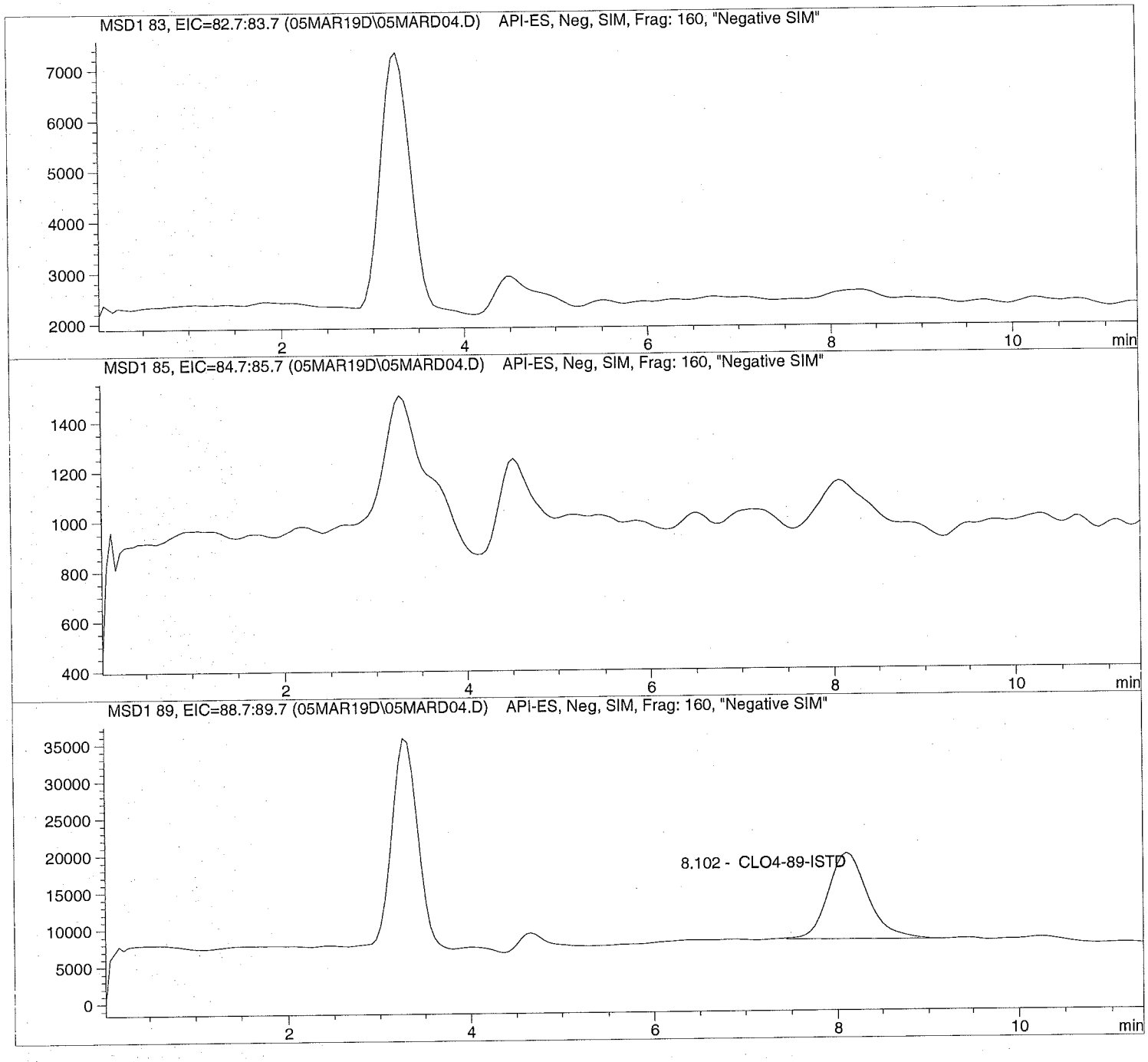
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.102	BBA	353313.1	5.0000	CLO4-89-ISTD

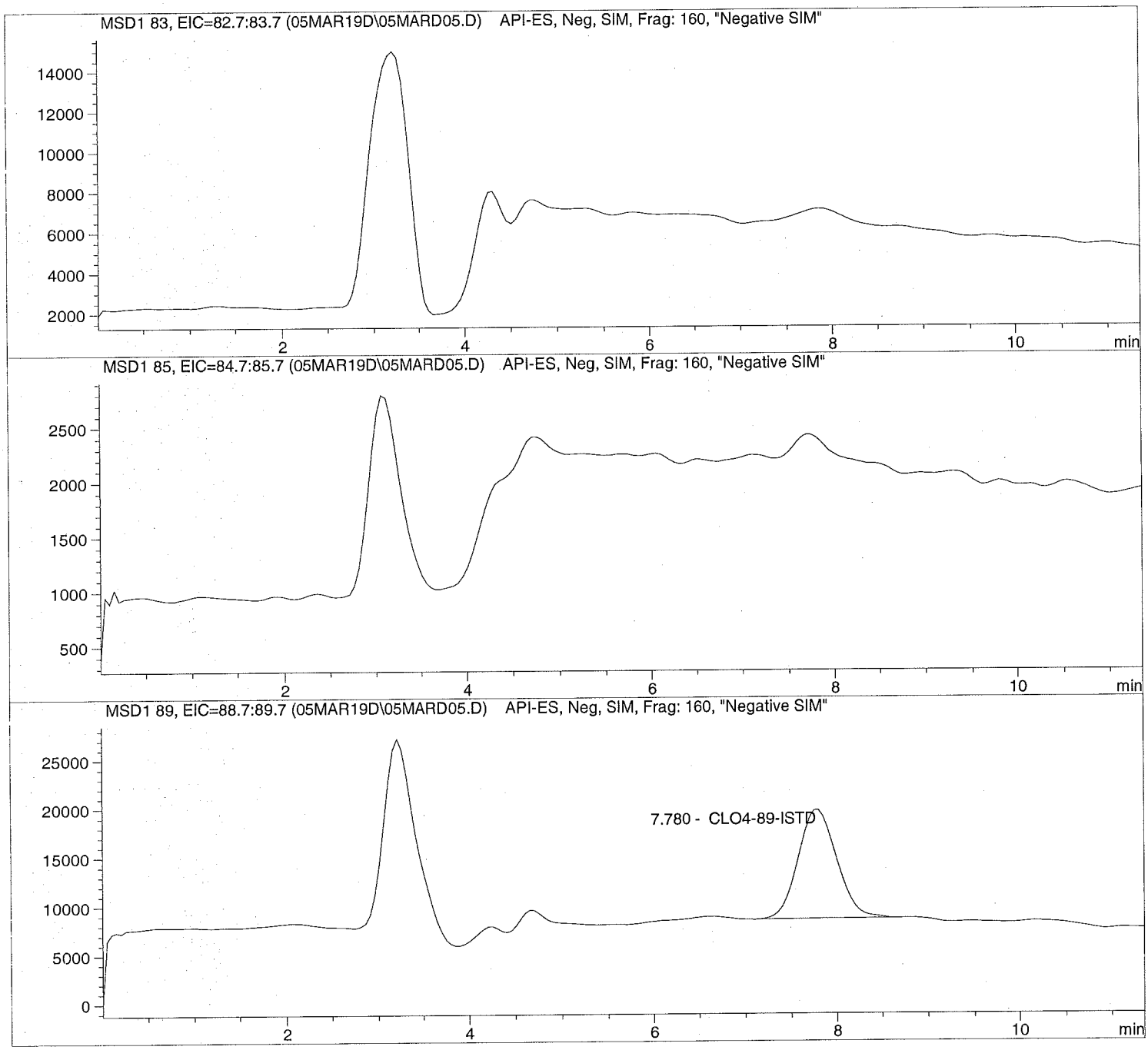
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.780	PBA	326356.2	5.0000	CLO4-89-ISTD

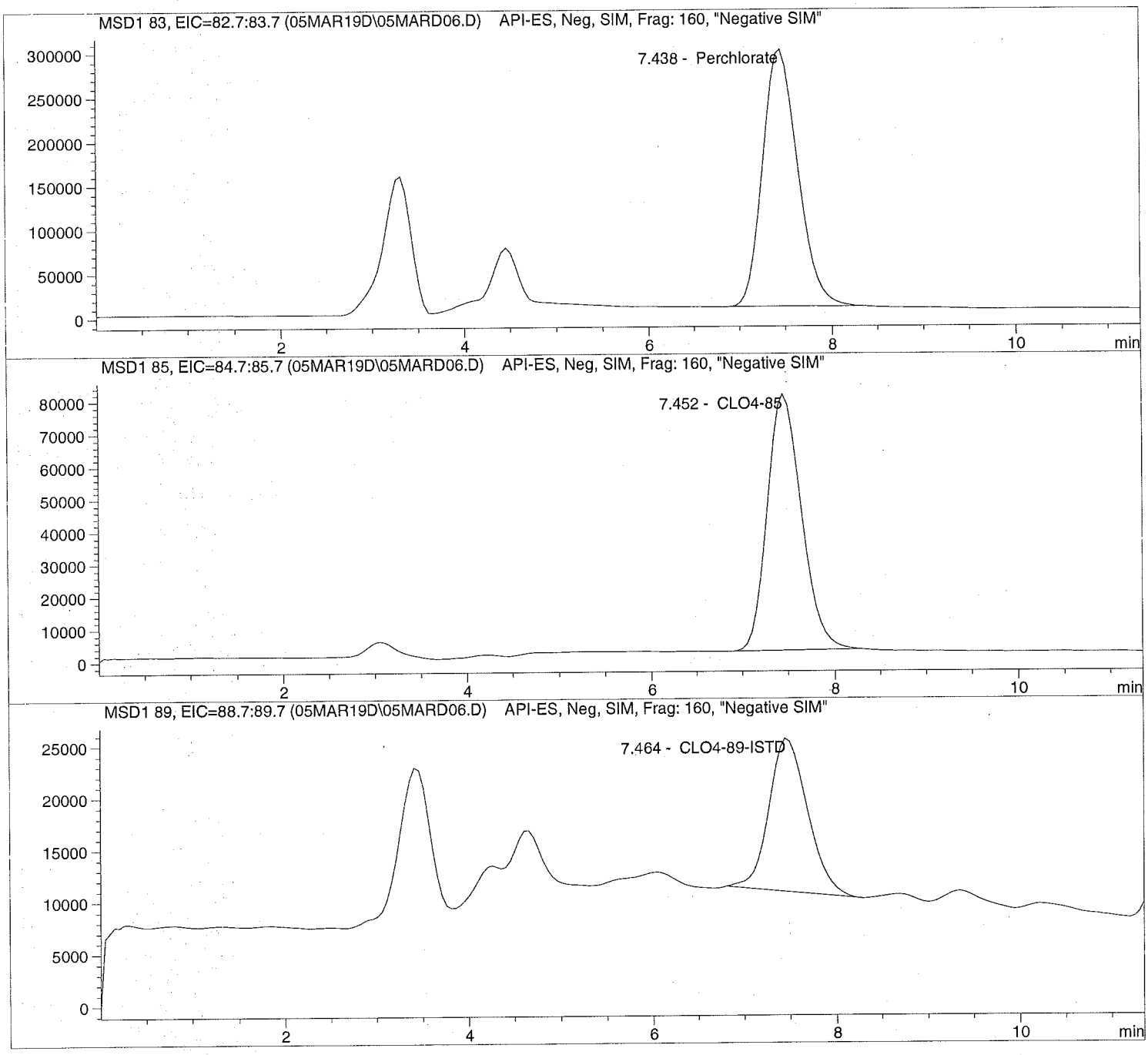
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.438	PBA	7711270.5	51.2515	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.452	PBA	2027855.1	51.1033	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.464	PB	426473.5	5.0000	CLO4-89-ISTD

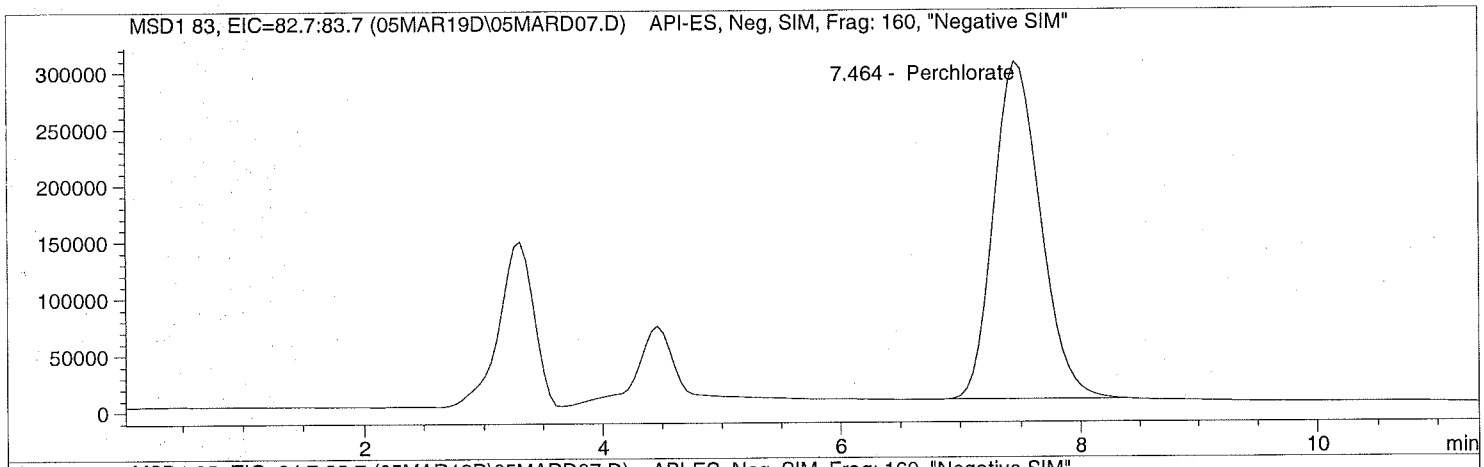
*** End of Report ***

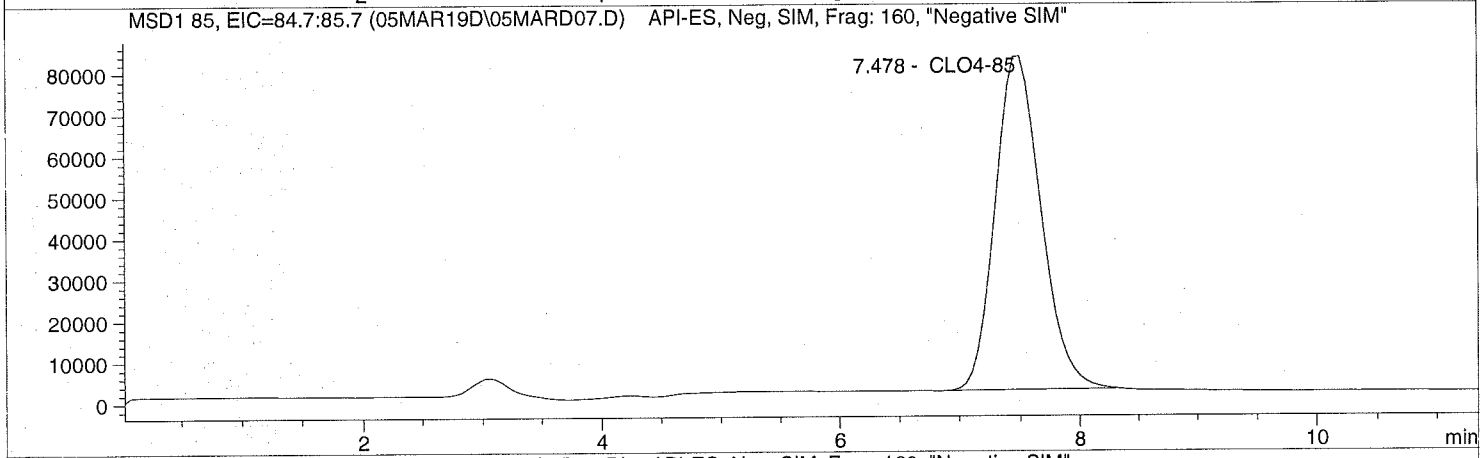
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

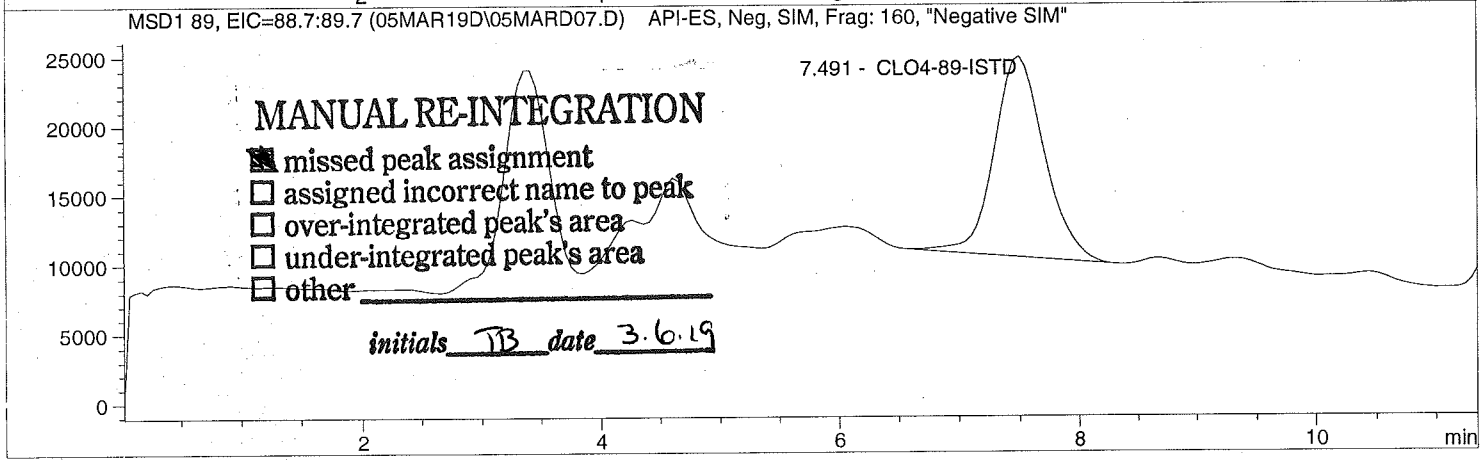
Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







MANUAL RE-INTEGRATION
☒ missed peak assignment
☐ assigned incorrect name to peak
☐ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____
initials JB *date* 3.6.19

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	53.8797	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	54.4680	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.491	MM	419549.0	5.0000	CLO4-89-ISTD

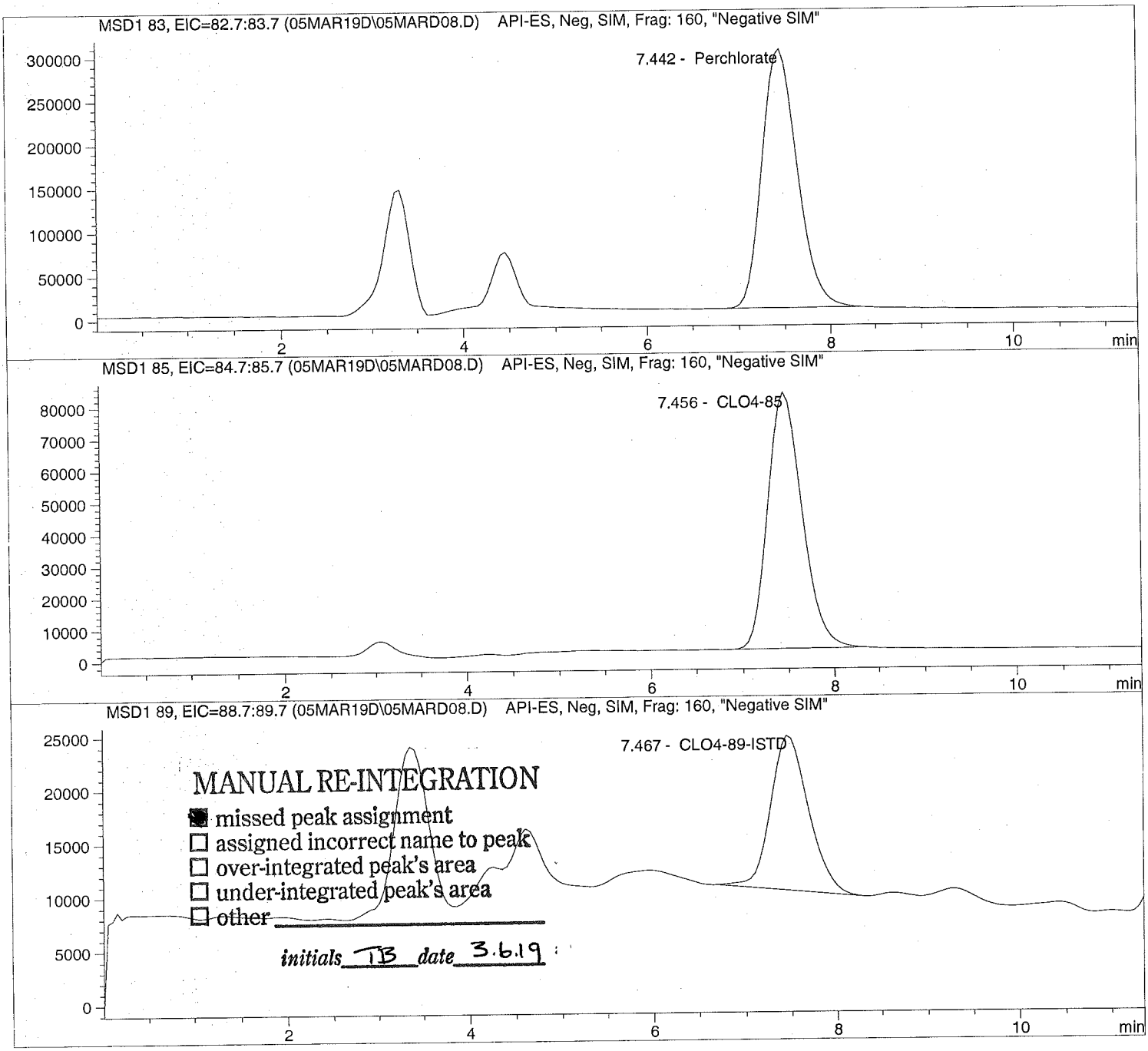
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	53.6994	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	53.9810	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.467	MM	416709.1	5.0000	CLO4-89-ISTD

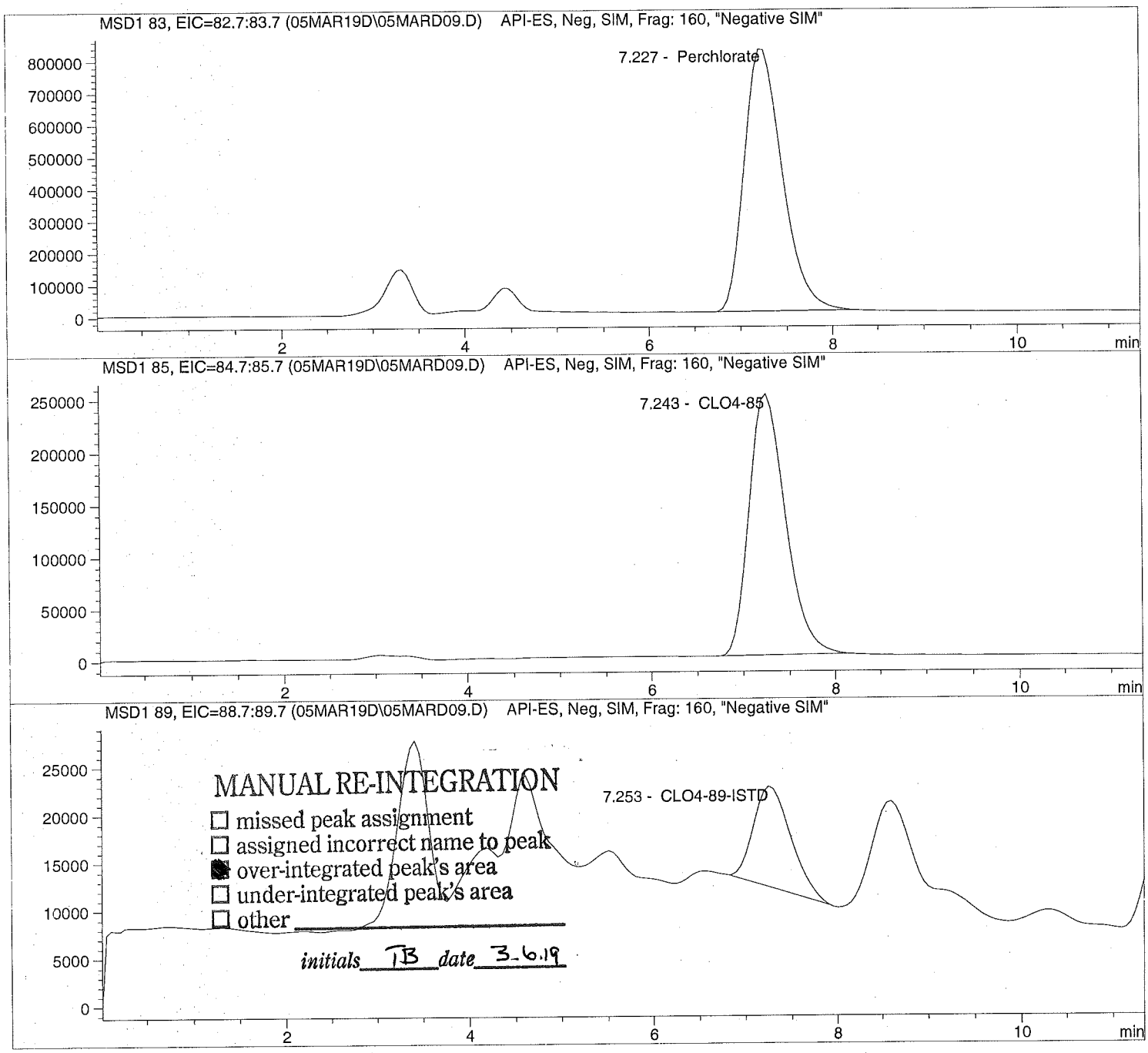
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	172.3652	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	180.4596	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.253	MM	295705.2	5.0000	CLO4-89-ISTD

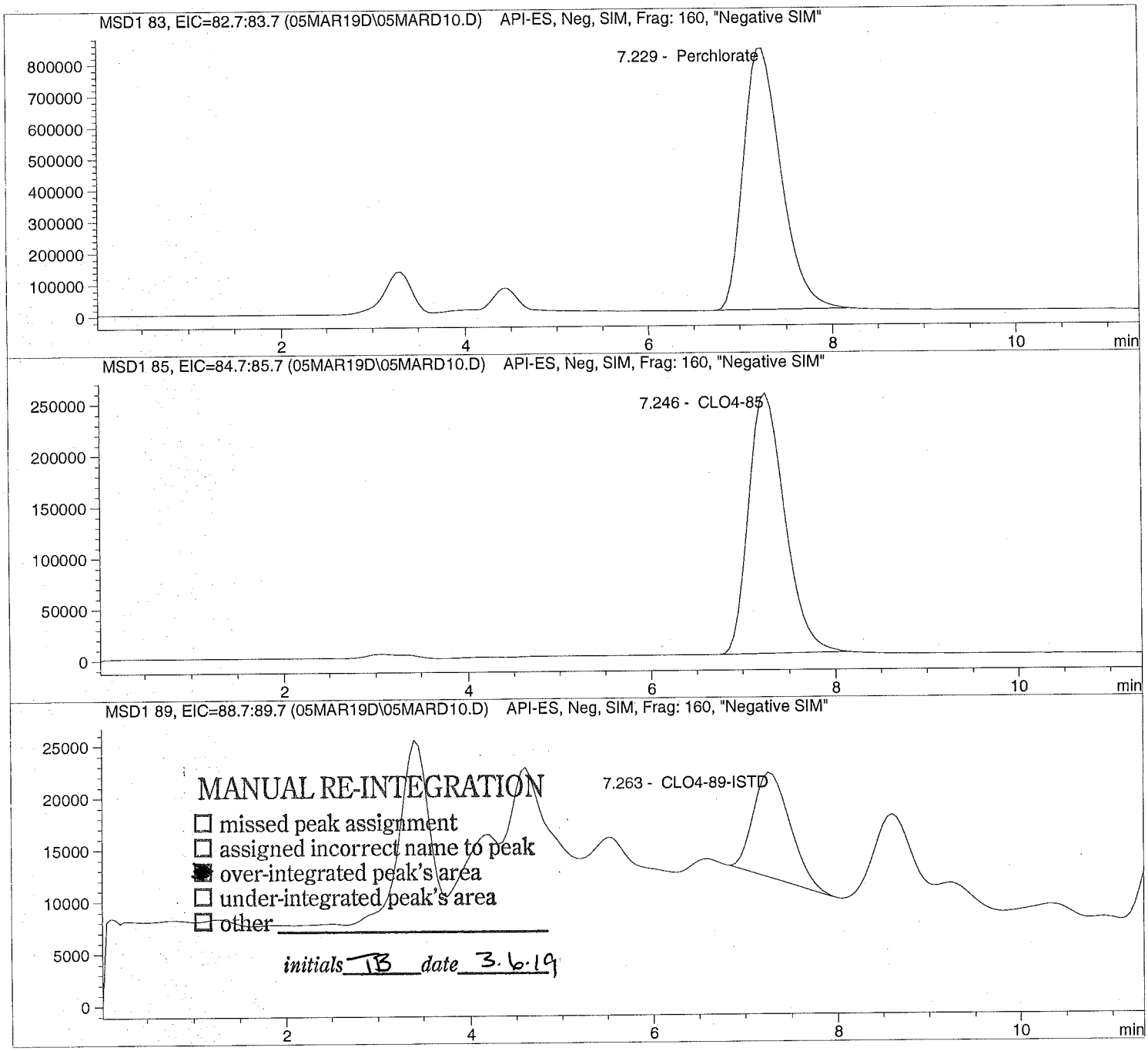
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	180.3857	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	190.3438	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	MM	275946.4	5.0000	CLO4-89-ISTD

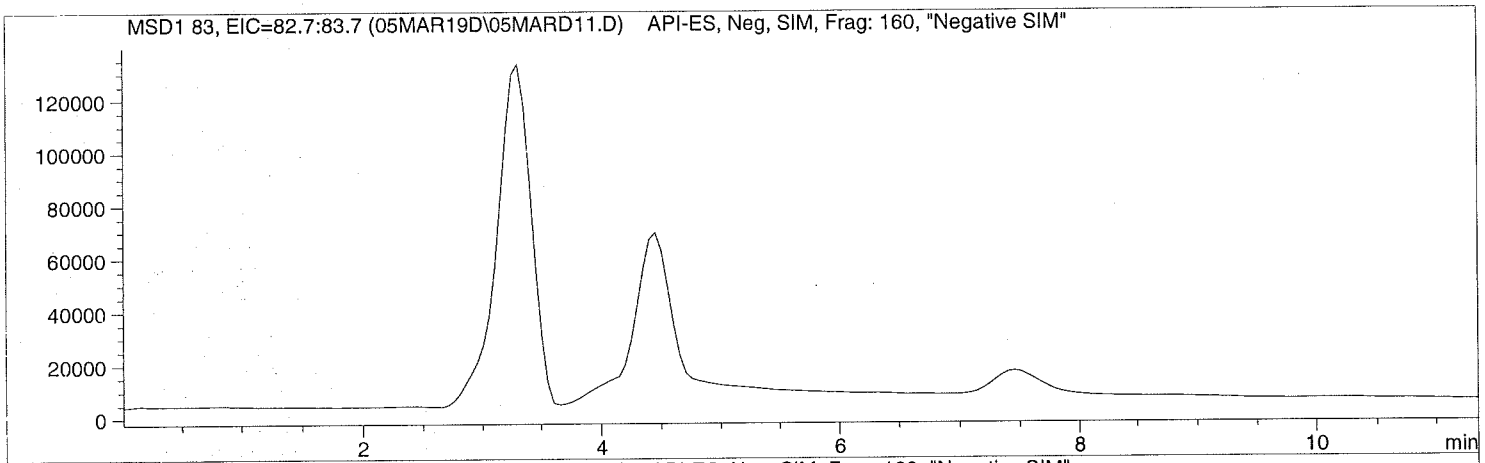
*** End of Report ***

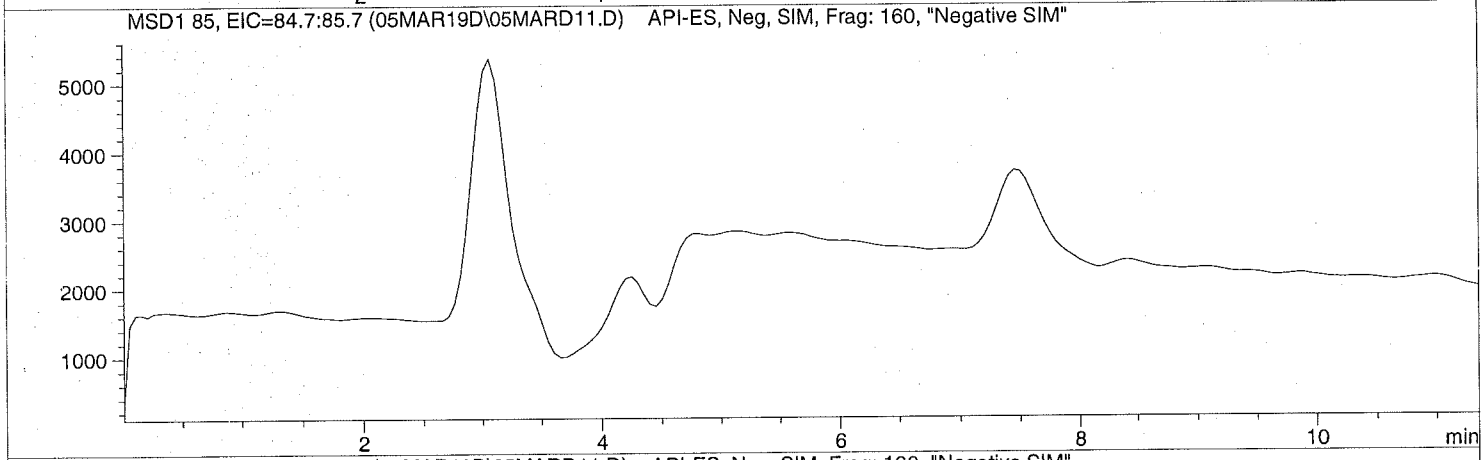
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

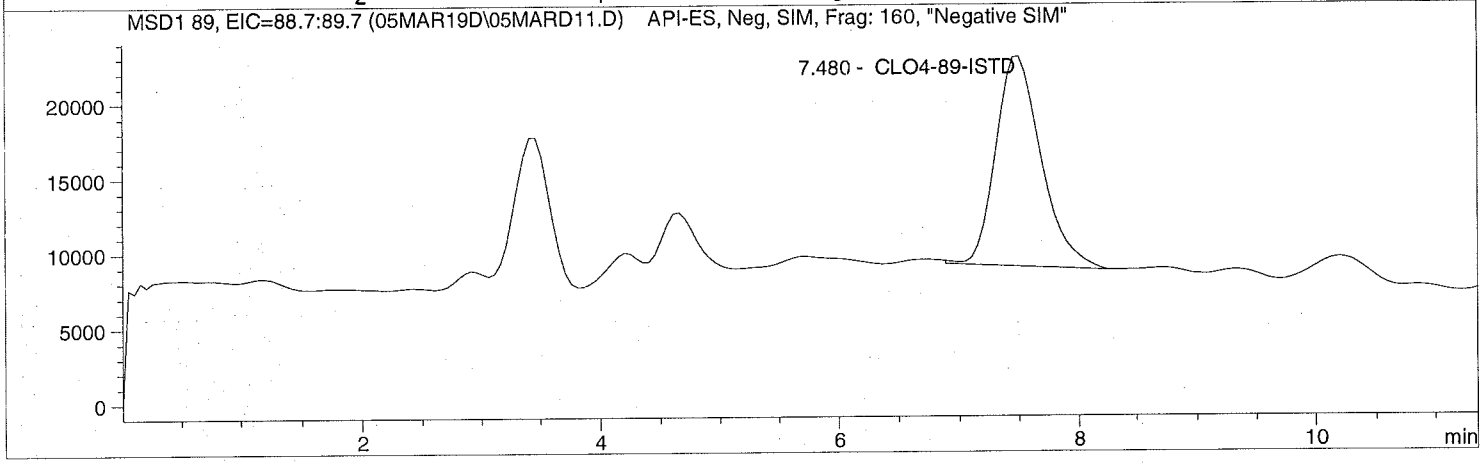
Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.480	BBA	373575.4	5.0000	CLO4-89-ISTD

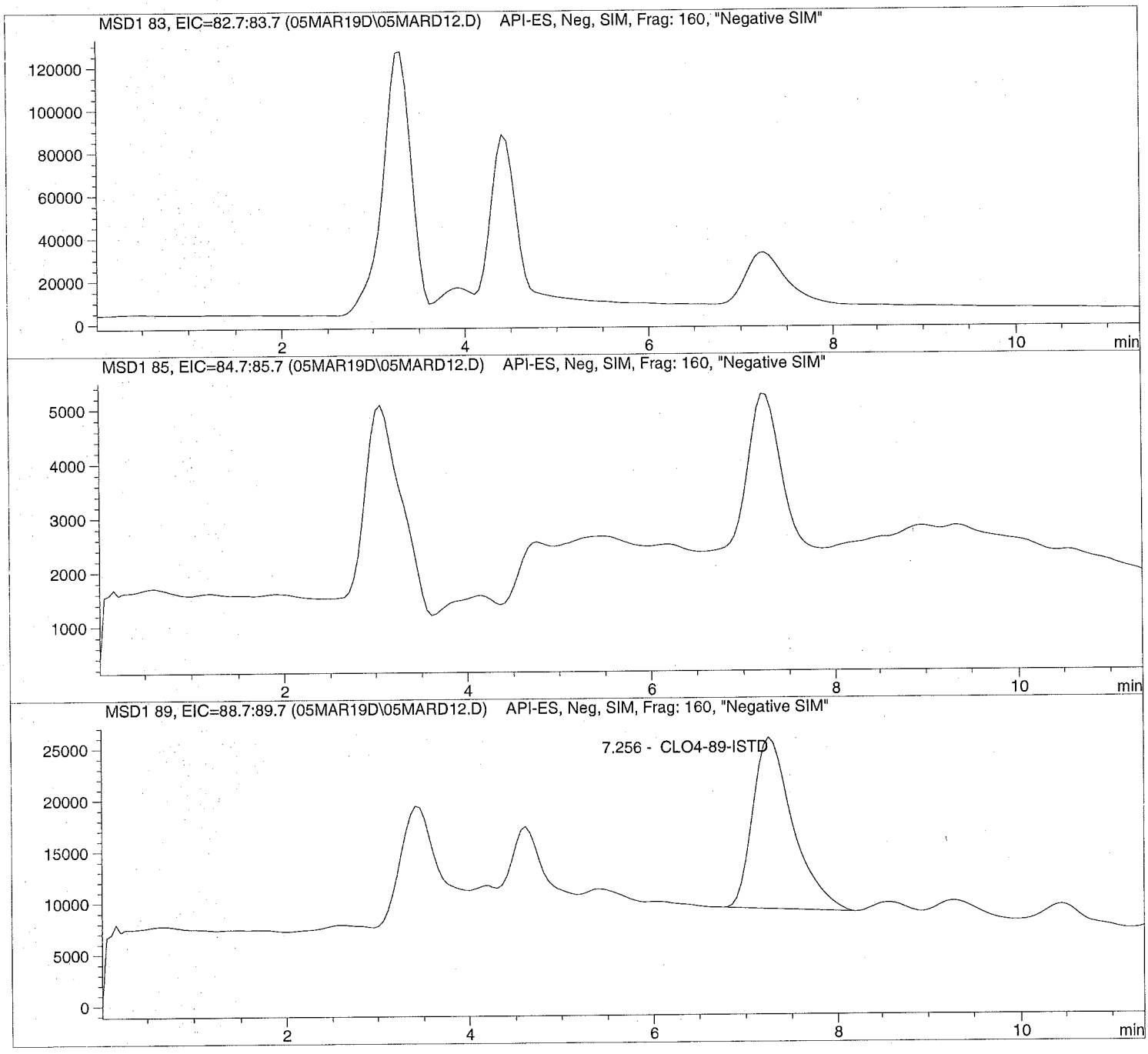
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.256	PB	500532.9	5.0000	CLO4-89-ISTD

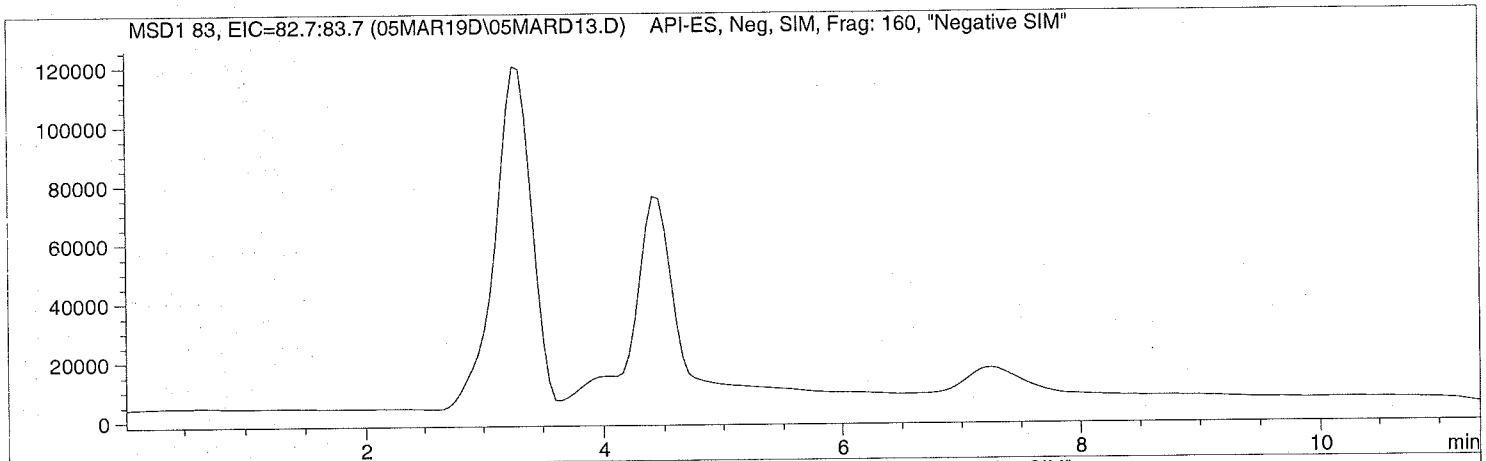
*** End of Report ***

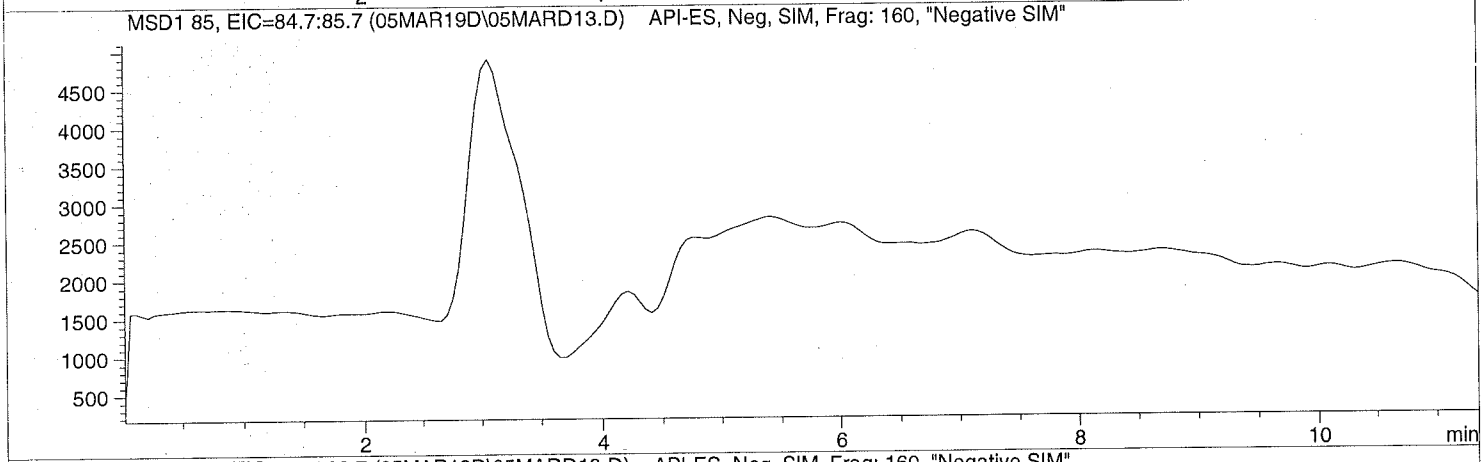
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

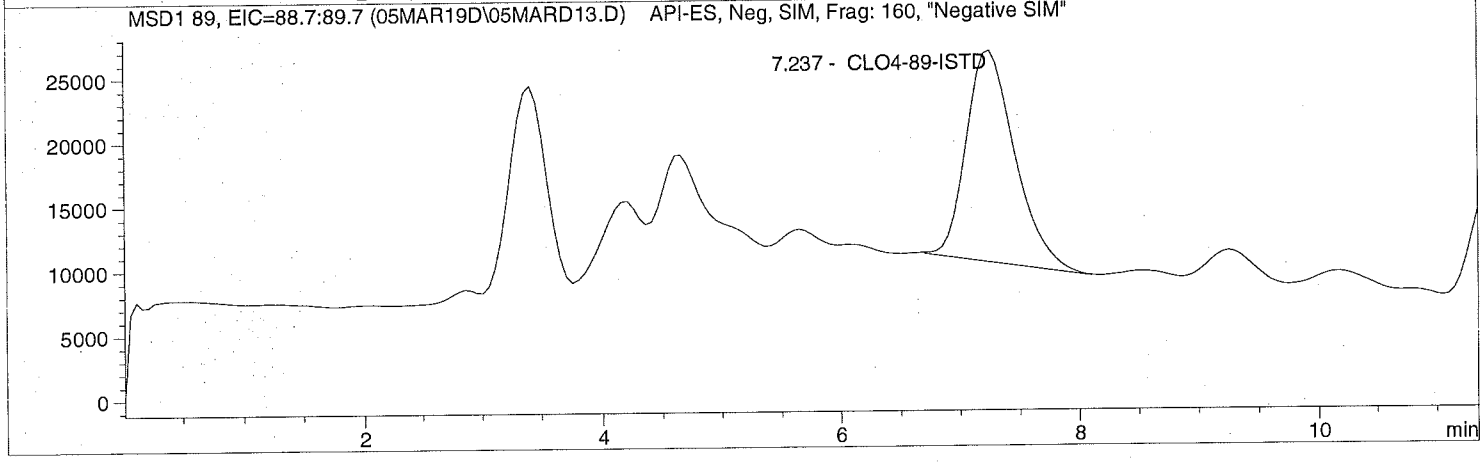
Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.237	BBA	465121.2	5.0000	CLO4-89-ISTD

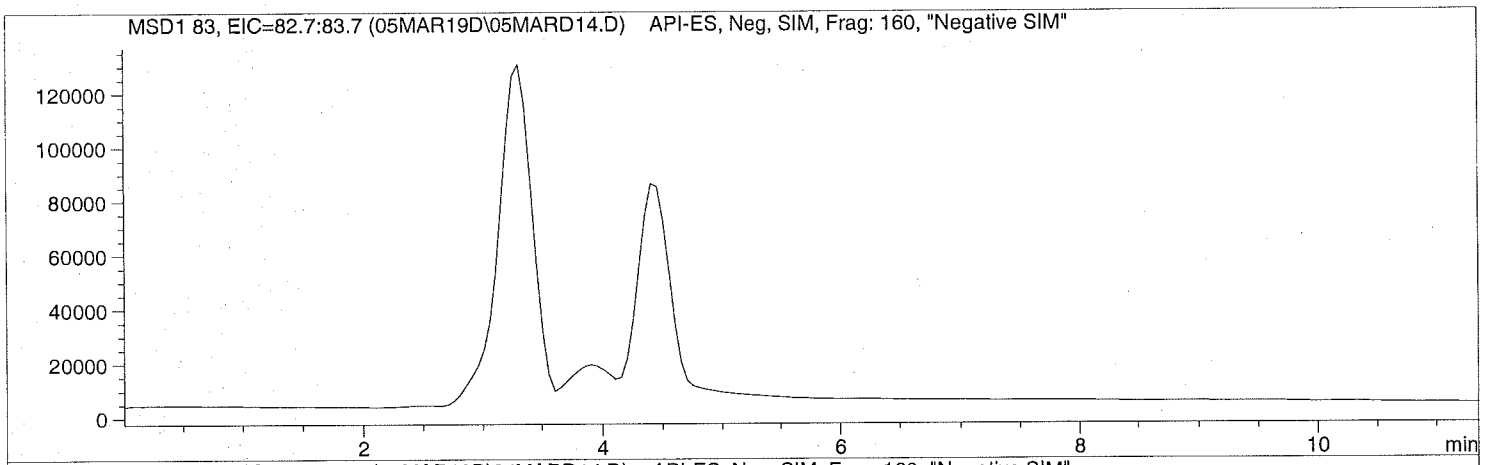
*** End of Report ***

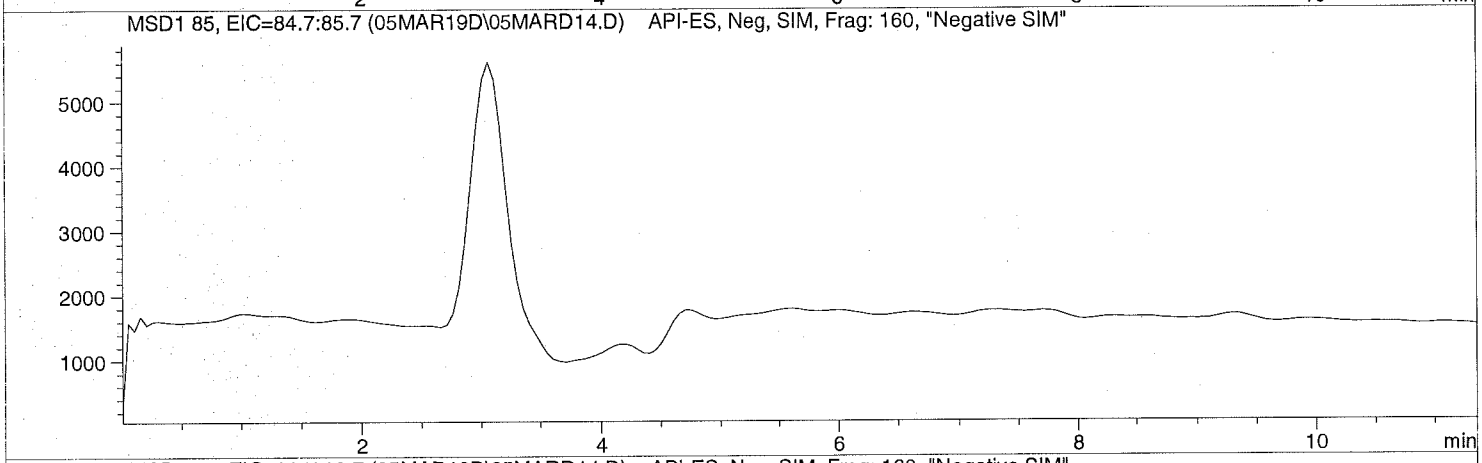
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

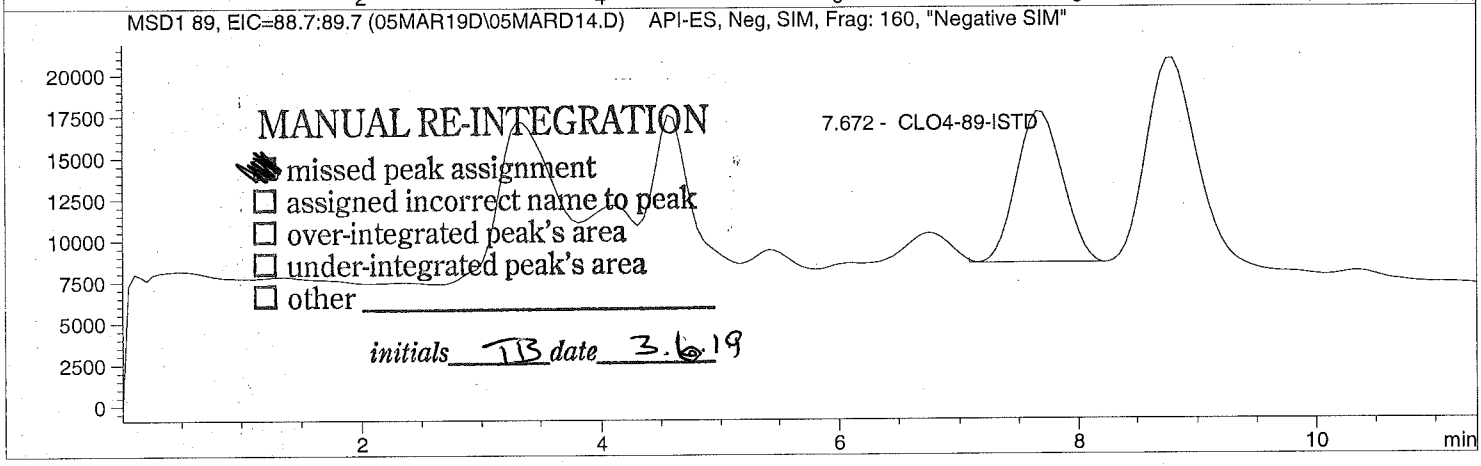
Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	5.0000	CLO4-89-ISTD

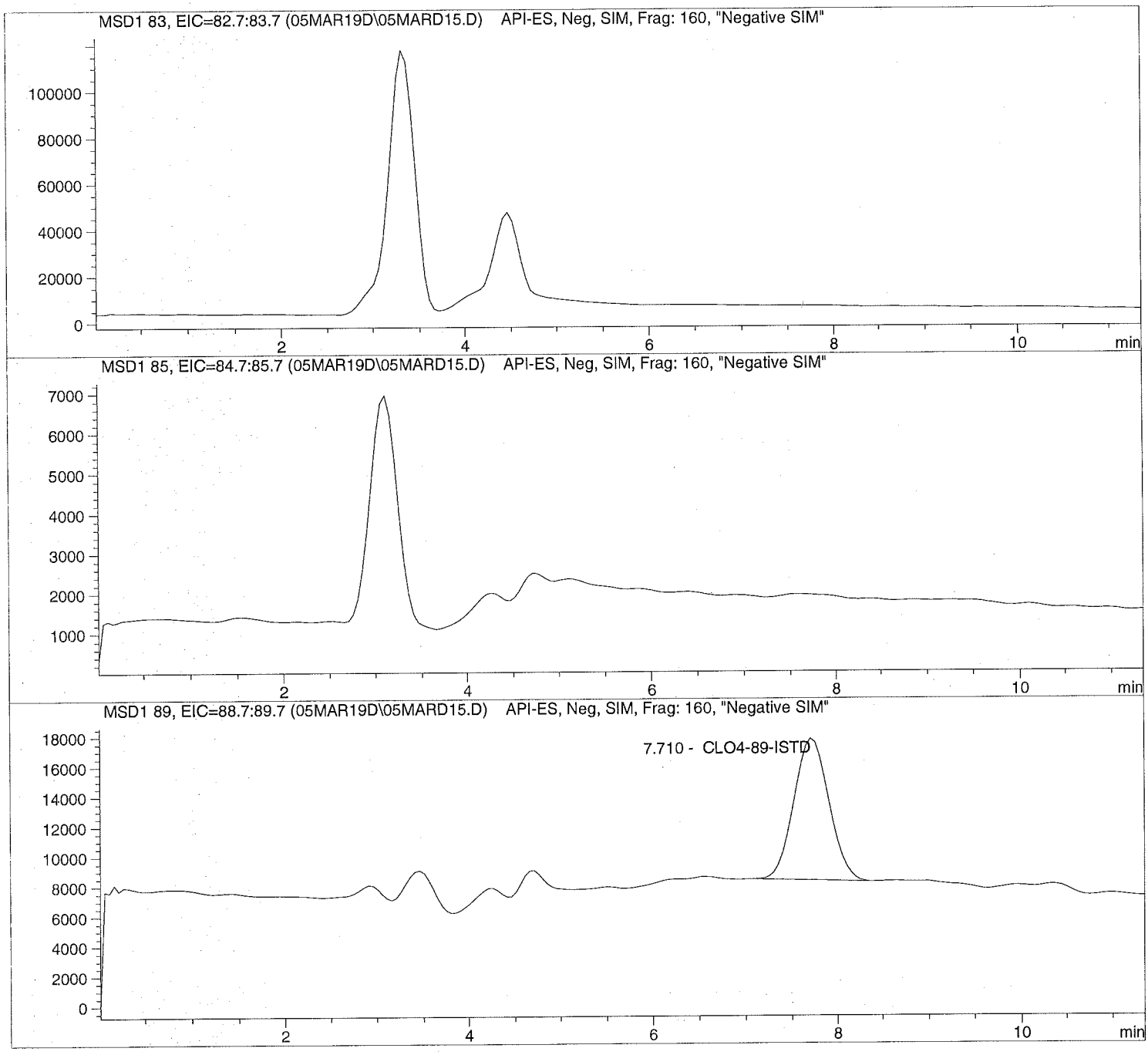
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.710	BBA	251865.4	5.0000	CLO4-89-ISTD

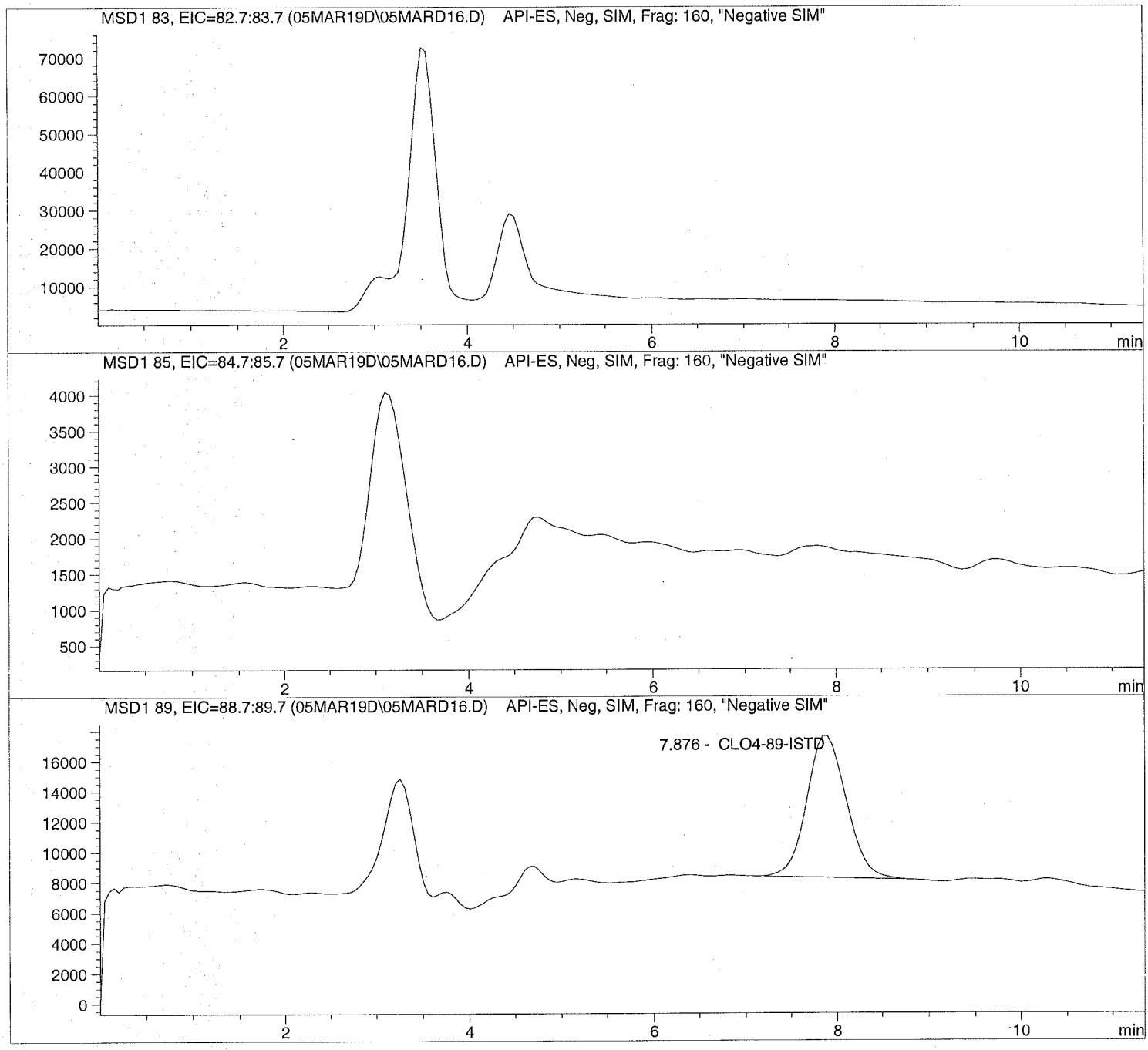
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.876	BBA	280792.2	5.0000	CLO4-89-ISTD

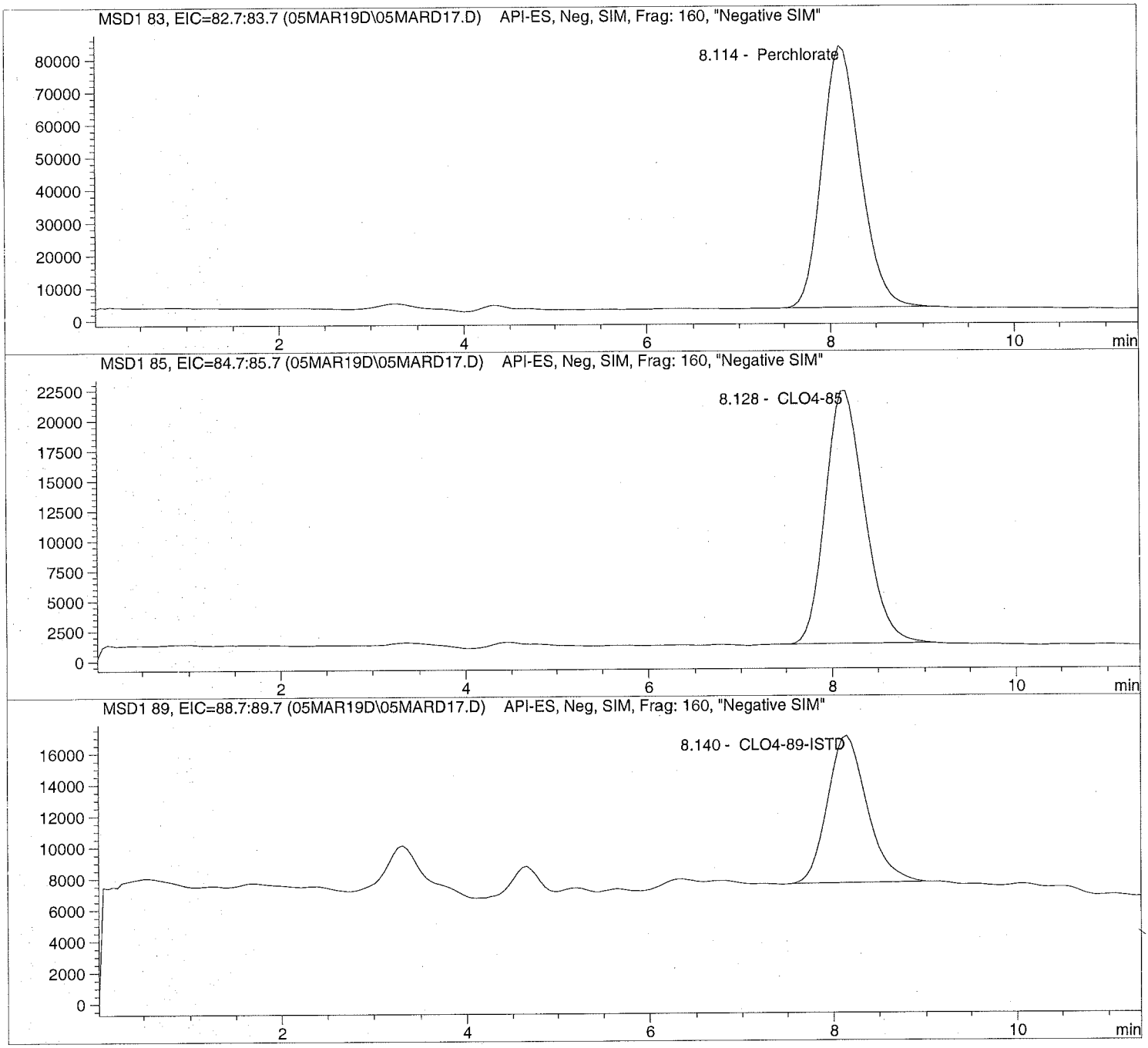
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD17.D Sample Name: 642101 CCV@25

Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	2336112.7	25.0199	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.128	PBA	628961.2	25.6341	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.140	PBA	283460.4	5.0000	CLO4-89-ISTD

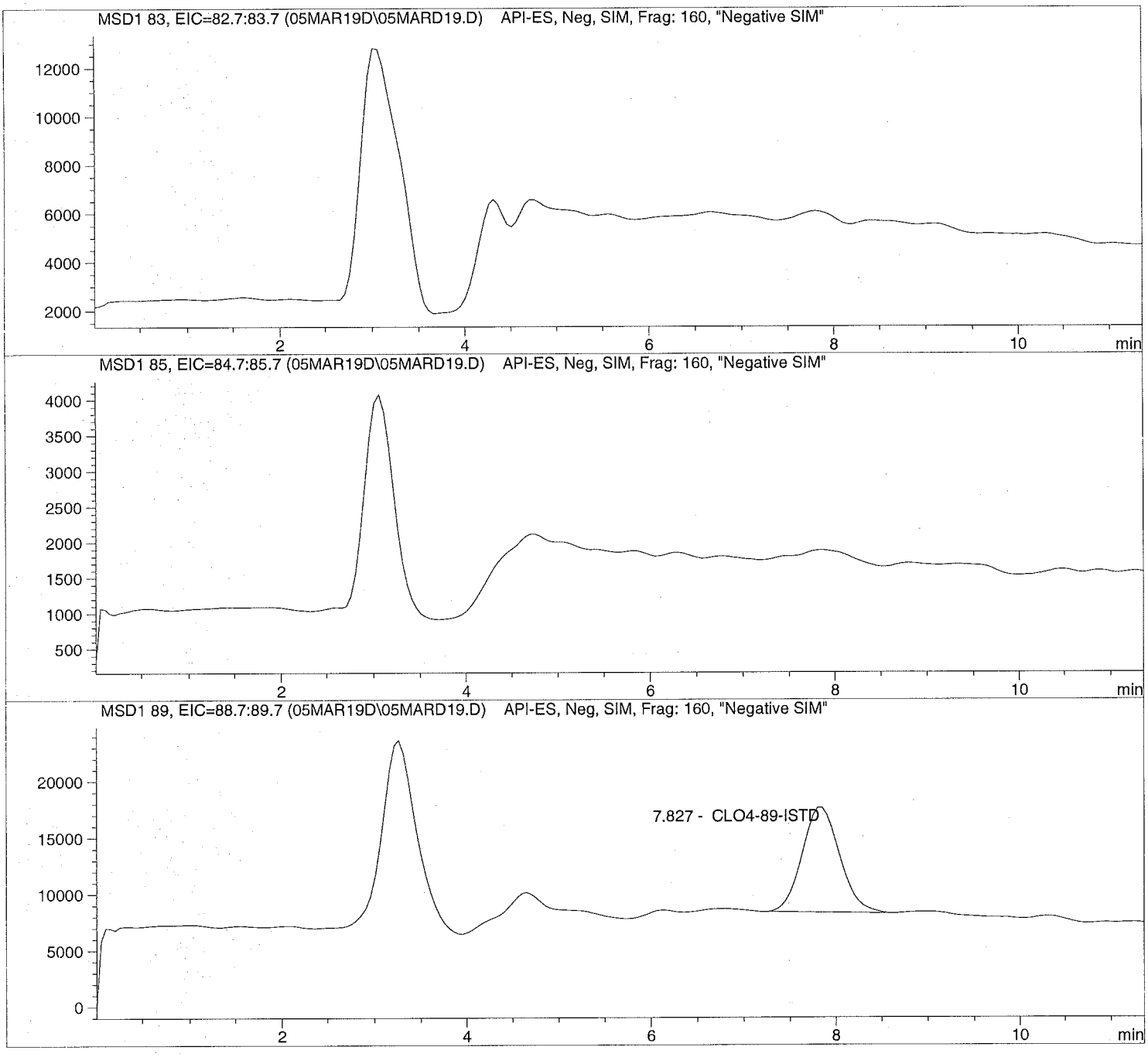
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.827	PBA	264674.3	5.0000	CLO4-89-ISTD

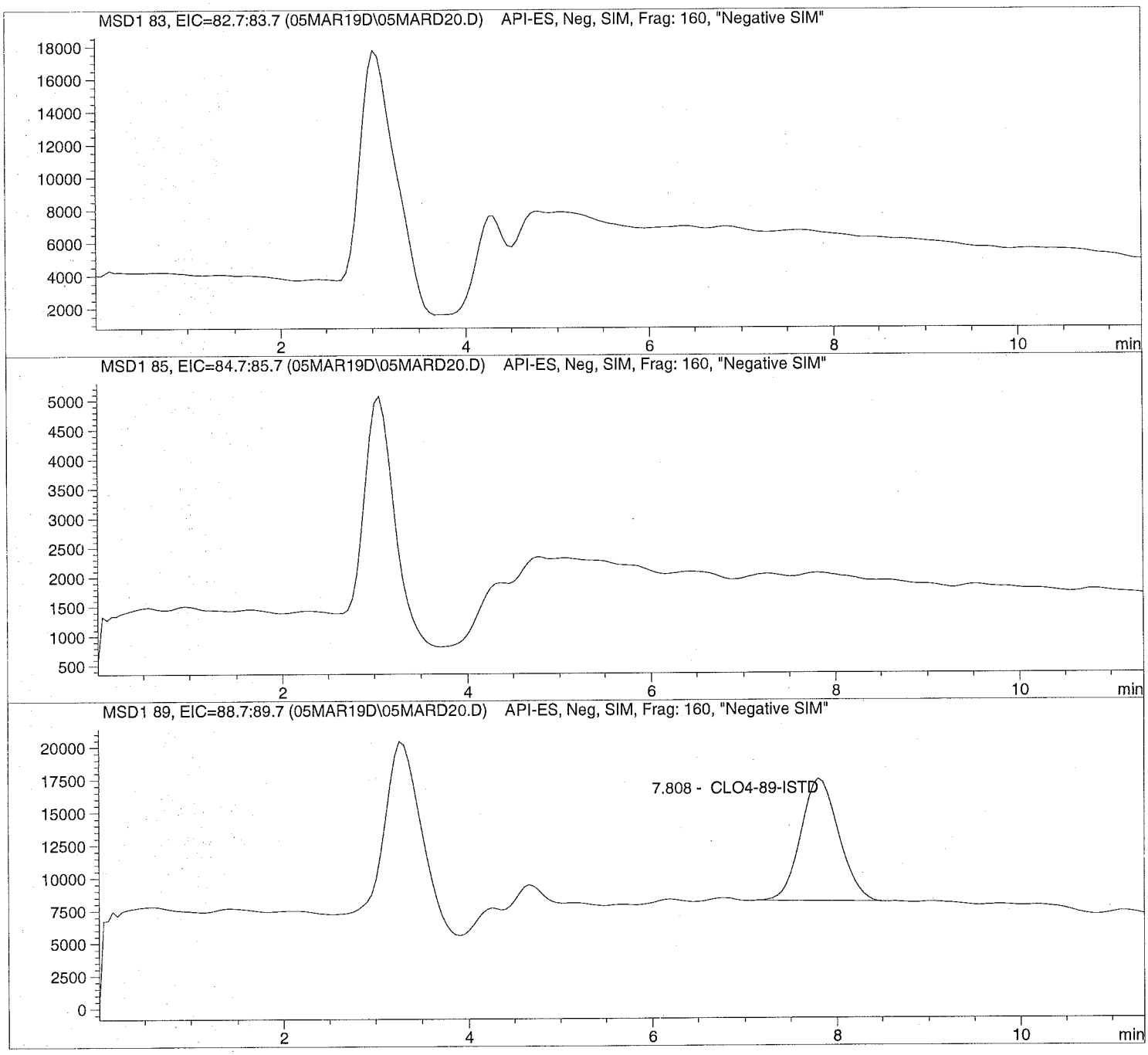
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.808	PBA	265662.0	5.0000	CLO4-89-ISTD

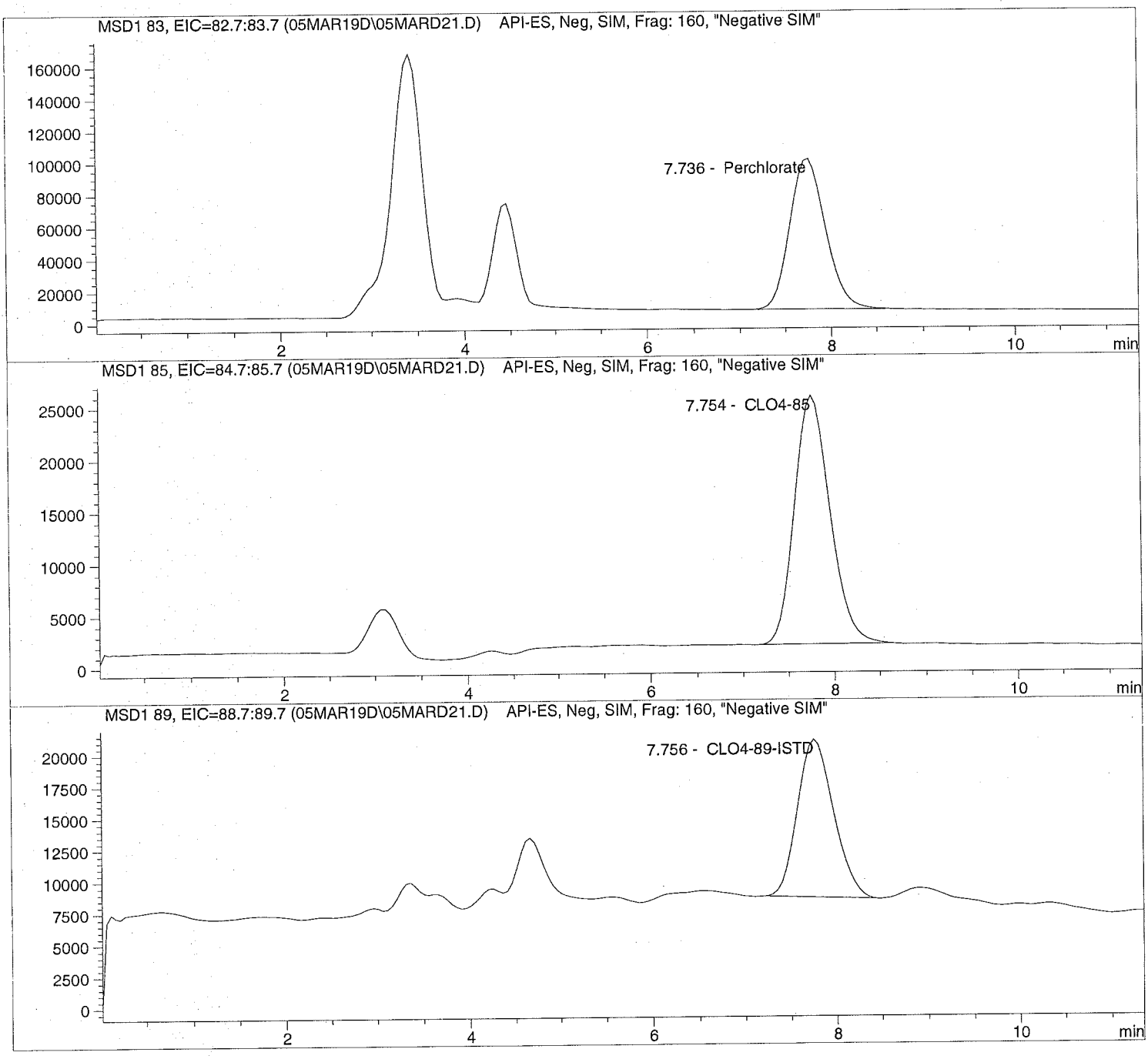
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X 00934604

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.736	PBA	2531259.3	226.4815	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.754	PBA	646870.4	220.9191	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	PB	341607.9	50.0000	CLO4-89-ISTD

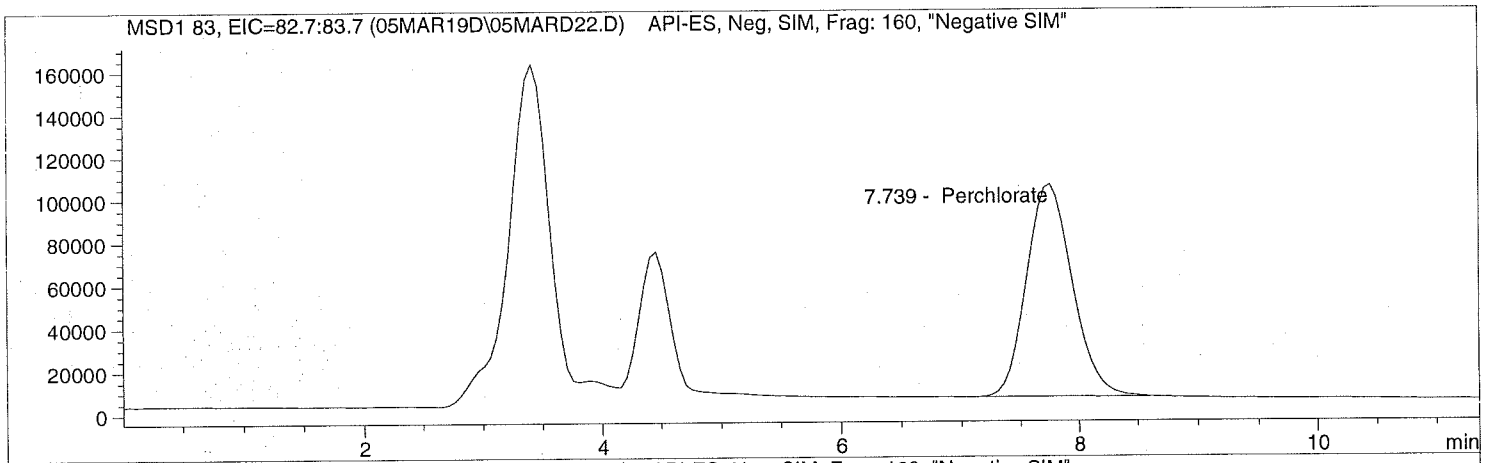
*** End of Report ***

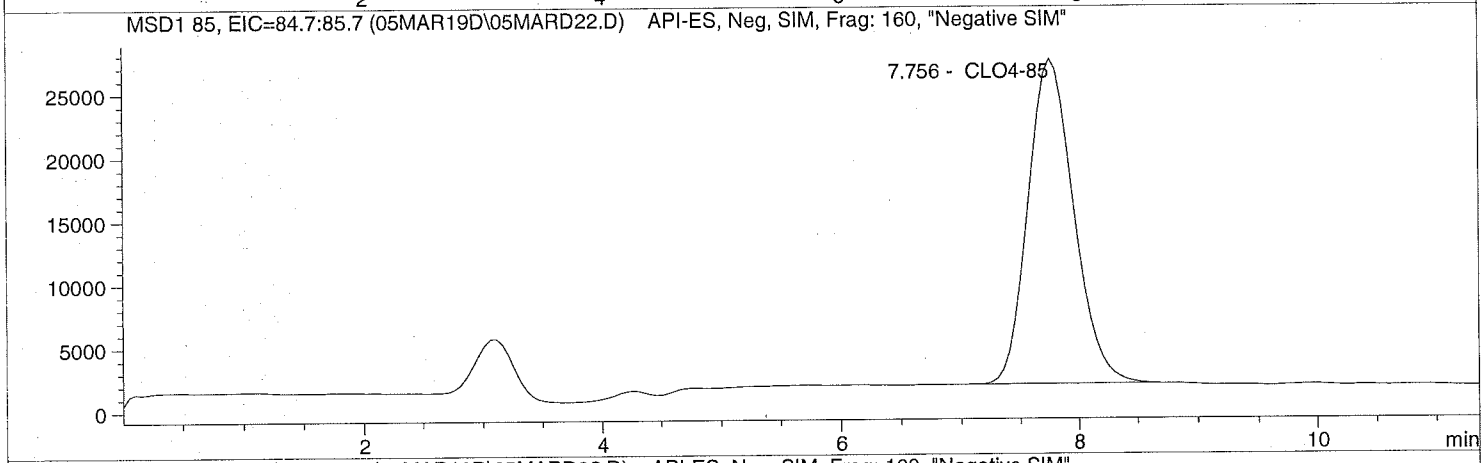
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X

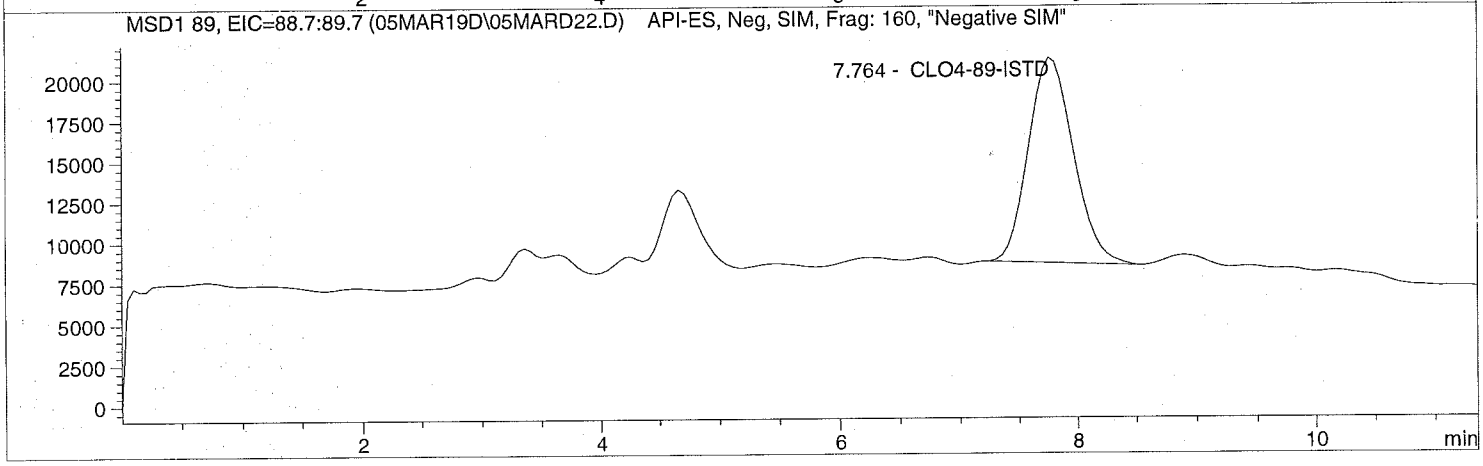
Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X

Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.739	PBA	2682370.5	241.0371	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	BBA	695643.1	238.4467	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.764	PB	338724.1	50.0000	CLO4-89-ISTD

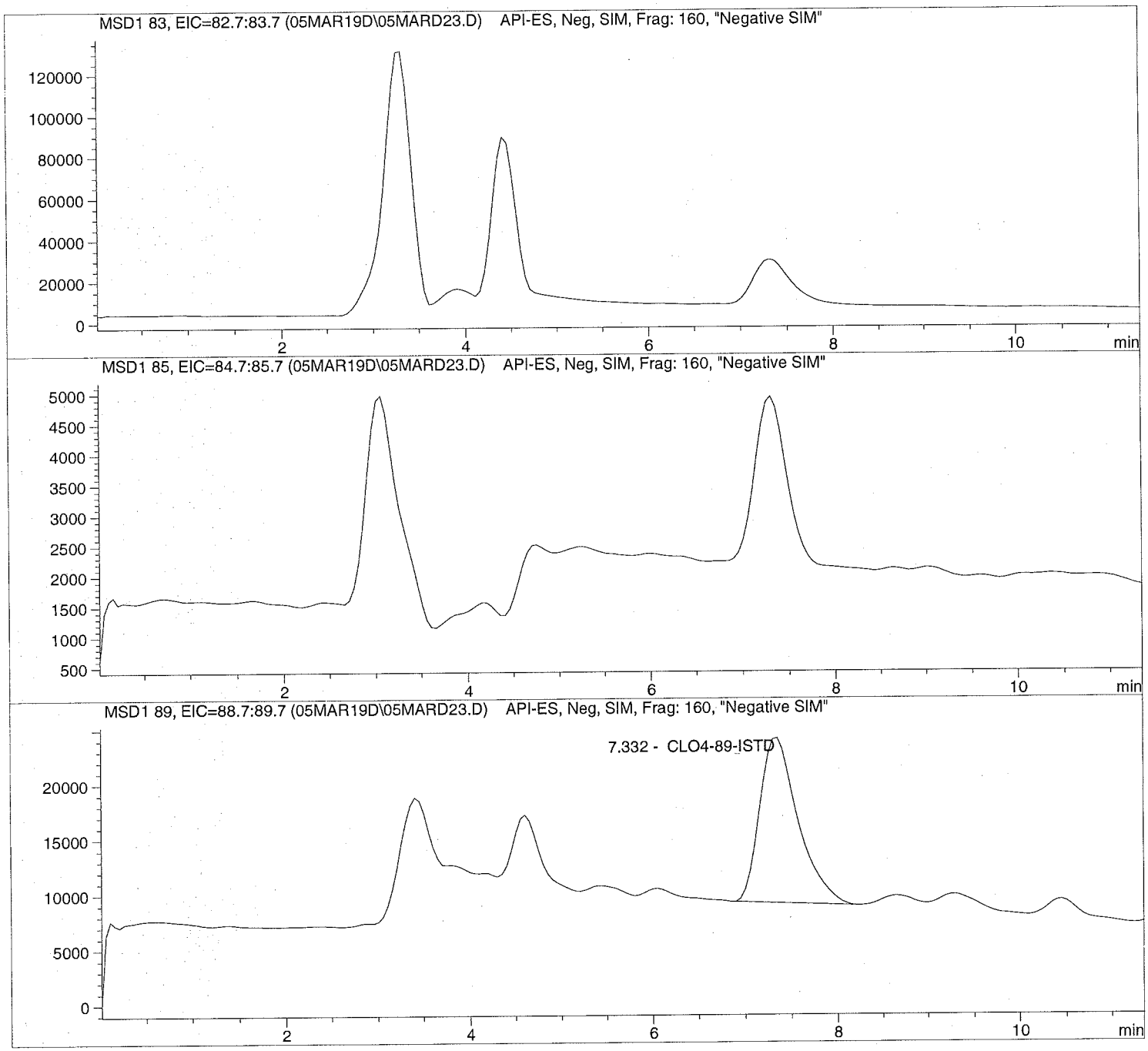
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.332	PB	431134.6	5.0000	CLO4-89-ISTD

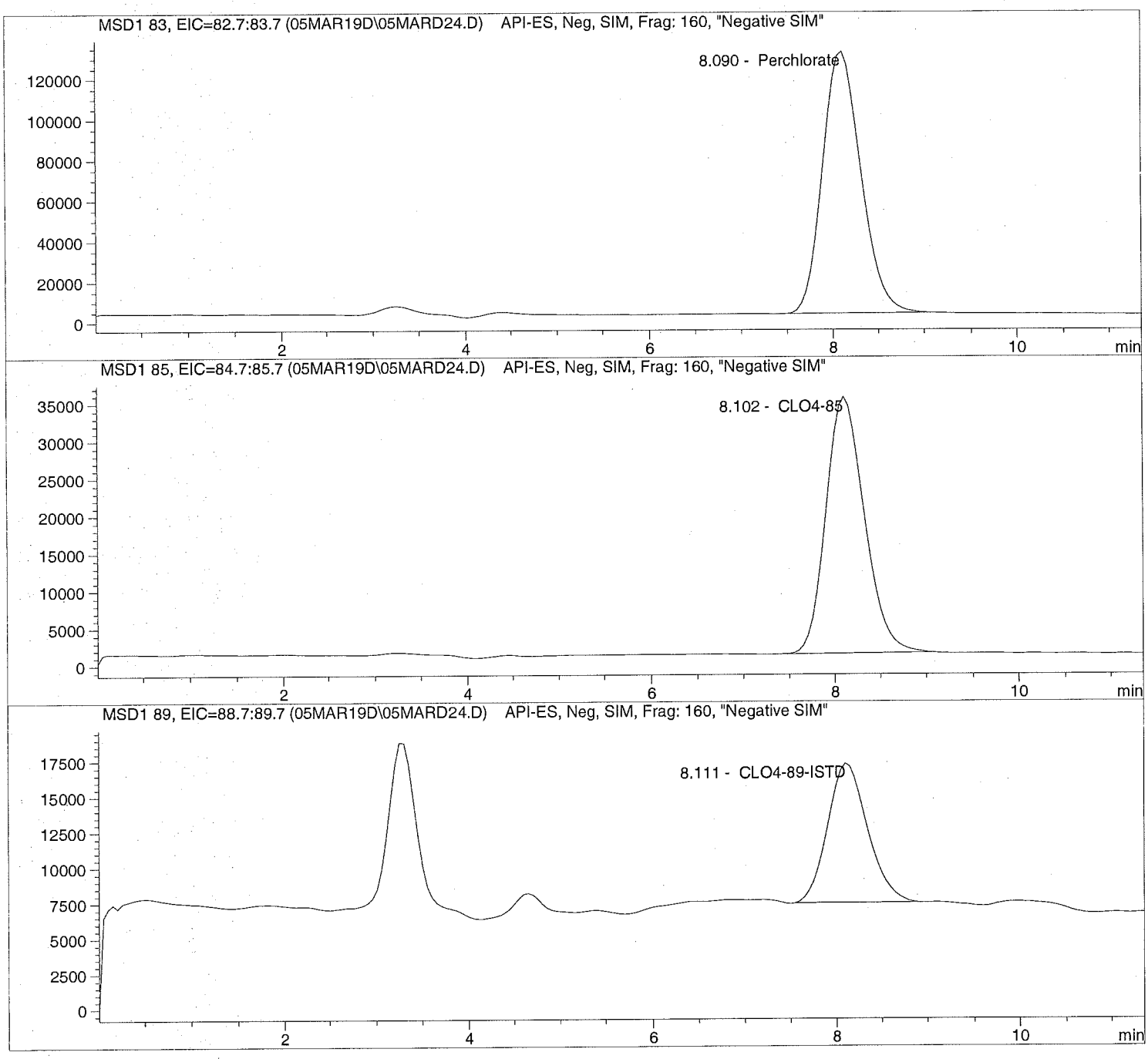
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	100.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.090	PBA	3773628.7	3708.6567	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.102	PBA	1010205.2	3771.6748	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.111	PBA	298984.6	500.0000	CLO4-89-ISTD

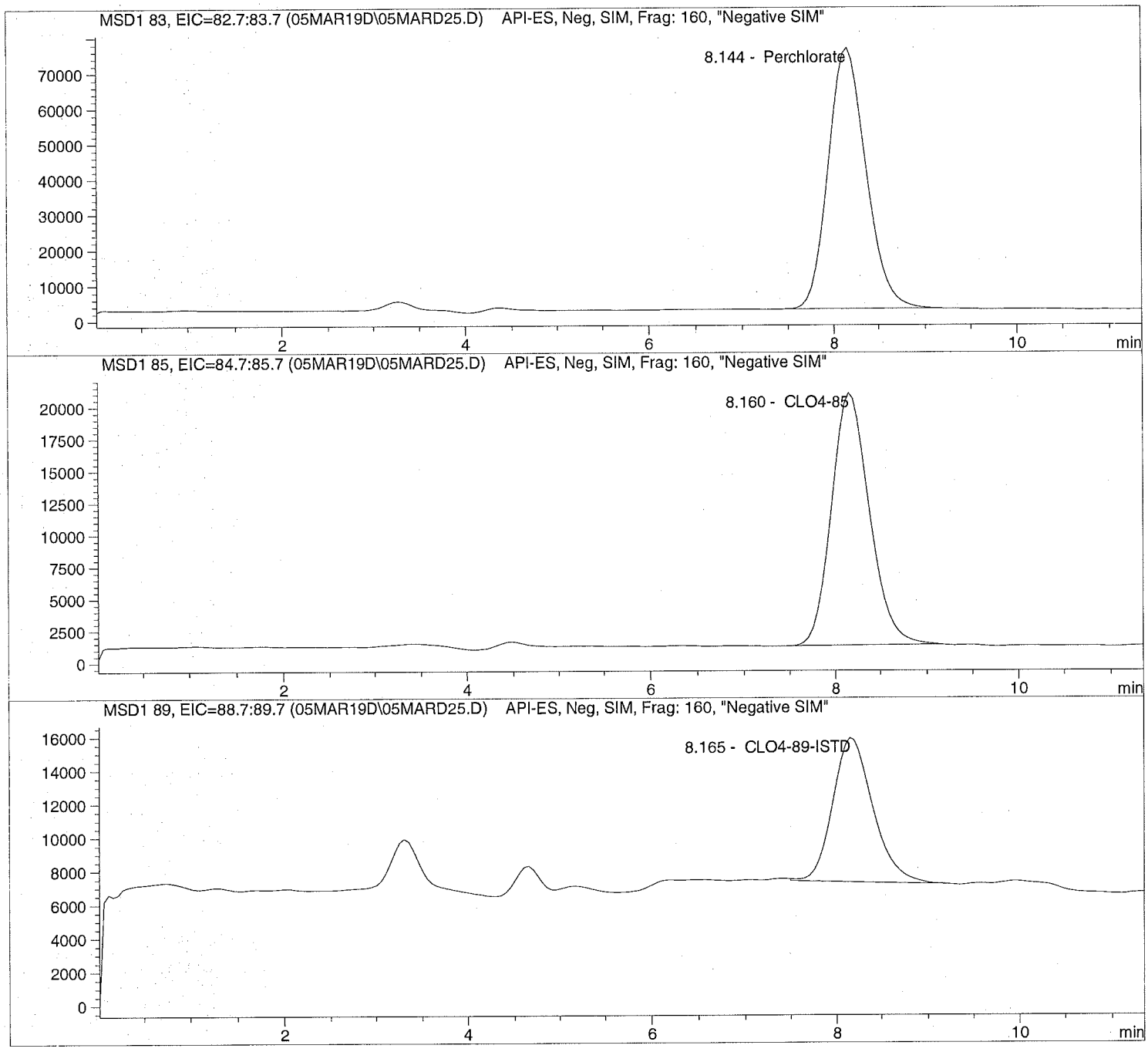
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.144	PBA	2157871.5	24.4553	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.160	PBA	583711.5	25.1665	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.165	BBA	268305.4	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Batch Report: C:\HPCHEM\1\DATA\15FEB19I\15FEB19D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	8.94006e4	7.889	9.89924e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	1.97443e5	8.114	2.26028
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	4.79370e5	7.828	4.65688
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	9.30136e5	7.904	9.14998
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	2.81067e6	7.793	25.52636
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	5.66830e6	7.976	51.07439
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	8.69624e6	7.886	74.30603
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	1.01141e6	7.988	9.46019

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.26121e4	7.914	9.98836e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	5.53134e4	8.127	2.11360
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	1.39247e5	7.842	4.91261
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	2.54396e5	7.923	9.39034
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	7.35969e5	7.811	25.48268
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	1.47152e6	7.993	50.35774
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	2.32809e6	7.900	74.72233
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	2.81230e5	8.007	9.87858

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.41443e5	7.900	5.00000
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	2.99651e5	8.132	5.00000
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	3.38646e5	7.853	5.00000
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	3.25154e5	7.925	5.00000
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	3.33799e5	7.819	5.00000
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	3.14712e5	7.999	5.00000
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	3.13909e5	7.908	5.00000
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	3.41503e5	8.005	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

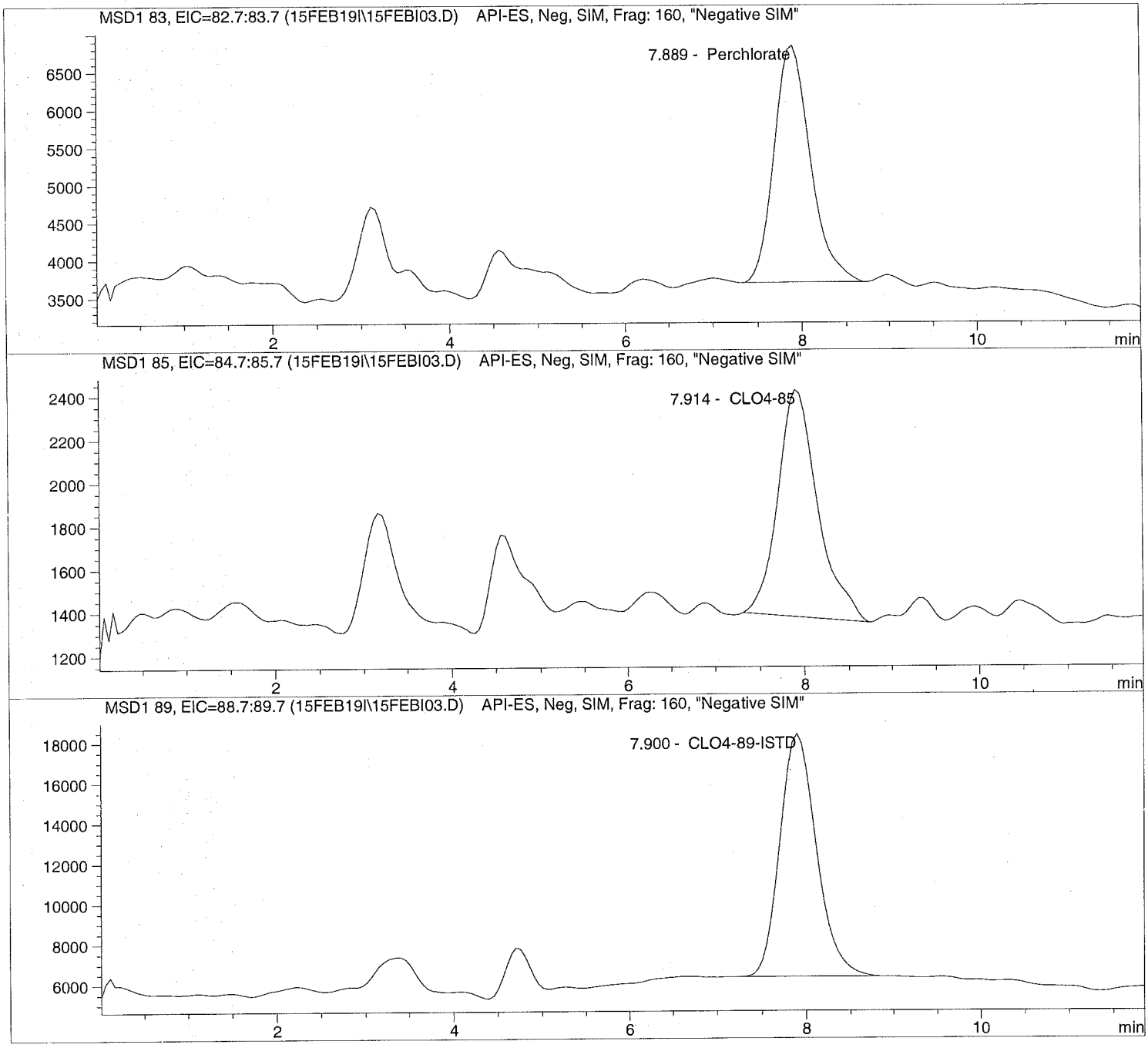
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	CLO4@ .20ug/L	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	CLO4@ 0.5ug/L	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	CLO4@ 1.0ug/L	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	CLO4@ 2.0ug/L	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	CLO4@ 5.0ug/L	CLO4-AQN	1	Ctrl Samp		
6	Vial 76	CLO4@ 10.ug/L	CLO4-AQN	1	Ctrl Samp		
7	Vial 77	CLO4@ 25.ug/L	CLO4-AQN	1	Ctrl Samp		
8	Vial 78	CLO4@ 50.ug/L	CLO4-AQN	1	Ctrl Samp		
9	Vial 79	CLO4@ 75.ug/L	CLO4-AQN	1	Ctrl Samp		
10	Vial 80	ICAL Verf@10ug/L	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.889	PBA	89400.6	0.9899	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.914	BBA	32612.1	0.9988	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	BBA	341443.2	5.0000	CLO4-89-ISTD

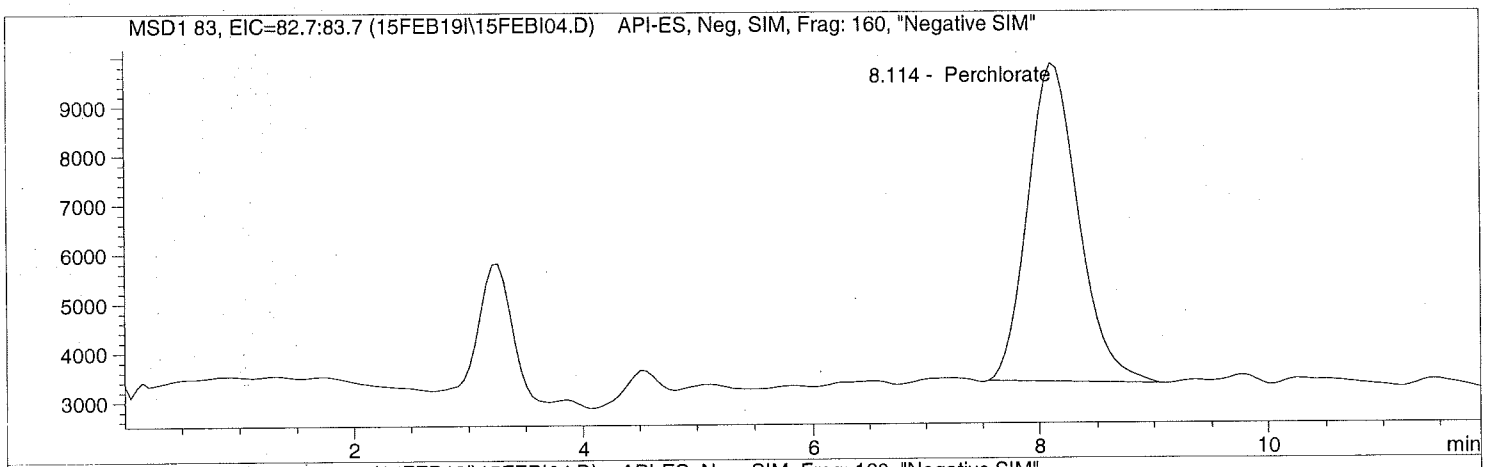
*** End of Report ***

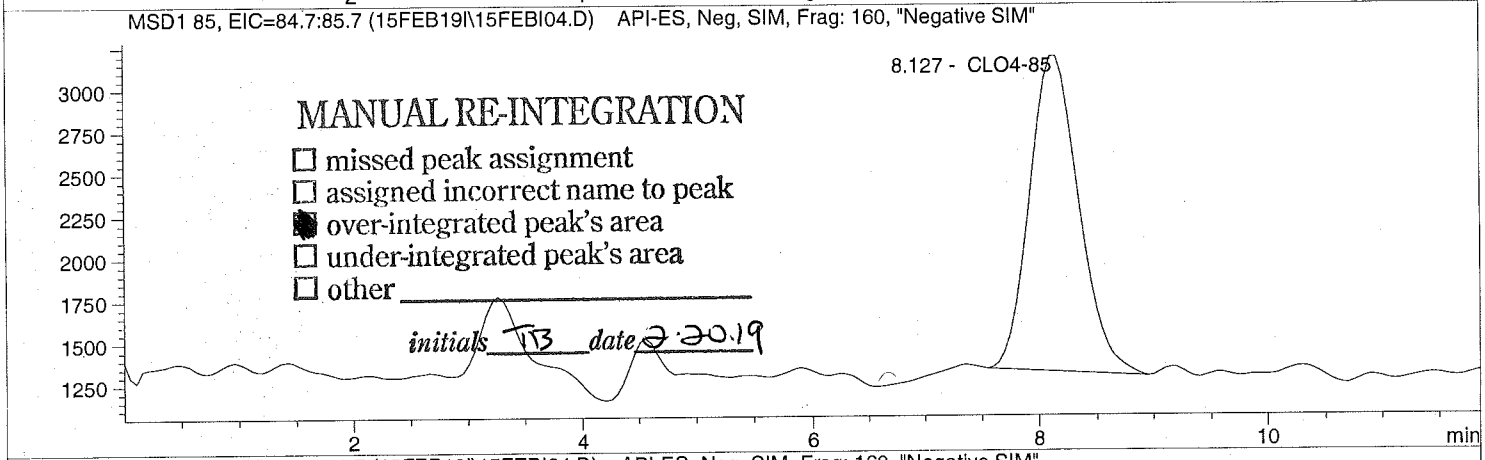
Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

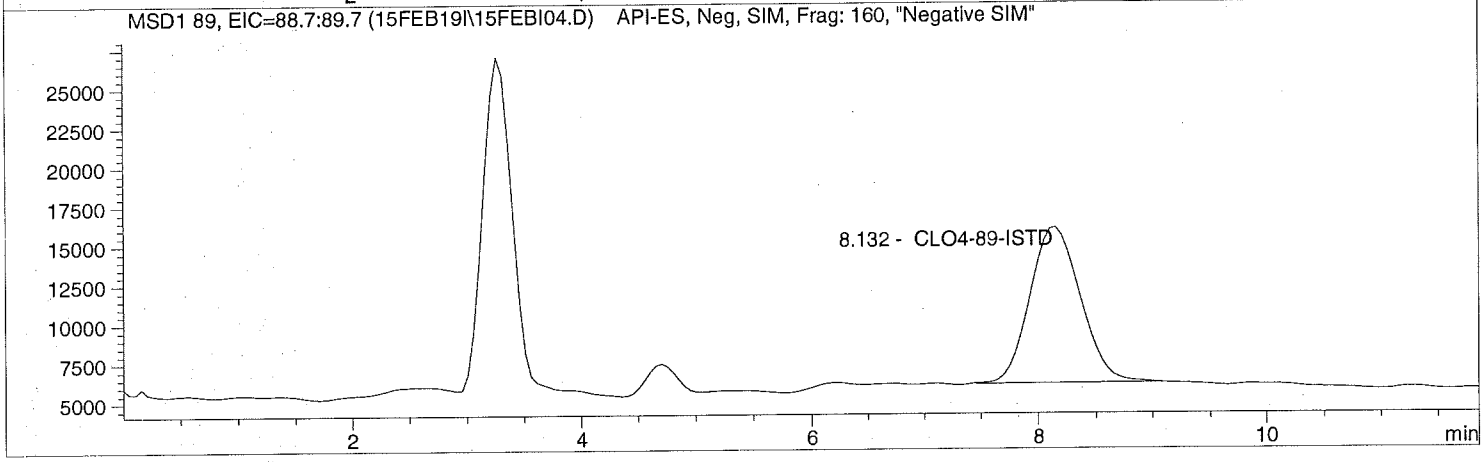
Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	MM	55313.4	2.1136	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

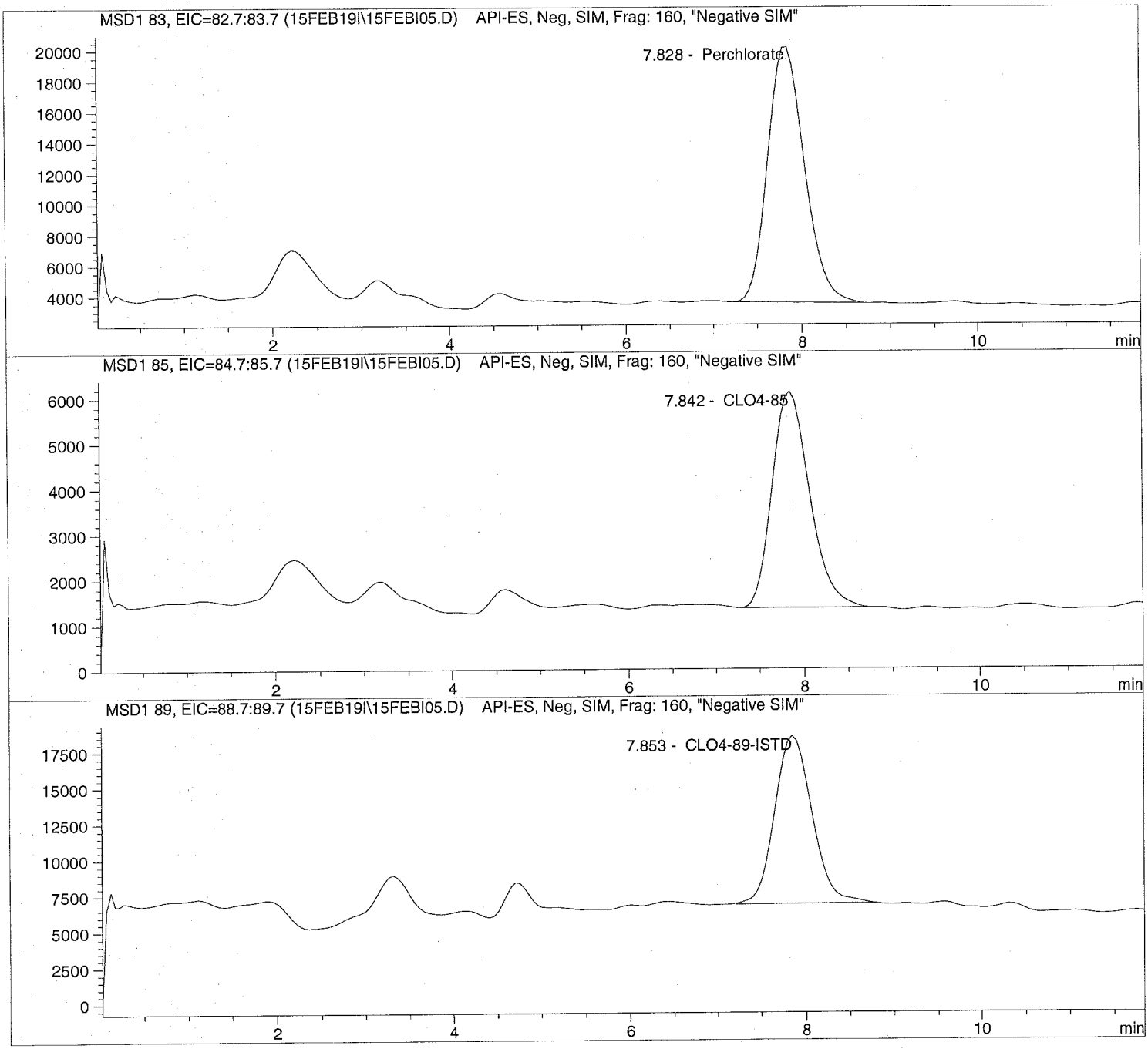
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.828	PBA	479370.4	4.6569	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.842	PBA	139246.9	4.9126	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.853	PBA	338646.3	5.0000	CLO4-89-ISTD

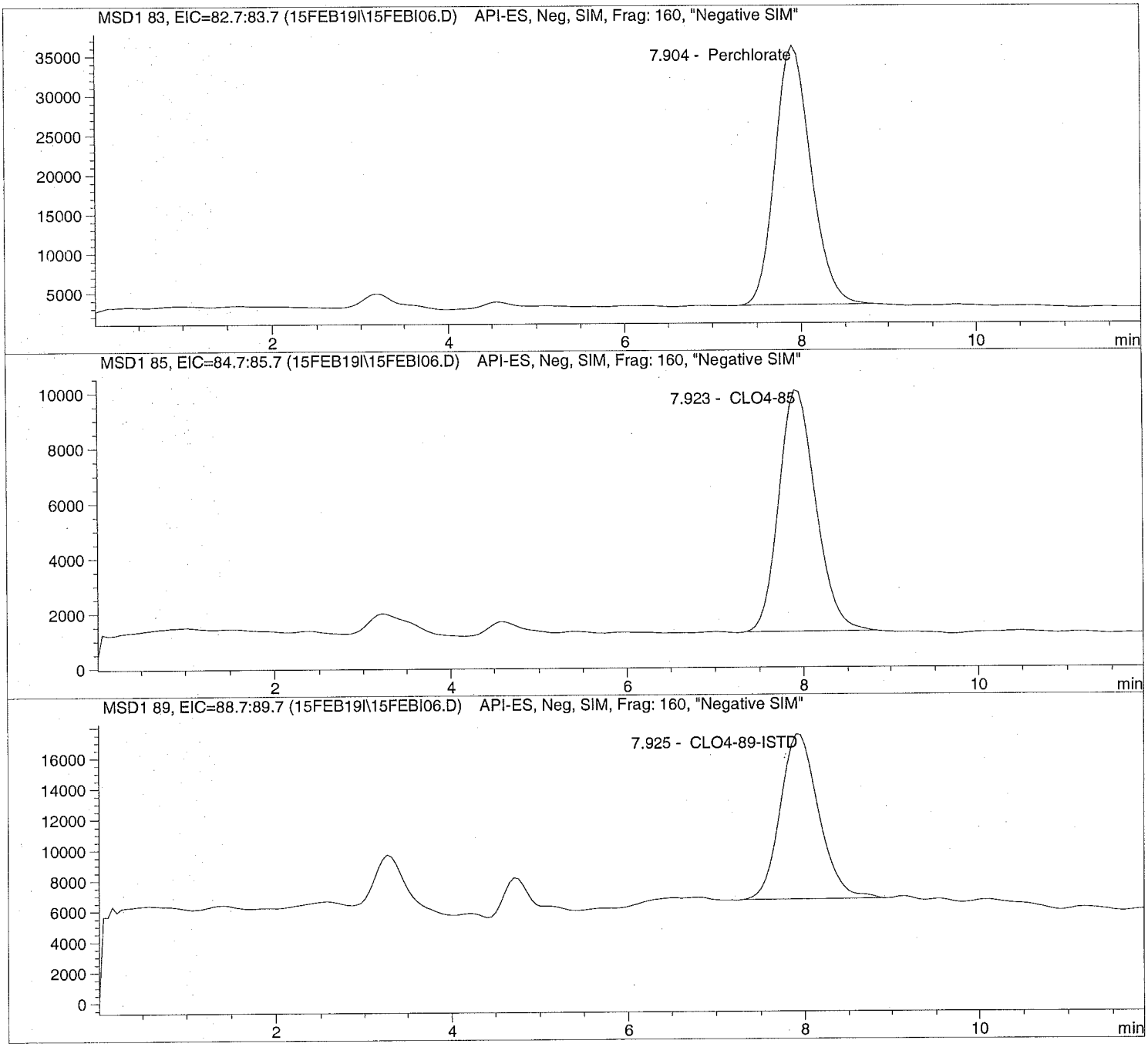
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.904	PBA	930135.8	9.1500	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.923	BBA	254395.6	9.3903	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.925	PBA	325154.4	5.0000	CLO4-89-ISTD

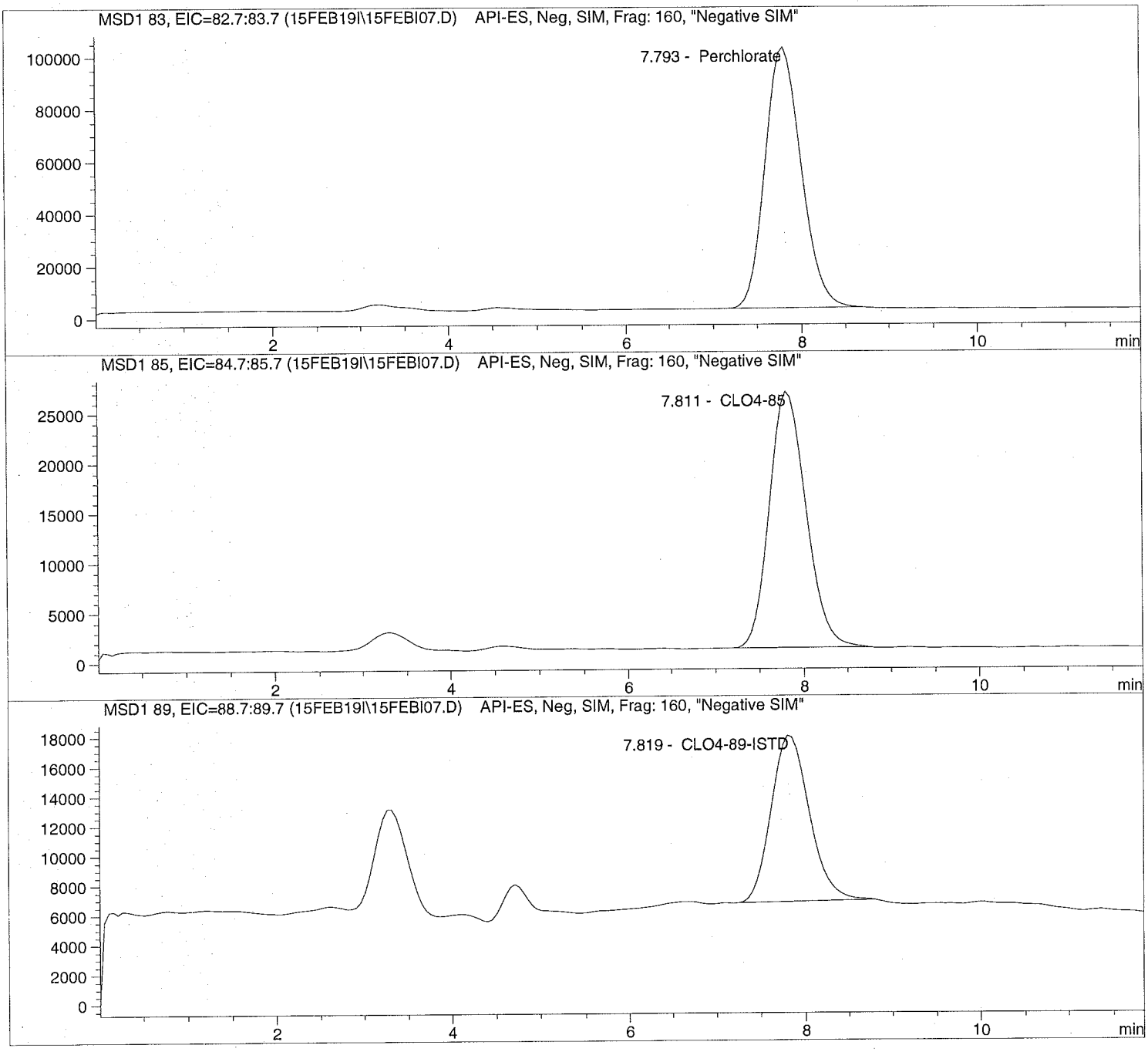
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.793	PBA	2810669.2	25.5264	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.811	BBA	735968.9	25.4827	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.819	PBA	333799.0	5.0000	CLO4-89-ISTD

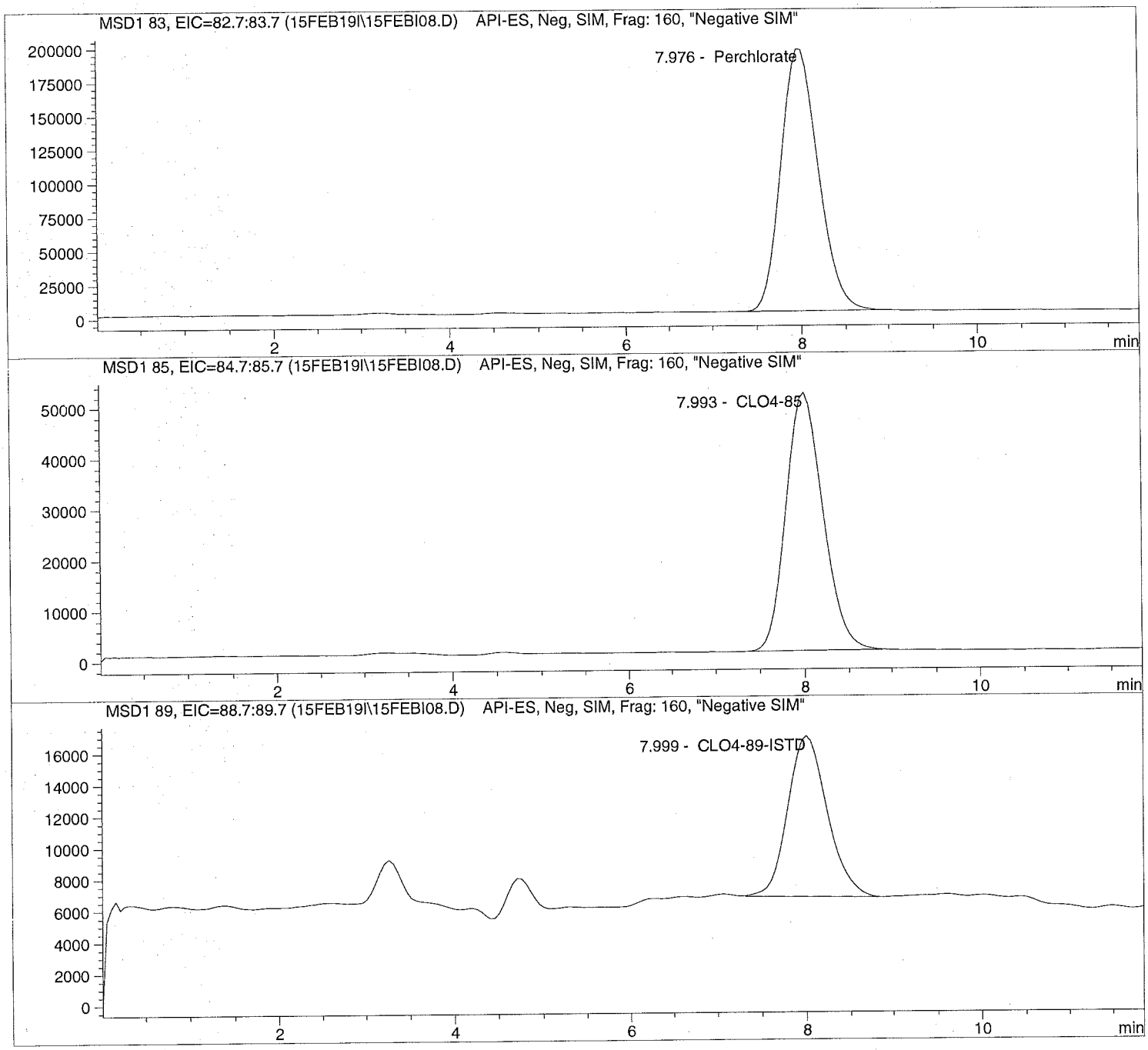
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.976	PBA	5668301.5	51.0744	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.993	PBA	1471522.9	50.3577	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.999	BBA	314711.8	5.0000	CLO4-89-ISTD

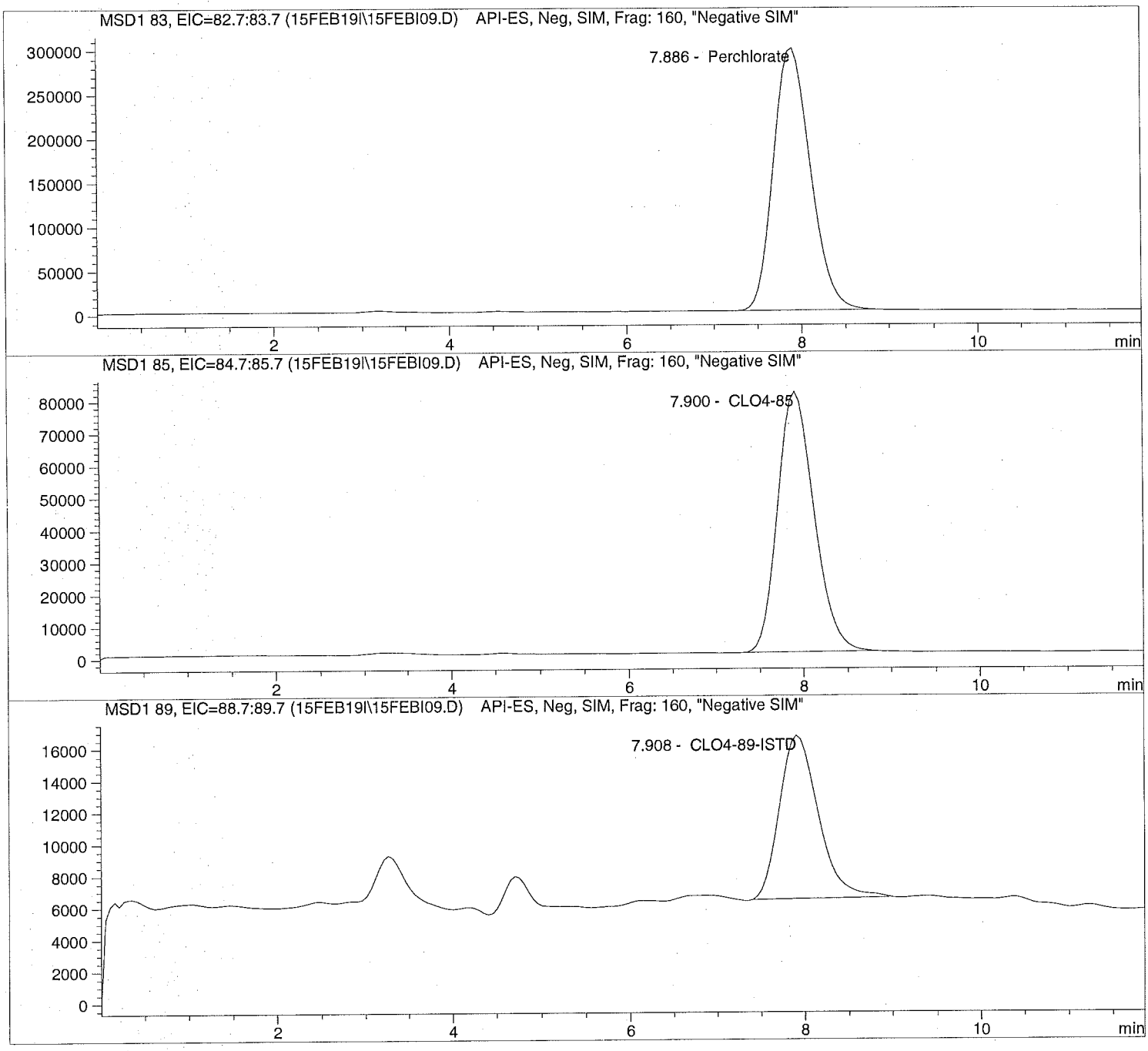
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.886	PBA	8696239.0	74.3060	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	PBA	2328089.5	74.7223	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.908	PBA	313908.9	5.0000	CLO4-89-ISTD

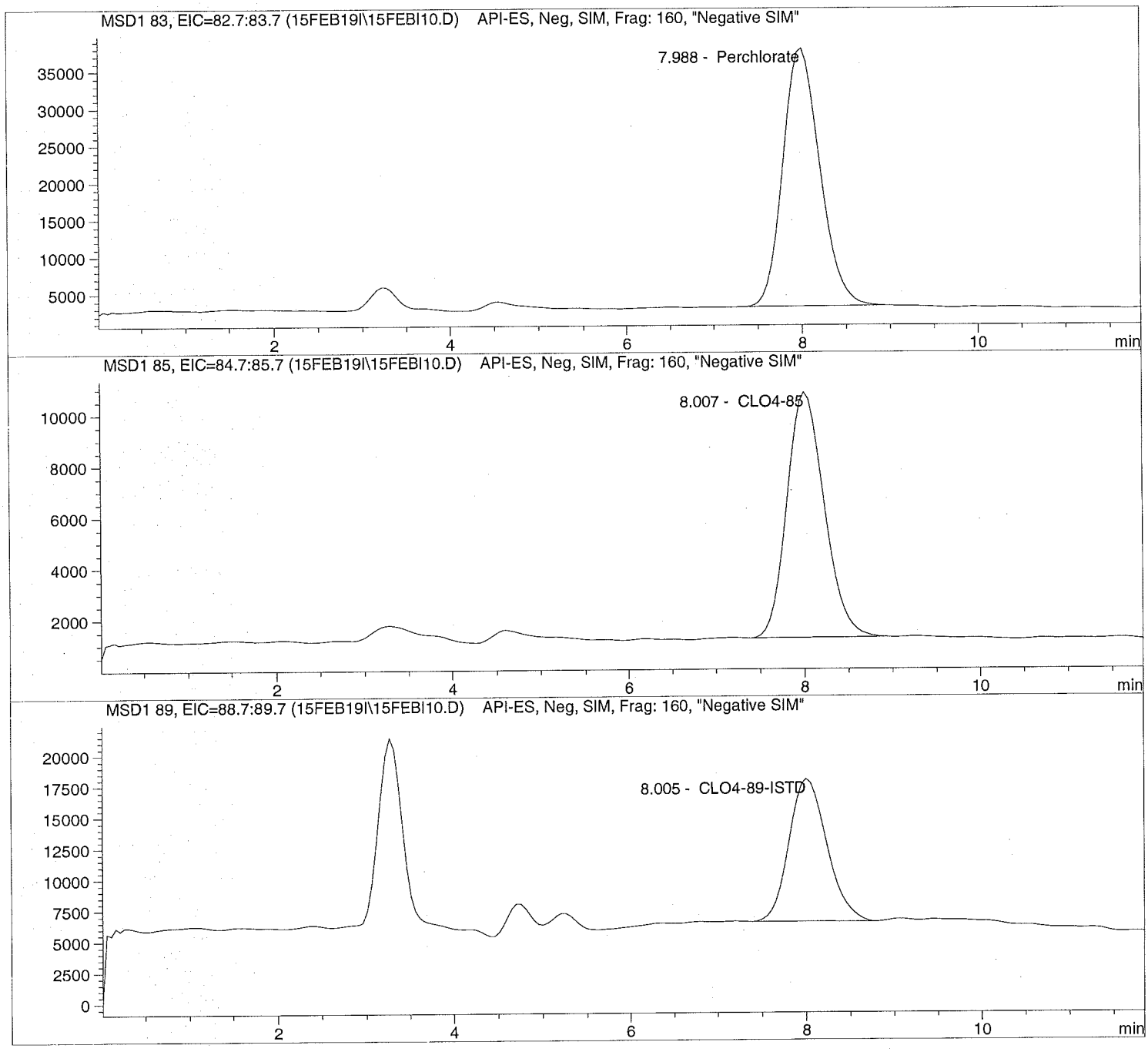
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.988	BBA	1011409.8	9.4602	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.007	BBA	281229.9	9.8786	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.005	BBA	341503.2	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

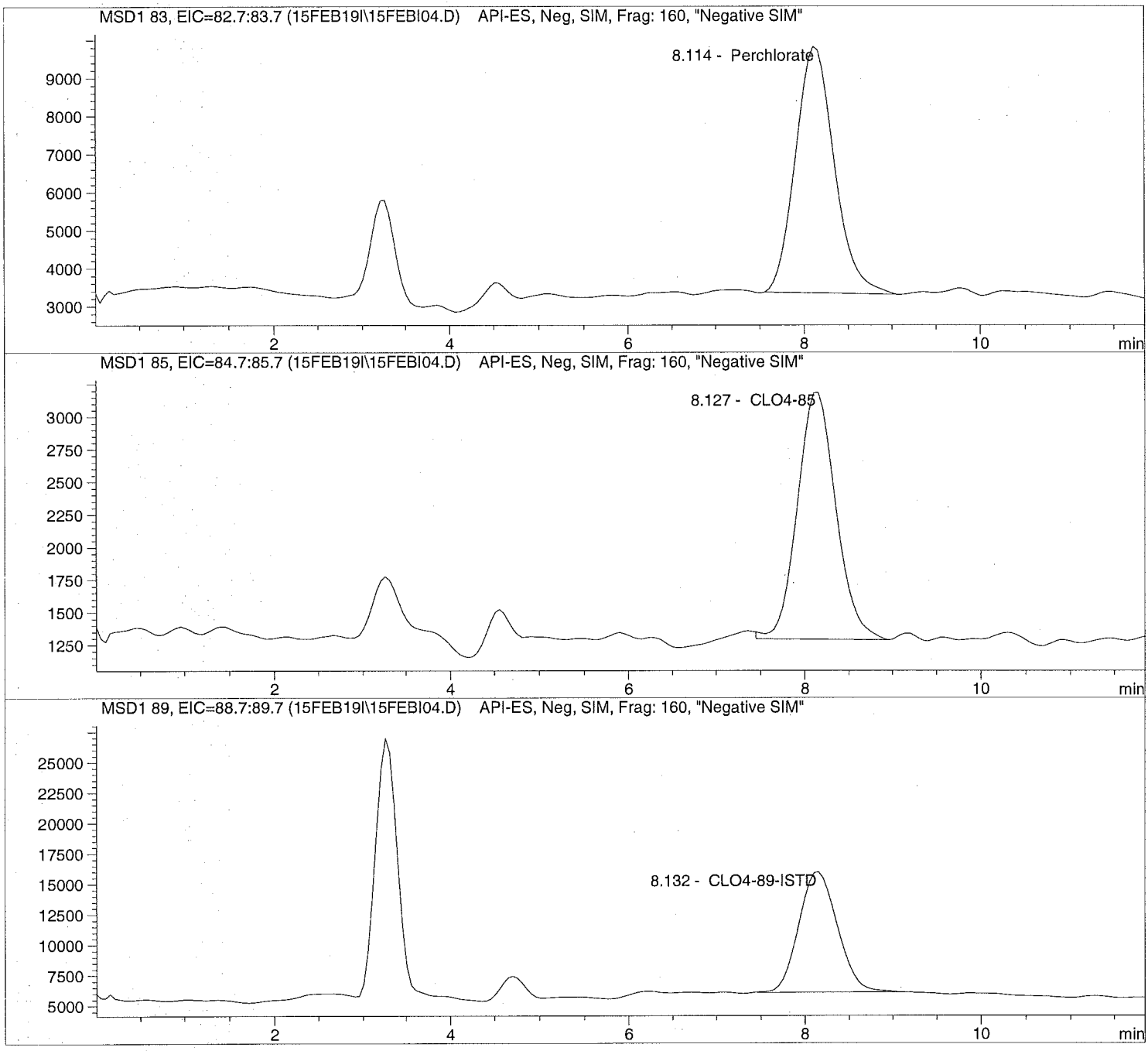
Unmodified

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	BBA	57206.1	2.1923	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

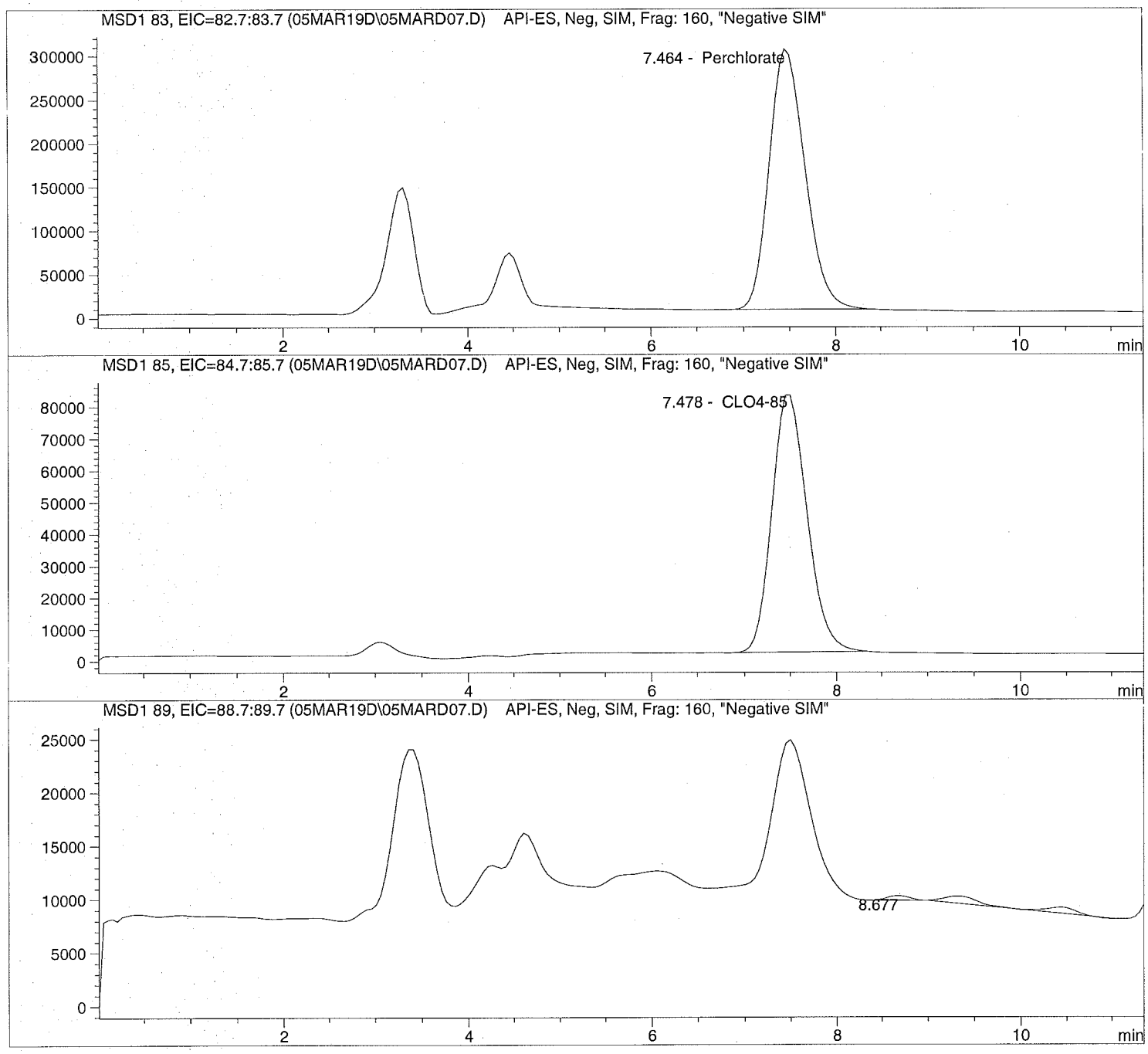
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	419.8794	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	402.6179	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.677	BB	7208.6	0.0000	
9.316	VBA	28561.1	5.0000	CLO4-89-ISTD

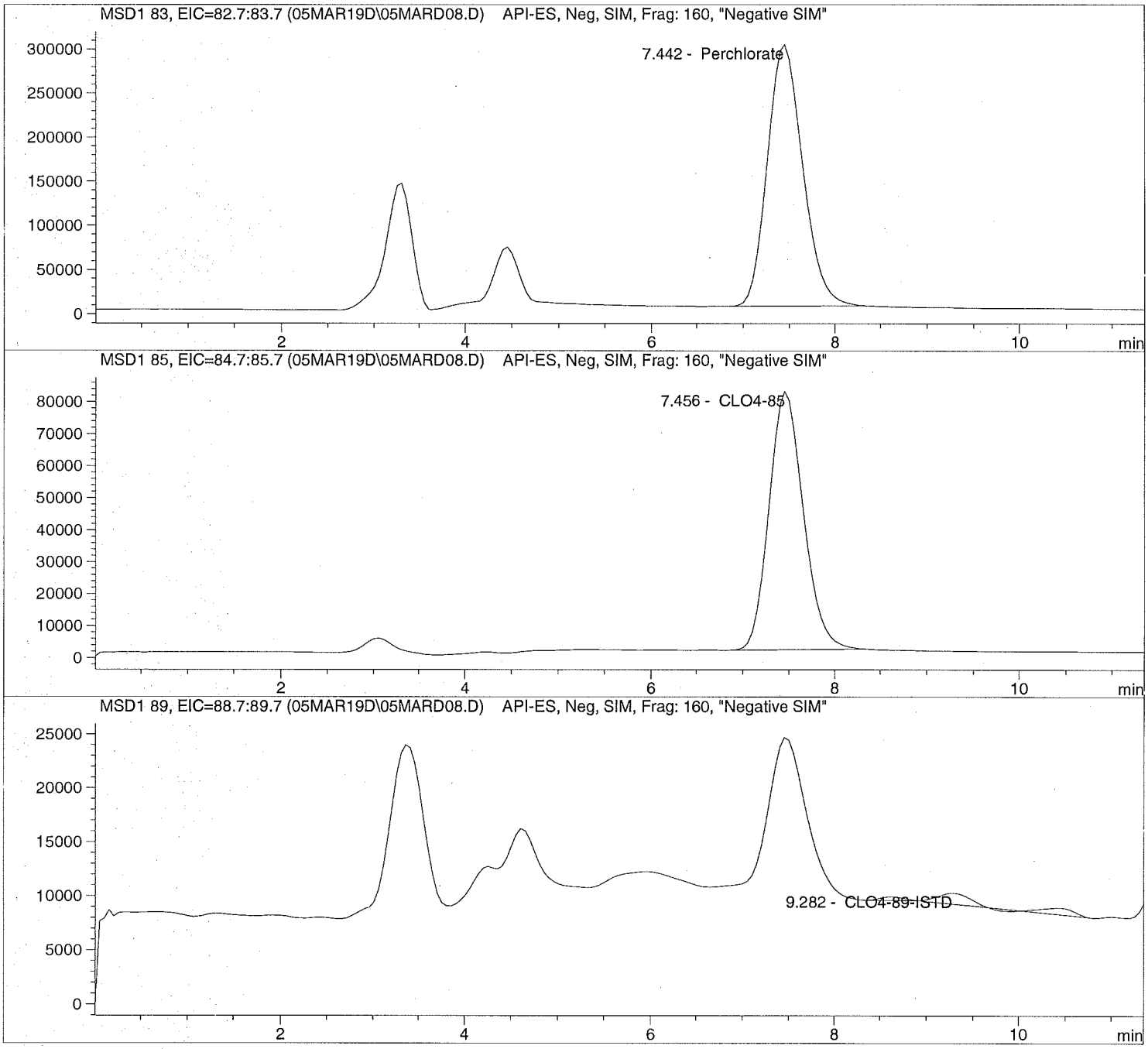
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD 00934638

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	359.0996	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	344.2233	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.621	VB	5769.9	0.0000	
9.282	VBA	35831.6	5.0000	CLO4-89-ISTD

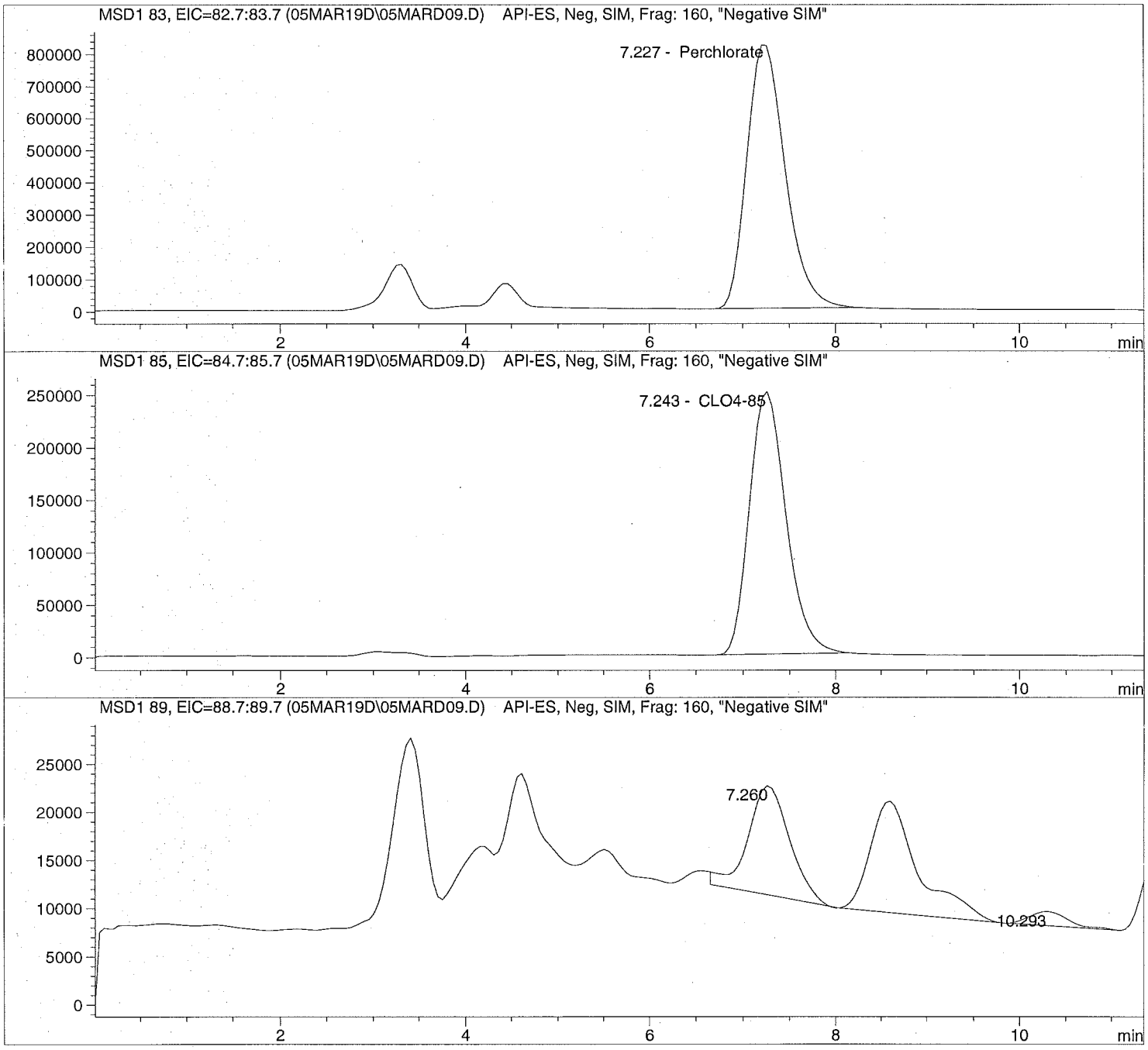
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	131.1742	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	138.8050	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.260	BB	352149.7	0.0000	
8.589	VBA	421141.9	5.0000	CLO4-89-ISTD
10.293	BBA	41603.7	0.0000	

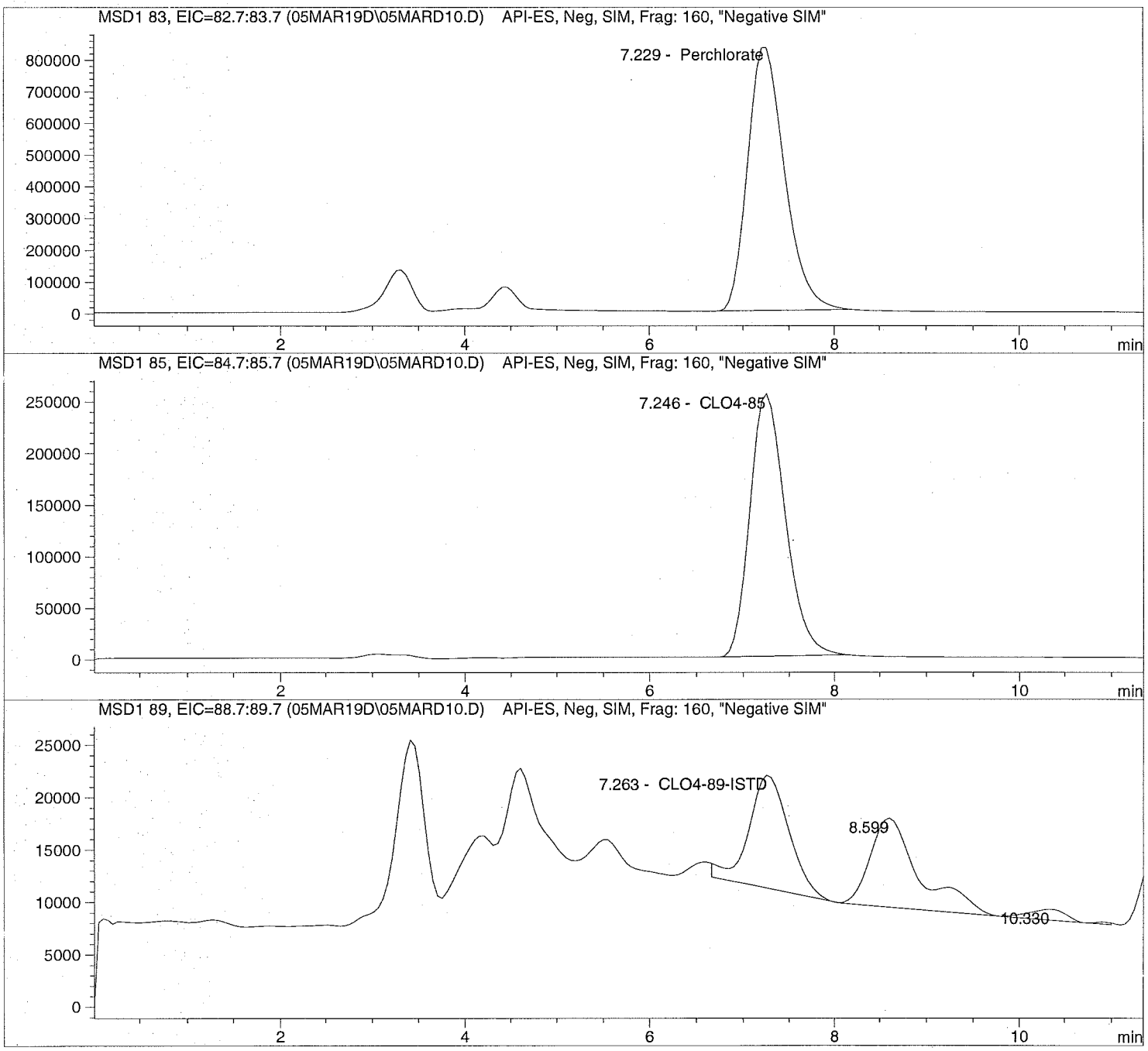
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	159.0418	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	168.6882	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	BB	325841.0	5.0000	CLO4-89-ISTD
8.599	VB	308921.9	0.0000	
10.330	VBA	30210.3	0.0000	

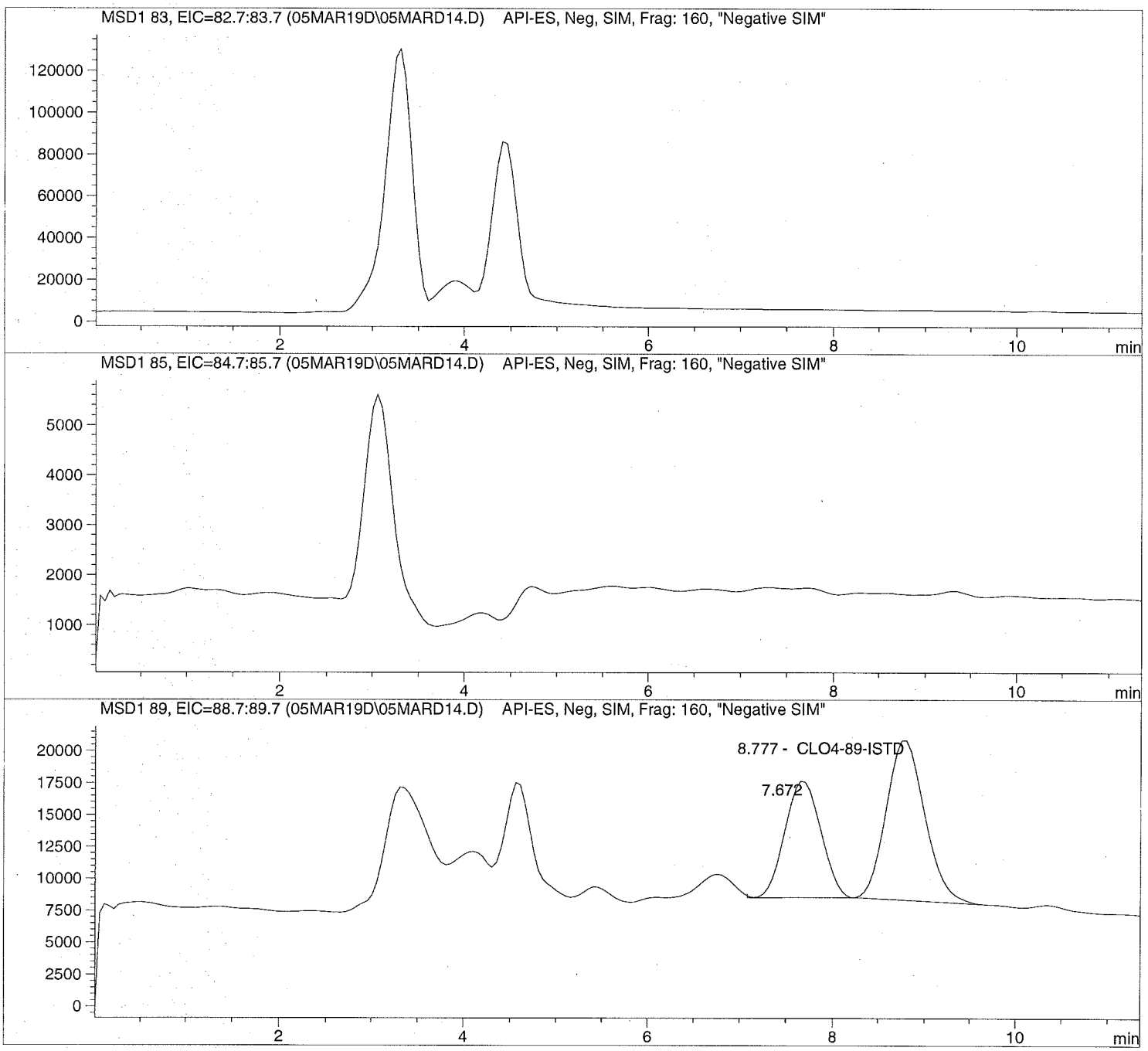
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	0.0000	
8.777	VBA	362717.3	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 18, 2019

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

Work Order: **HS19030012**

Laboratory Results for: **LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples**

Dear Marcia,

ALS Environmental received 3 sample(s) on Mar 01, 2019 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 Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
Work Order: HS19030012

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19030012-01	LH18/24-SP650_022819	Water		28-Feb-2019 14:00	01-Mar-2019 08:50	☐
HS19030012-02	LH18/24-SP650_022819_BIX	Water		28-Feb-2019 14:00	01-Mar-2019 08:50	☐
HS19030012-03	Trip Blank	Water	ALS 112818-41	28-Feb-2019 00:00	01-Mar-2019 08:50	☐

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LH18/24 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: 138390

Sample ID: LCSD-138390

• The RPD between the LCS and LCSD was outside of the control limit for surrogate Nitrobenzene-d5

Sample ID: MBLK-138390/LCS-138390/LCSD-138390

• Surrogates double spiked, however calculations were adjusted accordingly and the recoveries were within control limits.

GCMS Volatiles by Method SW8260

Batch ID: R334128

Sample ID: HS19021428-01MS

• MS and MSD were performed on unrelated sample

Metals by Method SW6020

Batch ID: 138281

Sample ID: HS19021441-01MS

• MS and MSD are for an unrelated sample

Wet Chemistry by Method SW7196

Batch ID: R334254

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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**

Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS19030012

Sample ID: LH18/24-SP650_022819 Lab ID:HS19030012-01

Collection Date: 28-Feb-2019 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	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	06-Mar-2019 12:39
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	06-Mar-2019 12:39
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	06-Mar-2019 12:39
Acetone	2.0	U	0.40	2.0	2.0	UG/L	1	06-Mar-2019 12:39
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	06-Mar-2019 12:39
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39

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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**

Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS19030012

Sample ID: LH18/24-SP650_022819 Lab ID:HS19030012-01

Collection Date: 28-Feb-2019 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: PC
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
cis-1,2-Dichloroethene	**2.1**		**0.20**	**0.50**	**1.0**	**UG/L**	1	06-Mar-2019 12:39
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	06-Mar-2019 12:39
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	06-Mar-2019 12:39
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	06-Mar-2019 12:39
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:39
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Trichloroethene	**0.80**	J	**0.20**	**0.50**	**1.0**	**UG/L**	1	06-Mar-2019 12:39
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:39
Surr: 1,2-Dichloroethane-d4	*81.4*			**0**	*81-118*	*%REC*	*1*	*06-Mar-2019 12:39*
Surr: 4-Bromofluorobenzene	*96.6*			**0**	*85-114*	*%REC*	*1*	*06-Mar-2019 12:39*
Surr: Dibromofluoromethane	*83.6*			**0**	*80-119*	*%REC*	*1*	*06-Mar-2019 12:39*
Surr: Toluene-d8	*107*			**0**	*89-112*	*%REC*	*1*	*06-Mar-2019 12:39*
SEMIVOLATILES SIM		**Method:SW8270SIM**				Prep:SW3510 / 06-Mar-2019		Analyst: QX
1,4-Dioxane	**4.3**		**0.51**	**0.51**	**0.51**	**ug/L**	50	06-Mar-2019 13:23
Surr: 2-Fluorobiphenyl	*55.4*			**0**	*40-140*	*%REC*	*50*	*06-Mar-2019 13:23*
Surr: 4-Terphenyl-d14	*70.0*			**0**	*40-140*	*%REC*	*50*	*06-Mar-2019 13:23*
Surr: Nitrobenzene-d5	*54.5*			**0**	*40-140*	*%REC*	*50*	*06-Mar-2019 13:23*
ICP-MS METALS BY SW6020A		**Method:SW6020**				Prep:SW3010A / 01-Mar-2019		Analyst: JHD
Barium	**0.137**		**0.00190**	**0.00250**	**0.00400**	**mg/L**	1	04-Mar-2019 22:49
Lead	0.00100	U	0.000600	0.00100	0.00200	mg/L	1	04-Mar-2019 22:49
Selenium	0.00250	U	0.00110	0.00250	0.00200	mg/L	1	04-Mar-2019 22:49
Silver	0.000500	U	0.000200	0.000500	0.00200	mg/L	1	04-Mar-2019 22:49

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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**

Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS19030012

Sample ID: LH18/24-SP650_022819 Lab ID:HS19030012-01

Collection Date: 28-Feb-2019 14:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
HEXAVALENT CHROMIUM BY SW7196A		**Method:SW7196**						Analyst: MZD
Chromium, Hexavalent	0.0100	U	0.00600	0.0100	0.0100	mg/L	1	01-Mar-2019 11:42

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

ALS Houston, US

Date: 18-Mar-19

Client:	Bhate Environmental Associates, Inc.	**ANALYTICAL REPORT**
Project:	LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples	WorkOrder:HS19030012
Sample ID:	LH18/24-SP650_022819_BIX	Lab ID:HS19030012-02
Collection Date:	28-Feb-2019 14:00	Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	07-Mar-2019 17:47

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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**

Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS19030012

Sample ID: Trip Blank Lab ID:HS19030012-03

Collection Date: 28-Feb-2019 00:00 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	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	06-Mar-2019 12:15
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	06-Mar-2019 12:15
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	06-Mar-2019 12:15
Acetone	2.0	U	0.40	2.0	2.0	UG/L	1	06-Mar-2019 12:15
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	06-Mar-2019 12:15
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15

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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**

Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples WorkOrder:HS19030012

Sample ID: Trip Blank Lab ID:HS19030012-03

Collection Date: 28-Feb-2019 00:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: PC
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	06-Mar-2019 12:15
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	06-Mar-2019 12:15
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	06-Mar-2019 12:15
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	06-Mar-2019 12:15
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Trichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	06-Mar-2019 12:15
Surr: 1,2-Dichloroethane-d4	*82.7*			**0**	*81-118*	*%REC*	*1*	*06-Mar-2019 12:15*
Surr: 4-Bromofluorobenzene	*99.5*			**0**	*85-114*	*%REC*	*1*	*06-Mar-2019 12:15*
Surr: Dibromofluoromethane	*86.2*			**0**	*80-119*	*%REC*	*1*	*06-Mar-2019 12:15*
Surr: Toluene-d8	*107*			**0**	*89-112*	*%REC*	*1*	*06-Mar-2019 12:15*

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

ALS Houston, US

Date: 18-Mar-19

WEIGHT LOG

Client: Bhate Environmental Associates, Inc.

Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples

WorkOrder: HS19030012

Batch ID: 138281 **Method:** ICP-MS METALS BY SW6020A **Prep:** 3010A

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS19030012-01	1	10	10 (mL)	1

Batch ID: 138390 **Method:** SEMIVOLATILES SIM **Prep:** 3510_B_SIM

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS19030012-01	1	990	1 (mL)	0.00101

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 138281	**Test Name :** ICP-MS METALS BY SW6020A			**Matrix:** Water		
HS19030012-01	LH18/24-SP650_022819	28 Feb 2019 14:00		01 Mar 2019 10:30	04 Mar 2019 22:49	1
Batch ID 138390	**Test Name :** SEMIVOLATILES SIM			**Matrix:** Water		
HS19030012-01	LH18/24-SP650_022819	28 Feb 2019 14:00		06 Mar 2019 09:10	06 Mar 2019 13:23	50
Batch ID R334128	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS19030012-01	LH18/24-SP650_022819	28 Feb 2019 14:00			06 Mar 2019 12:39	1
HS19030012-03	Trip Blank	28 Feb 2019 00:00			06 Mar 2019 12:15	1
Batch ID R334176	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS19030012-02	LH18/24-SP650_022819_BIX	28 Feb 2019 14:00			07 Mar 2019 17:47	1
Batch ID R334254	**Test Name :** HEXAVALENT CHROMIUM BY SW7196A			**Matrix:** Water		
HS19030012-01	LH18/24-SP650_022819	28 Feb 2019 14:00			01 Mar 2019 11:42	1

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: 138281 (0) **Instrument: ICPMS05** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-138281** Units: **mg/L** Analysis Date: **04-Mar-2019 21:51**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974208** PrepDate: **01-Mar-2019** 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	0.00250	0.00200								U
Silver	0.000500	0.00200								U

LCS Sample ID: **LCS-138281** Units: **mg/L** Analysis Date: **04-Mar-2019 21:53**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974209** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.05028	0.00400	0.05	0	101	80 - 120				
Lead	0.05263	0.00200	0.05	0	105	80 - 120				
Selenium	0.05168	0.00200	0.05	0	103	80 - 120				
Silver	0.05504	0.00200	0.05	0	110	80 - 120				

MS Sample ID: **HS19021441-01MS** Units: **mg/L** Analysis Date: **04-Mar-2019 22:00**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974212** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.3606	0.00400	0.05	0.3093	103	80 - 120				O
Lead	0.0512	0.00200	0.05	0	102	80 - 120				
Selenium	0.04948	0.00200	0.05	0	99.0	80 - 120				
Silver	0.0515	0.00200	0.05	0	103	80 - 120				

MSD Sample ID: **HS19021441-01MSD** Units: **mg/L** Analysis Date: **04-Mar-2019 22:02**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974213** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.3437	0.00400	0.05	0.3093	68.8	80 - 120	0.3606	4.8	20	SO
Lead	0.0515	0.00200	0.05	0	103	80 - 120	0.0512	0.582	20	
Selenium	0.04959	0.00200	0.05	0	99.2	80 - 120	0.04948	0.218	20	
Silver	0.05174	0.00200	0.05	0	103	80 - 120	0.0515	0.473	20	

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: 138281 (0) **Instrument: ICPMS05** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS19021441-01PDS** Units: **mg/L** Analysis Date: **04-Mar-2019 22:04**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974214** PrepDate: **01-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.4021	0.00400	0.1	0.3093	92.9	75 - 125				
Lead	0.1019	0.00200	0.1	0	102	75 - 125				
Selenium	0.09793	0.00200	0.1	0	97.9	75 - 125				
Silver	0.09993	0.00200	0.1	0	99.9	75 - 125				

SD Sample ID: **HS19021441-01SD** Units: **mg/L** Analysis Date: **04-Mar-2019 21:57**
Client ID: Run ID: **ICPMS05_333923** SeqNo: **4974211** PrepDate: **01-Mar-2019** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Barium	0.3016	0.0200					0.3093	2.48	10	
Lead	0.00500	0.0100					0.000204	0	10	U
Selenium	0.0125	0.0100					0.000452	0	10	U
Silver	0.00250	0.0100					0.00002	0	10	U

The following samples were analyzed in this batch: HS19030012-01

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: 138390 (0) **Instrument: SV-5** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-138390** Units: **ug/L** Analysis Date: **06-Mar-2019 11:36**
Client ID: Run ID: **SV-5_334088** SeqNo: **4976850** PrepDate: **06-Mar-2019** 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	*0.1248*	*0*	*0.16*	*0*	*78.0*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.1145*	*0*	*0.16*	*0*	*71.6*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.1894*	*0*	*0.16*	*0*	*118*	*40 - 140*				

LCS Sample ID: **LCS-138390** Units: **ug/L** Analysis Date: **06-Mar-2019 11:56**
Client ID: Run ID: **SV-5_334088** SeqNo: **4976851** PrepDate: **06-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.1105	0.010	0.08	0	138	40 - 140				
Surr: 2-Fluorobiphenyl	*0.1196*	*0*	*0.16*	*0*	*74.8*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.1031*	*0*	*0.16*	*0*	*64.4*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.1636*	*0*	*0.16*	*0*	*102*	*40 - 140*				

LCSD Sample ID: **LCSD-138390** Units: **ug/L** Analysis Date: **06-Mar-2019 12:17**
Client ID: Run ID: **SV-5_334088** SeqNo: **4976852** PrepDate: **06-Mar-2019** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.1033	0.010	0.08	0	129	40 - 140	0.1105	6.7	20	
Surr: 2-Fluorobiphenyl	*0.1048*	*0*	*0.16*	*0*	*65.5*	*40 - 140*	*0.1196*	*13.2*	*20*	
Surr: 4-Terphenyl-d14	*0.1045*	*0*	*0.16*	*0*	*65.3*	*40 - 140*	*0.1031*	*1.42*	*20*	
Surr: Nitrobenzene-d5	*0.1167*	*0*	*0.16*	*0*	*72.9*	*40 - 140*	*0.1636*	*33.5*	*20*	R

The following samples were analyzed in this batch: HS19030012-01

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument:** VOA6 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MBLK Sample ID: **VBLKW-190306** Units: **UG/L** Analysis Date: **06-Mar-2019 11:51**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977685** 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	2.0	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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument: VOA6** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MBLK Sample ID: **VBLKW-190306** Units: **UG/L** Analysis Date: **06-Mar-2019 11:51**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977685** 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	1.0	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	0.50	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	*41.51*	*1.0*	*50*	*0*	*83.0*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.32*	*1.0*	*50*	*0*	*98.6*	*85 - 114*				
Surr: Dibromofluoromethane	*43.47*	*1.0*	*50*	*0*	*86.9*	*80 - 119*				
Surr: Toluene-d8	*53.24*	*1.0*	*50*	*0*	*106*	*89 - 112*				

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument: VOA6** **Method: VOLATILES ORGANICS BY METHOD 8260C**

LCS Sample ID: **VLCSW-190306** Units: **UG/L** Analysis Date: **06-Mar-2019 11:03**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977684** 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	20.28	1.0	20	0	101	78 - 124				
1,1,1-Trichloroethane	20.23	1.0	20	0	101	74 - 131				
1,1,2,2-Tetrachloroethane	19.2	1.0	20	0	96.0	71 - 121				
1,1,2-Trichloroethane	19.93	1.0	20	0	99.6	80 - 119				
1,1-Dichloroethane	19.67	1.0	20	0	98.3	77 - 125				
1,1-Dichloroethene	19.73	1.0	20	0	98.6	71 - 131				
1,1-Dichloropropene	19.78	1.0	20	0	98.9	78 - 125				
1,2,3-Trichlorobenzene	20.06	1.0	20	0	100	69 - 129				
1,2,3-Trichloropropane	18.96	1.0	20	0	94.8	73 - 122				
1,2,4-Trichlorobenzene	19.89	1.0	20	0	99.4	69 - 130				
1,2,4-Trimethylbenzene	19.37	1.0	20	0	96.8	76 - 124				
1,2-Dibromo-3-chloropropane	18.77	1.0	20	0	93.9	62 - 128				
1,2-Dibromoethane	20.52	1.0	20	0	103	77 - 121				
1,2-Dichlorobenzene	19.02	1.0	20	0	95.1	80 - 119				
1,2-Dichloroethane	20.54	1.0	20	0	103	73 - 128				
1,2-Dichloropropane	20.31	1.0	20	0	102	78 - 122				
1,3,5-Trimethylbenzene	19.43	1.0	20	0	97.1	75 - 124				
1,3-Dichlorobenzene	19.44	1.0	20	0	97.2	80 - 119				
1,3-Dichloropropane	20.12	1.0	20	0	101	80 - 119				
1,4-Dichlorobenzene	19.16	1.0	20	0	95.8	79 - 118				
2,2-Dichloropropane	19.96	1.0	20	0	99.8	60 - 139				
2-Butanone	42.82	2.0	40	0	107	56 - 143				
2-Chlorotoluene	19.13	1.0	20	0	95.7	79 - 122				
2-Hexanone	40.07	2.0	40	0	100	57 - 139				
4-Chlorotoluene	19.38	1.0	20	0	96.9	78 - 122				
4-Isopropyltoluene	19.42	1.0	20	0	97.1	77 - 127				
4-Methyl-2-pentanone	39.73	2.0	40	0	99.3	67 - 130				
Acetone	42.44	2.0	40	0	106	39 - 160				
Benzene	19.99	1.0	20	0	99.9	79 - 120				
Bromobenzene	19.33	1.0	20	0	96.6	80 - 120				
Bromochloromethane	19.66	1.0	20	0	98.3	78 - 123				
Bromodichloromethane	19.92	1.0	20	0	99.6	79 - 125				
Bromoform	20.37	1.0	20	0	102	66 - 130				
Bromomethane	24.28	1.0	20	0	121	53 - 141				

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument: VOA6** **Method: VOLATILES ORGANICS BY METHOD 8260C**

LCS Sample ID: **VLCSW-190306** Units: **UG/L** Analysis Date: **06-Mar-2019 11:03**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977684** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	40.1	2.0	40	0	100	64 - 133				
Carbon tetrachloride	20.59	1.0	20	0	103	72 - 136				
Chlorobenzene	19.9	1.0	20	0	99.5	82 - 118				
Chloroethane	19.71	1.0	20	0	98.5	60 - 138				
Chloroform	19.55	1.0	20	0	97.7	79 - 124				
Chloromethane	20.54	1.0	20	0	103	50 - 139				
cis-1,2-Dichloroethene	19.71	1.0	20	0	98.6	78 - 123				
cis-1,3-Dichloropropene	20.44	1.0	20	0	102	75 - 124				
Dibromochloromethane	20.25	1.0	20	0	101	74 - 126				
Dibromomethane	20.09	1.0	20	0	100	79 - 123				
Dichlorodifluoromethane	20.24	1.0	20	0	101	32 - 152				
Ethylbenzene	20.01	1.0	20	0	100	79 - 121				
Hexachlorobutadiene	21.69	1.0	20	0	108	66 - 134				
Isopropylbenzene	19.97	1.0	20	0	99.8	72 - 131				
m,p-Xylene	40.08	2.0	40	0	100	80 - 121				
Methylene chloride	20.41	2.0	20	0	102	74 - 124				
Naphthalene	18.14	1.0	20	0	90.7	61 - 128				
n-Butylbenzene	19.01	1.0	20	0	95.0	75 - 128				
n-Propylbenzene	19.22	1.0	20	0	96.1	76 - 126				
o-Xylene	20.19	1.0	20	0	101	78 - 122				
sec-Butylbenzene	19	1.0	20	0	95.0	77 - 126				
Styrene	20.48	1.0	20	0	102	78 - 123				
tert-Butylbenzene	18.99	1.0	20	0	95.0	78 - 124				
Tetrachloroethene	19.96	1.0	20	0	99.8	74 - 129				
Toluene	19.89	1.0	20	0	99.5	80 - 121				
trans-1,2-Dichloroethene	20.32	1.0	20	0	102	75 - 124				
trans-1,3-Dichloropropene	20.39	1.0	20	0	102	73 - 127				
Trichloroethene	20.14	1.0	20	0	101	79 - 123				
Trichlorofluoromethane	19.72	1.0	20	0	98.6	65 - 141				
Vinyl chloride	19.12	1.0	20	0	95.6	58 - 137				
Surr: 1,2-Dichloroethane-d4	*50.81*	*1.0*	*50*	*0*	*102*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.81*	*1.0*	*50*	*0*	*104*	*85 - 114*				
Surr: Dibromofluoromethane	*51.53*	*1.0*	*50*	*0*	*103*	*80 - 119*				
Surr: Toluene-d8	*48.19*	*1.0*	*50*	*0*	*96.4*	*89 - 112*				

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument: VOA6** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MS Sample ID: **HS19021428-01MS** Units: **UG/L** Analysis Date: **06-Mar-2019 14:39**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977690** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	1131	50	1000	0	113	78 - 124				
1,1,1-Trichloroethane	987.3	50	1000	0	98.7	74 - 131				
1,1,2,2-Tetrachloroethane	1076	50	1000	0	108	71 - 121				
1,1,2-Trichloroethane	1111	50	1000	0	111	80 - 119				
1,1-Dichloroethane	940.2	50	1000	0	94.0	77 - 125				
1,1-Dichloroethene	1011	50	1000	0	101	71 - 131				
1,1-Dichloropropene	1112	50	1000	0	111	78 - 125				
1,2,3-Trichlorobenzene	1082	50	1000	0	108	69 - 129				
1,2,3-Trichloropropane	1033	50	1000	0	103	73 - 122				
1,2,4-Trichlorobenzene	1136	50	1000	0	114	69 - 130				
1,2,4-Trimethylbenzene	1203	50	1000	0	120	76 - 124				
1,2-Dibromo-3-chloropropane	1044	50	1000	0	104	62 - 128				
1,2-Dibromoethane	1119	50	1000	0	112	77 - 121				
1,2-Dichlorobenzene	1128	50	1000	0	113	80 - 119				
1,2-Dichloroethane	1026	50	1000	0	103	73 - 128				
1,2-Dichloropropane	1034	50	1000	0	103	78 - 122				
1,3,5-Trimethylbenzene	1243	50	1000	0	124	75 - 124				S
1,3-Dichlorobenzene	1180	50	1000	0	118	80 - 119				
1,3-Dichloropropane	1110	50	1000	0	111	80 - 119				
1,4-Dichlorobenzene	1153	50	1000	0	115	79 - 118				
2,2-Dichloropropane	1001	50	1000	0	100	60 - 139				
2-Butanone	1842	100	2000	0	92.1	56 - 143				
2-Chlorotoluene	1181	50	1000	0	118	79 - 122				
2-Hexanone	2034	100	2000	0	102	57 - 139				
4-Chlorotoluene	1190	50	1000	0	119	78 - 122				
4-Isopropyltoluene	1296	50	1000	0	130	77 - 127				S
4-Methyl-2-pentanone	2036	100	2000	0	102	67 - 130				
Acetone	1745	100	2000	0	87.3	39 - 160				
Benzene	1045	50	1000	0	104	79 - 120				
Bromobenzene	1145	50	1000	0	114	80 - 120				
Bromochloromethane	903.7	50	1000	0	90.4	78 - 123				
Bromodichloromethane	1027	50	1000	0	103	79 - 125				
Bromoform	1094	50	1000	0	109	66 - 130				
Bromomethane	1198	50	1000	0	120	53 - 141				

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument: VOA6** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MS Sample ID: **HS19021428-01MS** Units: **UG/L** Analysis Date: **06-Mar-2019 14:39**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977690** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1925	100	2000	0	96.2	64 - 133				
Carbon tetrachloride	1169	50	1000	0	117	72 - 136				
Chlorobenzene	1159	50	1000	0	116	82 - 118				
Chloroethane	922.9	50	1000	0	92.3	60 - 138				
Chloroform	938.1	50	1000	0	93.8	79 - 124				
Chloromethane	804.4	50	1000	0	80.4	50 - 139				
cis-1,2-Dichloroethene	4602	50	1000	3749	85.3	78 - 123				
cis-1,3-Dichloropropene	1038	50	1000	0	104	75 - 124				
Dibromochloromethane	1148	50	1000	0	115	74 - 126				
Dibromomethane	1016	50	1000	0	102	79 - 123				
Dichlorodifluoromethane	668.3	50	1000	0	66.8	32 - 152				
Ethylbenzene	1202	50	1000	0	120	79 - 121				
Hexachlorobutadiene	1396	50	1000	0	140	66 - 134				S
Isopropylbenzene	1253	50	1000	0	125	72 - 131				
m,p-Xylene	2393	100	2000	0	120	80 - 121				
Methylene chloride	955.4	100	1000	0	95.5	74 - 124				
Naphthalene	970.7	50	1000	0	97.1	61 - 128				
n-Butylbenzene	1323	50	1000	0	132	75 - 128				S
n-Propylbenzene	1256	50	1000	0	126	76 - 126				
o-Xylene	1200	50	1000	0	120	78 - 122				
sec-Butylbenzene	1306	50	1000	0	131	77 - 126				S
Styrene	1164	50	1000	0	116	78 - 123				
tert-Butylbenzene	1270	50	1000	0	127	78 - 124				S
Tetrachloroethene	1293	50	1000	0	129	74 - 129				S
Toluene	1184	50	1000	0	118	80 - 121				
trans-1,2-Dichloroethene	997.2	50	1000	0	99.7	75 - 124				
trans-1,3-Dichloropropene	1039	50	1000	0	104	73 - 127				
Trichloroethene	4573	50	1000	3686	88.7	79 - 123				
Trichlorofluoromethane	1014	50	1000	0	101	65 - 141				
Vinyl chloride	865.2	50	1000	0	86.5	58 - 137				
Surr: 1,2-Dichloroethane-d4	*2074*	*50*	*2500*	*0*	*83.0*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*2472*	*50*	*2500*	*0*	*98.9*	*85 - 114*				
Surr: Dibromofluoromethane	*2130*	*50*	*2500*	*0*	*85.2*	*80 - 119*				
Surr: Toluene-d8	*2648*	*50*	*2500*	*0*	*106*	*89 - 112*				

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument:** VOA6 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MSD Sample ID: **HS19021428-01MSD** Units: **UG/L** Analysis Date: **06-Mar-2019 15:03**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977691** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	1074	50	1000	0	107	78 - 124	1131	5.23	20	
1,1,1-Trichloroethane	1004	50	1000	0	100	74 - 131	987.3	1.64	20	
1,1,2,2-Tetrachloroethane	977.6	50	1000	0	97.8	71 - 121	1076	9.59	20	
1,1,2-Trichloroethane	1026	50	1000	0	103	80 - 119	1111	7.97	20	
1,1-Dichloroethane	918.7	50	1000	0	91.9	77 - 125	940.2	2.32	20	
1,1-Dichloroethene	1003	50	1000	0	100	71 - 131	1011	0.851	20	
1,1-Dichloropropene	1155	50	1000	0	116	78 - 125	1112	3.85	20	
1,2,3-Trichlorobenzene	1116	50	1000	0	112	69 - 129	1082	3.06	20	
1,2,3-Trichloropropane	947	50	1000	0	94.7	73 - 122	1033	8.7	20	
1,2,4-Trichlorobenzene	1120	50	1000	0	112	69 - 130	1136	1.43	20	
1,2,4-Trimethylbenzene	1139	50	1000	0	114	76 - 124	1203	5.47	20	
1,2-Dibromo-3-chloropropane	993.9	50	1000	0	99.4	62 - 128	1044	4.94	20	
1,2-Dibromoethane	1034	50	1000	0	103	77 - 121	1119	7.94	20	
1,2-Dichlorobenzene	1051	50	1000	0	105	80 - 119	1128	7.08	20	
1,2-Dichloroethane	1012	50	1000	0	101	73 - 128	1026	1.39	20	
1,2-Dichloropropane	1017	50	1000	0	102	78 - 122	1034	1.63	20	
1,3,5-Trimethylbenzene	1168	50	1000	0	117	75 - 124	1243	6.24	20	
1,3-Dichlorobenzene	1093	50	1000	0	109	80 - 119	1180	7.6	20	
1,3-Dichloropropane	1025	50	1000	0	102	80 - 119	1110	7.93	20	
1,4-Dichlorobenzene	1063	50	1000	0	106	79 - 118	1153	8.16	20	
2,2-Dichloropropane	982.5	50	1000	0	98.2	60 - 139	1001	1.83	20	
2-Butanone	1713	100	2000	0	85.7	56 - 143	1842	7.25	20	
2-Chlorotoluene	1102	50	1000	0	110	79 - 122	1181	6.9	20	
2-Hexanone	1939	100	2000	0	96.9	57 - 139	2034	4.78	20	
4-Chlorotoluene	1105	50	1000	0	110	78 - 122	1190	7.4	20	
4-Isopropyltoluene	1246	50	1000	0	125	77 - 127	1296	3.91	20	
4-Methyl-2-pentanone	1953	100	2000	0	97.6	67 - 130	2036	4.18	20	
Acetone	1701	100	2000	0	85.0	39 - 160	1745	2.58	20	
Benzene	1032	50	1000	0	103	79 - 120	1045	1.18	20	
Bromobenzene	1050	50	1000	0	105	80 - 120	1145	8.62	20	
Bromochloromethane	886.4	50	1000	0	88.6	78 - 123	903.7	1.92	20	
Bromodichloromethane	1012	50	1000	0	101	79 - 125	1027	1.47	20	
Bromoform	1026	50	1000	0	103	66 - 130	1094	6.41	20	
Bromomethane	1111	50	1000	0	111	53 - 141	1198	7.53	20	

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334128 (0) **Instrument: VOA6** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MSD Sample ID: **HS19021428-01MSD** Units: **UG/L** Analysis Date: **06-Mar-2019 15:03**
Client ID: Run ID: **VOA6_334128** SeqNo: **4977691** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	1914	100	2000	0	95.7	64 - 133	1925	0.566	20	
Carbon tetrachloride	1209	50	1000	0	121	72 - 136	1169	3.36	20	
Chlorobenzene	1092	50	1000	0	109	82 - 118	1159	5.98	20	
Chloroethane	929.6	50	1000	0	93.0	60 - 138	922.9	0.728	20	
Chloroform	908	50	1000	0	90.8	79 - 124	938.1	3.27	20	
Chloromethane	783	50	1000	0	78.3	50 - 139	804.4	2.7	20	
cis-1,2-Dichloroethene	4457	50	1000	3749	70.8	78 - 123	4602	3.18	20	S
cis-1,3-Dichloropropene	1021	50	1000	0	102	75 - 124	1038	1.73	20	
Dibromochloromethane	1059	50	1000	0	106	74 - 126	1148	8.06	20	
Dibromomethane	990.7	50	1000	0	99.1	79 - 123	1016	2.54	20	
Dichlorodifluoromethane	688.8	50	1000	0	68.9	32 - 152	668.3	3.02	20	
Ethylbenzene	1160	50	1000	0	116	79 - 121	1202	3.53	20	
Hexachlorobutadiene	1434	50	1000	0	143	66 - 134	1396	2.69	20	S
Isopropylbenzene	1231	50	1000	0	123	72 - 131	1253	1.82	20	
m,p-Xylene	2294	100	2000	0	115	80 - 121	2393	4.21	20	
Methylene chloride	914.4	100	1000	0	91.4	74 - 124	955.4	4.38	20	
Naphthalene	939.7	50	1000	0	94.0	61 - 128	970.7	3.25	20	
n-Butylbenzene	1292	50	1000	0	129	75 - 128	1323	2.38	20	S
n-Propylbenzene	1191	50	1000	0	119	76 - 126	1256	5.27	20	
o-Xylene	1141	50	1000	0	114	78 - 122	1200	5.07	20	
sec-Butylbenzene	1272	50	1000	0	127	77 - 126	1306	2.68	20	S
Styrene	1098	50	1000	0	110	78 - 123	1164	5.82	20	
tert-Butylbenzene	1210	50	1000	0	121	78 - 124	1270	4.84	20	
Tetrachloroethene	1247	50	1000	0	125	74 - 129	1293	3.64	20	
Toluene	1121	50	1000	0	112	80 - 121	1184	5.5	20	
trans-1,2-Dichloroethene	971.6	50	1000	0	97.2	75 - 124	997.2	2.59	20	
trans-1,3-Dichloropropene	1012	50	1000	0	101	73 - 127	1039	2.6	20	
Trichloroethene	4546	50	1000	3686	86.1	79 - 123	4573	0.581	20	
Trichlorofluoromethane	1013	50	1000	0	101	65 - 141	1014	0.0243	20	
Vinyl chloride	860.2	50	1000	0	86.0	58 - 137	865.2	0.586	20	
Surr: 1,2-Dichloroethane-d4	*2035*	*50*	*2500*	*0*	*81.4*	*81 - 118*	*2074*	*1.92*	*20*	
Surr: 4-Bromofluorobenzene	*2550*	*50*	*2500*	*0*	*102*	*85 - 114*	*2472*	*3.09*	*20*	
Surr: Dibromofluoromethane	*2117*	*50*	*2500*	*0*	*84.7*	*80 - 119*	*2130*	*0.579*	*20*	
Surr: Toluene-d8	*2586*	*50*	*2500*	*0*	*103*	*89 - 112*	*2648*	*2.39*	*20*	

ALS Houston, US Date: 18-Mar-19

Client:	Bhate Environmental Associates, Inc.
Project:	LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder:	HS19030012

QC BATCH REPORT NEW

Batch ID:	**R334128 (0)**	**Instrument:**	**VOA6**	**Method:**	**VOLATILES ORGANICS BY METHOD 8260C**

The following samples were analyzed in this batch: HS19030012-01 HS19030012-03

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: HS19030012

QC BATCH REPORT NEW

Batch ID: R334254 (0) **Instrument: UV-2450** **Method: HEXAVALENT CHROMIUM BY SW7196A**

MBLK Sample ID: **MBLK-334254** Units: **mg/L** Analysis Date: **01-Mar-2019 11:42**
Client ID: Run ID: **UV-2450_334254** SeqNo: **4986763** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.0100	0.0100								U

LCS Sample ID: **LCS-334254** Units: **mg/L** Analysis Date: **01-Mar-2019 11:42**
Client ID: Run ID: **UV-2450_334254** SeqNo: **4986764** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.249	0.0100	0.25	0	99.6	90 - 111				

LCSD Sample ID: **LCSD-334254** Units: **mg/L** Analysis Date: **01-Mar-2019 11:42**
Client ID: Run ID: **UV-2450_334254** SeqNo: **4986765** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.241	0.0100	0.25	0	96.4	90 - 111	0.249	3.27	20	

The following samples were analyzed in this batch: HS19030012-01

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Monthly Effluent Samples
WorkOrder: **HS19030012**

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 Houston, US Date: 18-Mar-19

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	20-Dec-2021
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019
North Carolina	624-2019	31-Dec-2019
California	2919, 2018-2019	30-Apr-2019
Maryland	343, 2018-2019	30-Jun-2019

00934672

ALS Houston, US Date: 18-Mar-19

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS19030012
Date/Time Received: **01-Mar-2019 08:50**
Received by: **JRM**

Checklist completed by: *Jared R. Makan* 1-Mar-2019
eSignature | Date

Reviewed by: *RJ Modashia* 1-Mar-2019
eSignature | 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 ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:N/A
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	1.8c/1.8c UC/C	IR25
Cooler(s)/Kit(s):	43795	
Date/Time sample(s) sent to storage:	03/01/2019 10:35	

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:

00934673

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd., Suite 210 Houston, TX 77099 (281) 530 – 5656 ATTN: RJ Modashia

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_022819	Water	02/28/19 / 14:00		3	X										HCL	
LH18/24-SP650_022819	Water	02/28/19 / 14:00		2			X	X							NONE	
LH18/24-SP650_022819_BIX	Water	02/28/19 / 14:00		1					X						NONE	
LH18/24-SP650_022819	Water	02/28/19 / 14:00		1		X									HNO3	
Trip Blank	Water	02/28/19		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	02/28/19	14:30	J. Martinez	3/1/19	0850						

For Lab Use Only

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

Remarks: Cooler 43795 Temp 1.8
Inc 25 CF0.0

HS19030012

Bhate Environmental Associates, Inc.
18/24 Longhorn GW Treatment Plant Monthly Effluer

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

00934674

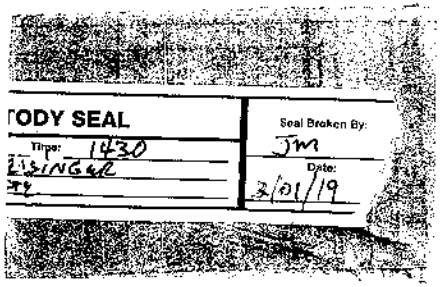
TRK# 4380 9530 9423
3221

FRI - 01 MAR 10:30A
PRIORITY OVERNIGHT

77099
TX-US
IAH

AB SGRA

3646088 01Mar 00:38 AFWH 547C2/0E3D/A17C



Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1905651; 1906112; 1906330; 1906332; 1906334

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2223 (233911)

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: Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 642099) was less than 1/2 the CRDL. The recovery for the LCS (642100) was within acceptable parameters.

MS/MSD Analysis: MS/MSD was performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 4.µg/L. The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

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 5.1.1. The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level of 4.0µg/L. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported. Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

Thomas Bosch March 06, 2019
Analyst Date

ANALYTICAL REPORT

Report Date: March 07, 2019

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1906332**
Project ID: HS19030012
Purchase Order: HS19030012
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_022819_BIX	1906332001	02/28/19	03/02/19	

ANALYTICAL REPORT

Workorder: 34-1906332
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_022819_BIX**	Sampling Site: NA	Collected: 02/28/2019
Lab ID: 1906332001	Media: 125 mL Nalgene	Received: 03/02/2019
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/2223 (HBN: 233911)	**Percent Solid:** NA
	Analyzed: 03/05/2019 12:49	**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: 233911)**

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 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 03/06/2019 09:17	/S/ Stephen Brose 03/07/2019 11:04

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: 34-1906332
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	PJLA (DoD ELAP)	L17-506	http://www.pjlabs.com
	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com
	Utah (TNI)	UT00953	http://lams.nelac-institute.org/search
	Nevada (TNI)	UT00953201-1	https://ndep.nv.gov/water/lab-certification
	Iowa (TNI)	IA# 376	http://www.shl.uiowa.edu/labcert/idnr/
	Kansas	E-10416	http://www.kdheks.gov/envlab/disclaimer.html
	Oklahoma (TNI)	IJ# 9980	http://www.deq.state.ok.us/CSDnew/labcert.htm
	Texas (TNI)	T104704456-18-9	https://www.tceq.texas.gov/assets/public/compliance/compliance_support/qa/txnelap_lab_list.pdf
Industrial Hygiene	AIHA (ISO 17025 & AIHA IHLAP)	101574	http://www.aihaaccreditedlabs.org
	DOECAP-AP	L18-606	http://www.pjlabs.com
	Washington	C596	https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Laboratory-Accreditation
Dietary Supplements	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com

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.
< Means 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: 1906332

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 642099
Analyzed: 03/05/2019 09:26
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 642100
Analyzed: 03/05/2019 09:00
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.11	4.00	103	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

	Sample: 1906112001	MS: 1906112002	MSD: 1906112003
	Analyzed: 03/05/2019 09:54	Analyzed: 03/05/2019 10:07	Analyzed: 03/05/2019 10:20
	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	4	▲ 65.7	78.8	123.8	53.7	▲ 61.2	0.337	0.0	20.0

Continuing Calibration Verification

	CCV: 642096	CCV: 642101	CCV: 642102
	Analyzed: 03/05/2019 08:44	Analyzed: 03/05/2019 12:18	Analyzed: 03/05/2019 14:07
	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	25.0	25.0	100	25.0	25.0	100	24.5	25.0	97.8

Interference Check Sample

ICSA: 642098
Analyzed: 03/05/2019 09:13
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	3.93	4.00	98.2

Comments

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Quality Control Sample
Batch Report

Analysis Information

Workorder: **1906332**

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		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
03/06/2019 13:45	03/07/2019 11:04

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

18698/#2

W

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: 10854

1906332

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:	HS19030012
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19030012-02**	**LH18/24-SP650_022819_BIX**	**Water**	**28 Feb 2019 14:00**
	SUB_Perch-6850			15 Mar 2019

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: 3/1/19 1800

Received By: _____ Date/Time: 3/2/19 1903

Cooler ID(s): 9203 Temperature(s): 3°

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS19030012	***Split:***	**Workorder ID:** 1906332	**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	02/28/2019 14:00	LH18/24-SP650_022819_BIX	1906332001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

COOL

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	03/02/2019 09:03	ALS Sample Receiving	Sample Login
Justin Warath 3/4/19 1400		13B	Storage
R.33.1	03.04.19 16:10	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

00934683

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ARS Houston

Project/Task/Site: 1906332

Date/Time of Receipt: 3/2/19 903

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	C19 9203	3 °C	4	C19	°C	7	C19	°C
2	C19	°C	5	C19	°C	8	C19	°C
3	C19	°C	6	C19	°C	9	C19	°C

Taken By: [signature] (Signature) Meredith Edens (Printed Name) 3/2/19 (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: _____

00934685

Must Deliver Next Business Day
Time and Tempature Sensitive!

Part # 159469-434 RIT2 EXP 11/19

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

SHIP DATE: 01MAR19
ACTWGT: 8.55 LB
CAD: 300130/CAFE3211
DIMS: 14x11x10 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS19030011/12/14 - RJ

551C2/0E3D/104C

FedEx Express

TRK# 0201 4809 7831 2469

SATURDAY 12:00P
PRIORITY OVERNIGHT

XO BTFA

84123
UT-US SLC

FedEx Express

FedEx® Saturday Delivery

151966 10/04 MWI

SDR

RT B639 1
ST F1 12:00

ALS
10450
Houst
Tel. +1
Fax. +1

Batch Worklist

Batch: ELMS/ 2223 **Created:** 3/5/2019 08:21 **Instrument:** **HBN:** 233911

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

Workorder: 1905651 [ENV_LVL4]
Workorder: 1906112 [ENV_LVL4]
Workorder: 1906330 [ENV_LVL4]
Workorder: 1906332 [ENV_LVL4]
Workorder: 1906334 [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	642096	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
2	642097	RLVS for HBN 233911 [ELMS/2223				RLVS	3		E685041C3Q	5311		3/7/2019	
3	642098	ICS for HBN 233911 [ELMS/2223]				ICS	3		E6850..D3Q	5311		3/7/2019	
4	642099	LMB for HBN 233911 [ELMS/2223]				LMB	3		E6850Q413Q	5311		3/7/2019	
5	642100	LCS for HBN 233911 [ELMS/2223]				LCS	3		E6850Q413Q	5311		3/7/2019	
6	1905651001	HS19021158-02/LH18/24-SP650_02				SAMPLE	3	1905651001-A	E6850Q41.3	5480	3/21/2019	3/7/2019	
7	1906112001	EW01_022619				SAMPLE	3	1906112001-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
8	1906112002	EW01_022619MS				MS	3	1906112002-A	E6850Q413Q	5480		3/7/2019	
9	1906112003	EW01_022619MSD				MSD	3	1906112003-A	E6850Q413Q	5480		3/7/2019	
10	1906112004	EW05_022619				SAMPLE	3	1906112004-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
11	1906112005	EW05_022619_FD				FLDDUP	3	1906112005-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
12	1906112006	EW02_022619				SAMPLE	3	1906112006-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
13	1906112007	EW06_022619				SAMPLE	3	1906112007-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
14	1906112008	EW03_022619				SAMPLE	3	1906112008-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
15	1906112009	EW07_022619				SAMPLE	3	1906112009-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
16	642101	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
17	1906112010	EW04_022619				SAMPLE	3	1906112010-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
18	1906112011	EW08_022619				SAMPLE	3	1906112011-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
19	1906330001	LH18/24-SP140_022819				SAMPLE	3	1906330001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
20	1906332001	LH18/24-SP650_022819_BIX				SAMPLE	3	1906332001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
21	1906334001	LH18-24-SP650_022819_BIX				SAMPLE	3	1906334001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
22	642102	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1905651 (001); 1906112 (001-11); 1906330 (001); 1906332 (001); 1906334 (001) ELMS Batch/HBN ID: 2223 (233911)
Prep Date: 03/04/2019 Analysis Date: 03/05/2019 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2019\MAR\05MAR19D.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 AH015-4)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot AH015-4)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 43730. Dilutions of Working Standard Solution ID 43702 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/15/2019, sequence 15FEB19D.s Offline Quantitation Method: CLO4-DP1.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-AQN.M Fragmentor: 160 Output Gain: 3 Injection Volume: 30µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.65
5.8	0.65
5.9	0.25
10.3	0.25
10.5	0.65
12.0	0.65

QC DATA: 4.0µL of QC Solution Horizon ID 41830 was used for LCS 642100; Target = 4.0µg/L. ASTM type II water was used for LMB 642099.

MS/MSD: The Matrix Spike and duplicate (MS/MSD) were performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. Spike target = 4.0µg/L.

COMMENTS:

1) Results reported in µg/L. Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2019\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2019\23911-DoD-ALS-Hstn LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#
5) The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level 4.0µg/L.
6) Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

5.5 Chromatography (GC, HPLC and LC/MS) Technical Review

Note: It is the peer reviewer's responsibility to ensure that appropriate criteria are used as defined in the HORIZON PROFILE. The evaluation criteria are prioritized as per Section 2.2 of this SOP. These items must be checked for all projects. The following checklist will be completed by both the analyst and the peer reviewer and scanned into the HBN folder with the raw data.

Chromatography (GC, HPLC, LC/MS) Technical Review Criteria Batch(es)/SDG: ELMS: 2223 HBN: 233911 Sample Set IDs if Applicable: 1905651/1906912/1906330 1906332/1906334	Analyst Initials	Reviewer Initials
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
For method 8081A, Endrin/DDT Breakdown is checked for compliance	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR#	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 43702
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 WRK

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
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK — Description - 6850 Stock AccStd 1,000ug/mL

Standard: 43659
MFG: AccuStandard
MFG Lot: 218065075
Part ID: IC-PER-10X-1

Created By: Thomas Bosch
Create Date: 09/17/2018 09:09AM

Amount: 100 mL
Expires: 07/25/2020
Usable: No
Lab Lot: CLO4 STOCK

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: 43701
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 INT

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
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020

STANDARD REPORT

Working Standard - CLO4 QC WRK

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

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

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
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

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

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

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: 43730	**Created By:** Thomas Bosch	**Amount:** 25 mL
MFG: ALS/SLC	**Create Date:** 09/20/2018 09:09AM	**Expires:** 09/20/2019
MFG Lot: TNB: 05/09/2018	**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
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK — Description - Perchlorate ISTD Stock

Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date:	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

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

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

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

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

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

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®

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

CERTIFICATE OF ANALYSIS

S 43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 218065075
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Date Certified: Jun 25, 2018
Expiration: Jul 25, 2020
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO 17034 Scope of Accreditation: Yes

Signal Word: None

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

The gravimetric uncertainty for this product is ±0.24%.
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.

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 (1804, 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 Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
*	642096 CCV@25	Vial 71	1	Control	1	2.57589e6	8.017	25.04585
*	642100 QC@4.0	Vial 72	1	Control	2	4.23307e5	8.139	4.10749
*	642098 ICS@4.0	Vial 73	1	Control	3	3.17619e5	7.883	3.92708
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	7.71127e6	7.438	51.25151
*	1906112002 MS	Vial 77	1	Sample	7	8.02696e6	7.464	53.87972
*	1906112003 MSD	Vial 78	1	Sample	8	7.94242e6	7.442	53.69940
*	1906112004	Vial 79	1	Sample	9	2.33017e7	7.227	172.36522
*	1906112005	Vial 80	1	Sample	10	2.30991e7	7.229	180.38568
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	2.33611e6	8.114	25.01987
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	2.53126e6	7.736	226.48155
*	1906112005 10X	Vial 91	1	Sample	22	2.68237e6	7.739	241.03710
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	3.77363e6	8.090	3708.65666
*	642102 CCV@25	Vial 71	1	Control	25	2.15787e6	8.144	24.45533

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	642096 CCV@25	Vial 71	1	Control	1	6.79028e5	8.036	25.15984
*	642100 QC@4.0	Vial 72	1	Control	2	1.27412e5	8.156	4.45187
*	642098 ICS@4.0	Vial 73	1	Control	3	9.68721e4	7.906	4.29888
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	2.02786e6	7.452	51.10329
*	1906112002 MS	Vial 77	1	Sample	7	2.14637e6	7.478	54.46797
*	1906112003 MSD	Vial 78	1	Sample	8	2.10991e6	7.456	53.98100
*	1906112004	Vial 79	1	Sample	9	6.79668e6	7.243	180.45962
*	1906112005	Vial 80	1	Sample	10	6.82834e6	7.246	190.34382
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	6.28961e5	8.128	25.63410
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	6.46870e5	7.754	220.91905
*	1906112005 10X	Vial 91	1	Sample	22	6.95643e5	7.756	238.44674
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	1.01021e6	8.102	3771.67475
*	642102 CCV@25	Vial 71	1	Control	25	5.83711e5	8.160	25.16652

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
*	642096 CCV@25	Vial 71	1	Control	1	3.12207e5	8.043	5.00000
*	642100 QC@4.0	Vial 72	1	Control	2	3.41038e5	8.157	5.00000
*	642098 ICS@4.0	Vial 73	1	Control	3	2.68237e5	7.902	5.00000
*	642099 LMB	Vial 74	1	Control	4	3.53313e5	8.102	5.00000
*	1905651001	Vial 75	1	Sample	5	3.26356e5	7.780	5.00000
*	1906112001	Vial 76	1	Sample	6	4.26473e5	7.464	5.00000
*	1906112002 MS	Vial 77	1	Sample	7	4.19549e5	7.491	5.00000
*	1906112003 MSD	Vial 78	1	Sample	8	4.16709e5	7.467	5.00000
*	1906112004	Vial 79	1	Sample	9	2.95705e5	7.253	5.00000
*	1906112005	Vial 80	1	Sample	10	2.75946e5	7.263	5.00000
*	1906112006	Vial 81	1	Sample	11	3.73575e5	7.480	5.00000
*	1906112007	Vial 82	1	Sample	12	5.00533e5	7.256	5.00000
*	1906112008	Vial 83	1	Sample	13	4.65121e5	7.237	5.00000
*	1906112009	Vial 84	1	Sample	14	2.43675e5	7.672	5.00000
*	1906112010	Vial 85	1	Sample	15	2.51865e5	7.710	5.00000
*	1906112011	Vial 86	1	Sample	16	2.80792e5	7.876	5.00000
*	642101 CCV@25	Vial 71	1	Control	17	2.83460e5	8.140	5.00000
*	1906332001	Vial 88	1	Sample	19	2.64674e5	7.827	5.00000
*	1906334001	Vial 89	1	Sample	20	2.65662e5	7.808	5.00000
*	1906112004 10X	Vial 90	1	Sample	21	3.41608e5	7.756	50.00000
*	1906112005 10X	Vial 91	1	Sample	22	3.38724e5	7.764	50.00000
*	1906112007 RE	Vial 82	1	Sample	23	4.31135e5	7.332	5.00000
*	1906330001 100	Vial 92	1	Sample	24	2.98985e5	8.111	500.00000
*	642102 CCV@25	Vial 71	1	Control	25	2.68305e5	8.165	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

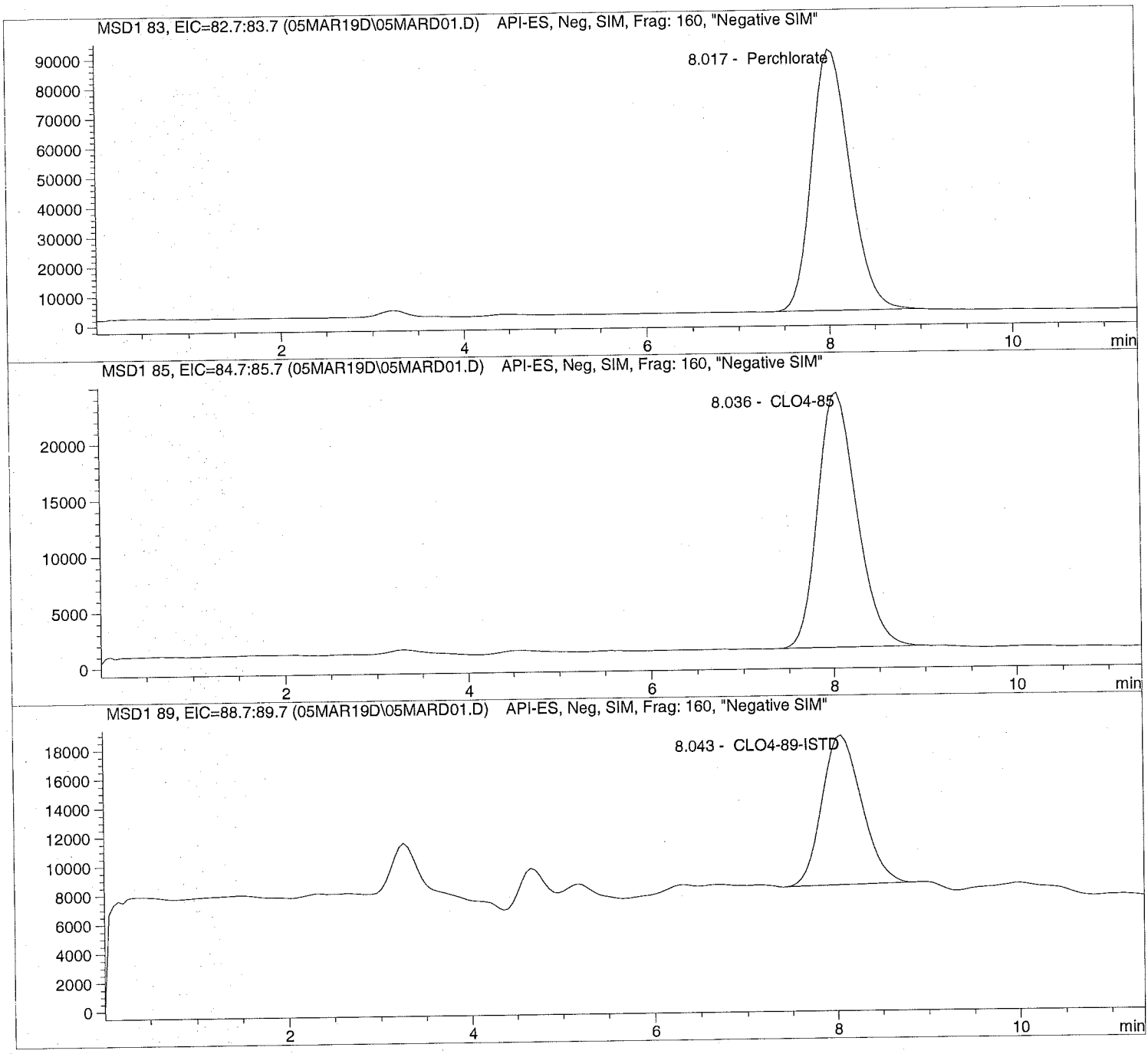
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	642096	CCV@25	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	642100	QC@4.0	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	642098	ICS@4.0	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	642099	LMB	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	1905651001		CLO4-AQN	1	Sample		
6	Vial 76	1906112001		CLO4-AQN	1	Sample		
7	Vial 77	1906112002	MS	CLO4-AQN	1	Sample		
8	Vial 78	1906112003	MSD	CLO4-AQN	1	Sample		
9	Vial 79	1906112004		CLO4-AQN	1	Sample		
10	Vial 80	1906112005		CLO4-AQN	1	Sample		
11	Vial 81	1906112006		CLO4-AQN	1	Sample		
12	Vial 82	1906112007		CLO4-AQN	1	Sample		
13	Vial 83	1906112008		CLO4-AQN	1	Sample		
14	Vial 84	1906112009		CLO4-AQN	1	Sample		
15	Vial 85	1906112010		CLO4-AQN	1	Sample		
16	Vial 86	1906112011		CLO4-AQN	1	Sample		
17	Vial 71	642101	CCV@25	CLO4-AQN	1	Ctrl Samp		
18	Vial 87	1906330001	1K	CLO4-AQN	1	Sample		
19	Vial 88	1906332001		CLO4-AQN	1	Sample		
20	Vial 89	1906334001		CLO4-AQN	1	Sample		
21	Vial 90	1906112004	10X	CLO4-AQN	1	Sample		
22	Vial 91	1906112005	10X	CLO4-AQN	1	Sample		
23	Vial 82	1906112007	RE	CLO4-AQN	1	Sample		
24	Vial 92	1906330001	100	CLO4-AQN	1	Sample		
25	Vial 71	642102	CCV@25	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.017	PBA	2575886.3	25.0459	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.036	PBA	679028.4	25.1598	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.043	PBA	312206.9	5.0000	CLO4-89-ISTD

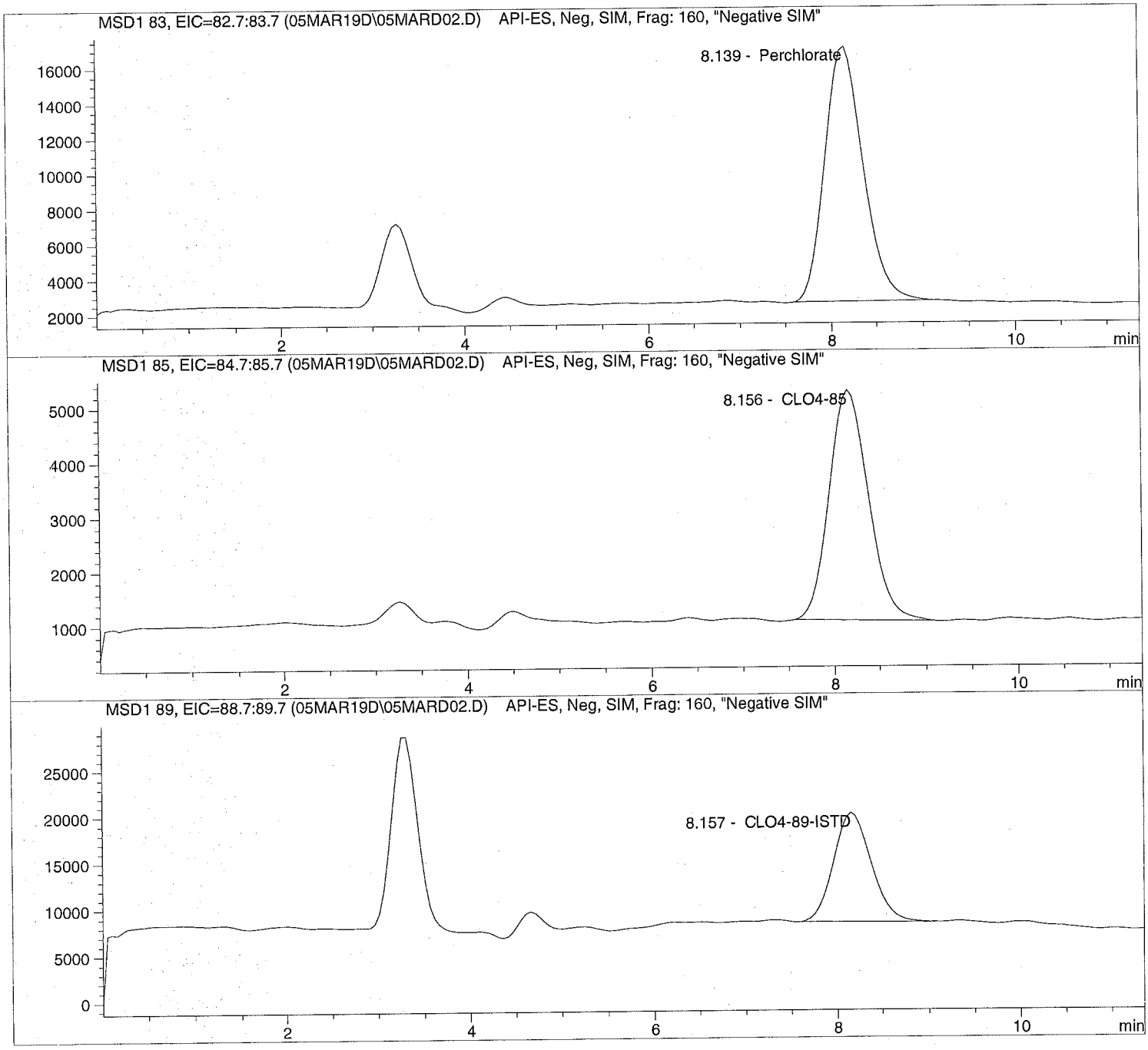
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD02.D Sample Name: 642100 QC@4.0

Injection Date:	3/05/2019 09:00:30	Seq Line:	2
Sample Name:	642100 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Injection Date:	3/05/2019 09:00:30	Seq Line:	2
Sample Name:	642100 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.139	PBA	423307.1	4.1075	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.156	PBA	127412.0	4.4519	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.157	PBA	341038.3	5.0000	CLO4-89-ISTD

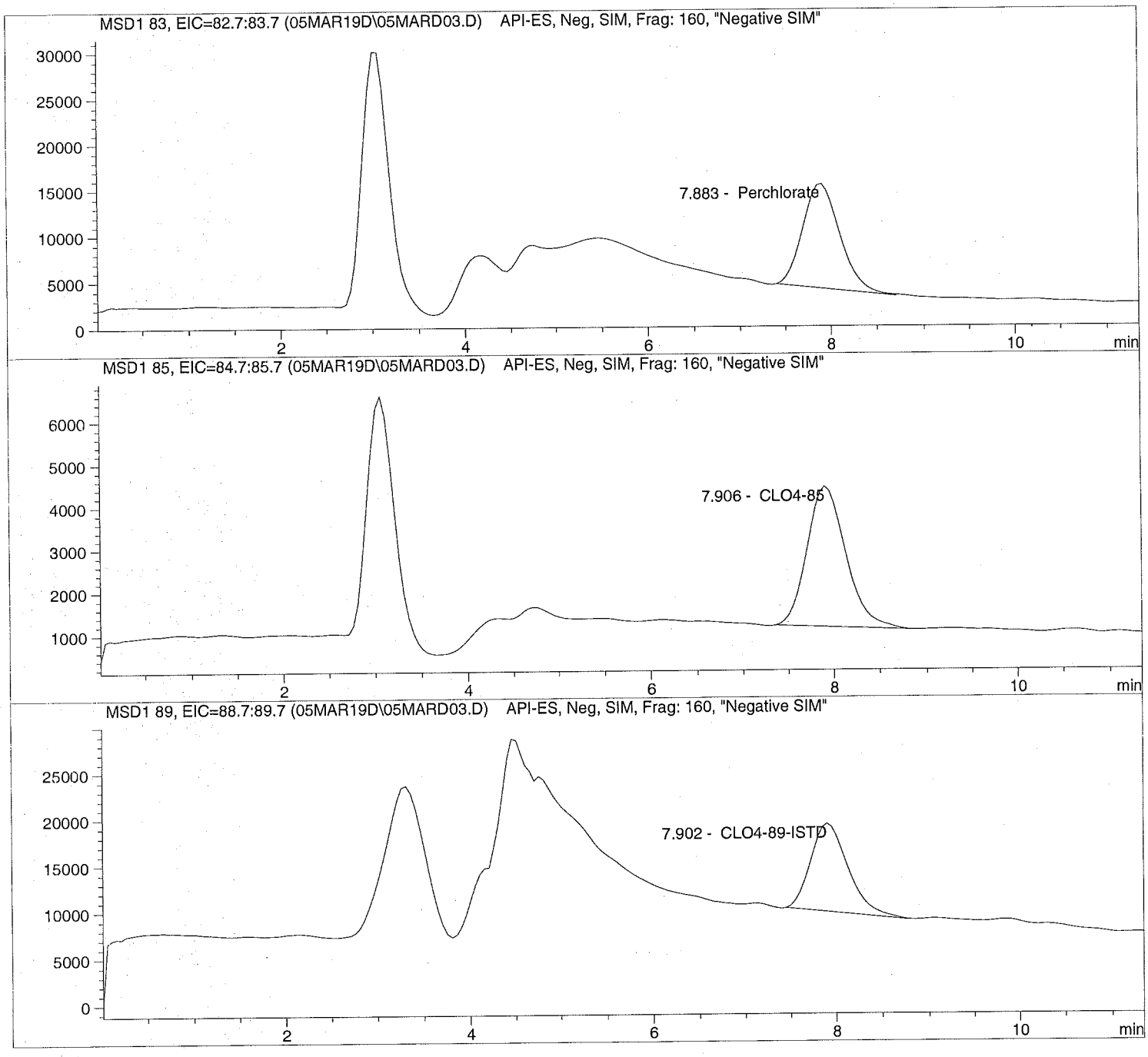
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.883	PBA	317618.9	3.9271	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.906	PBA	96872.1	4.2989	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.902	PBA	268236.7	5.0000	CLO4-89-ISTD

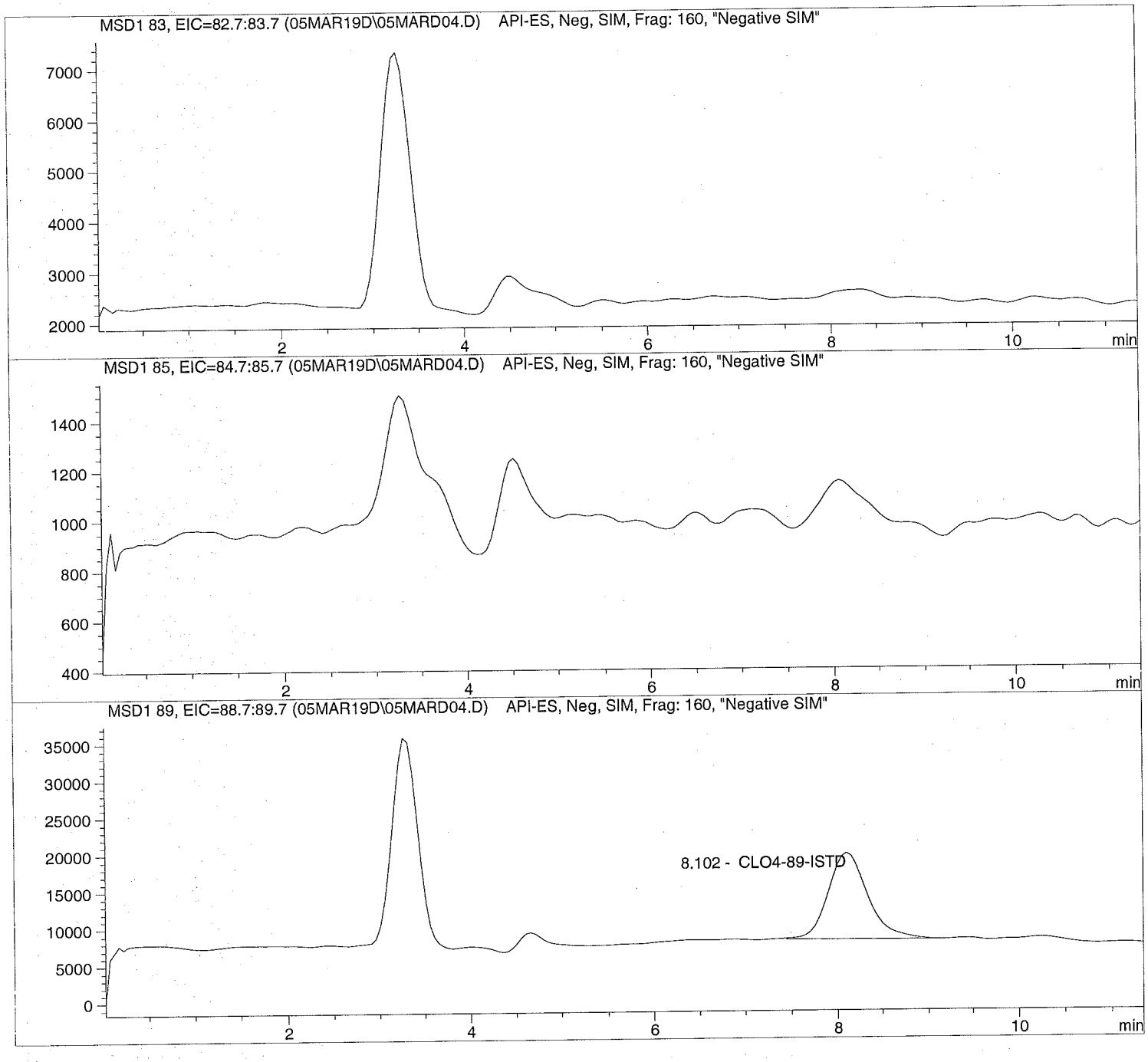
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.102	BBA	353313.1	5.0000	CLO4-89-ISTD

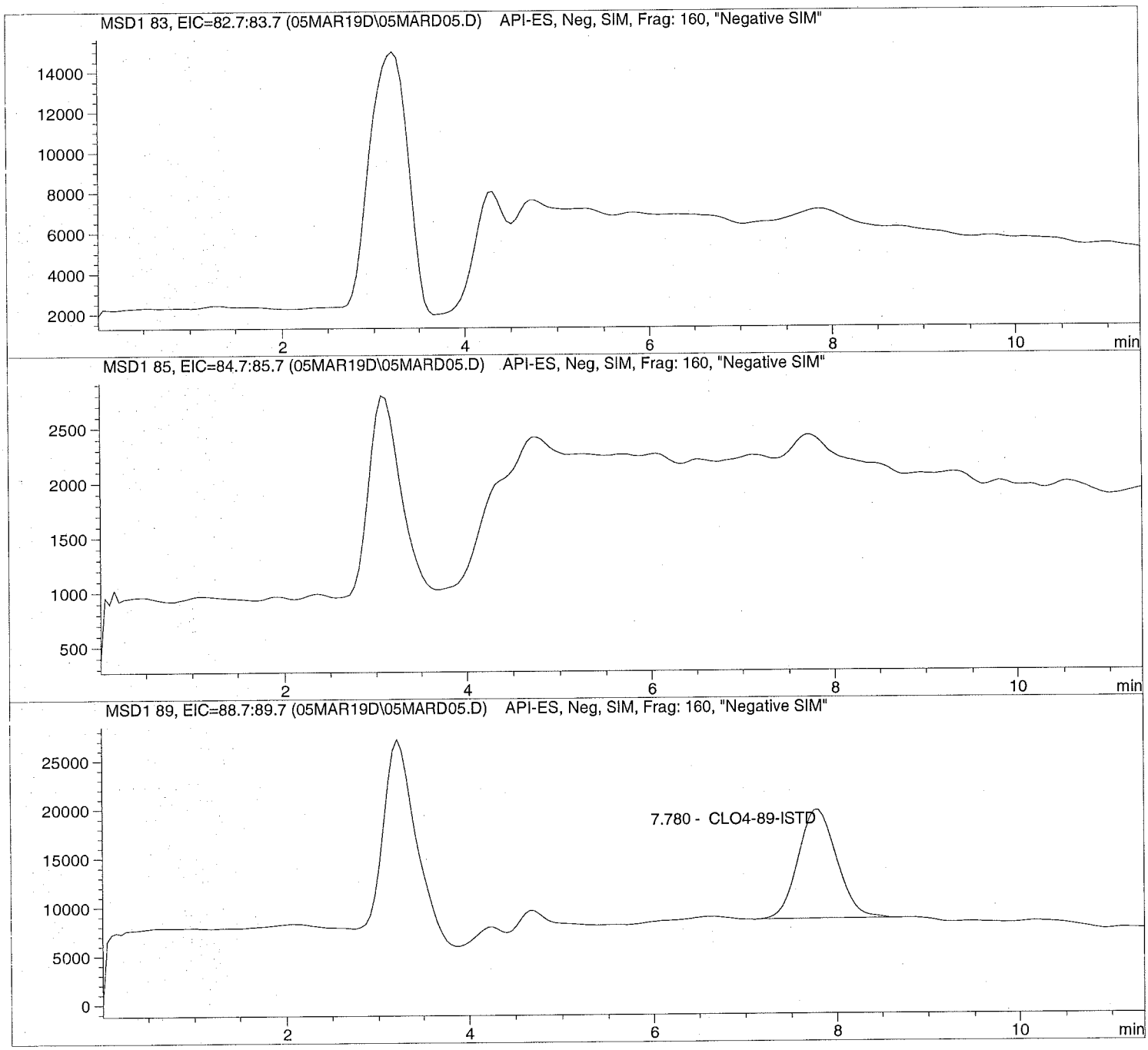
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.780	PBA	326356.2	5.0000	CLO4-89-ISTD

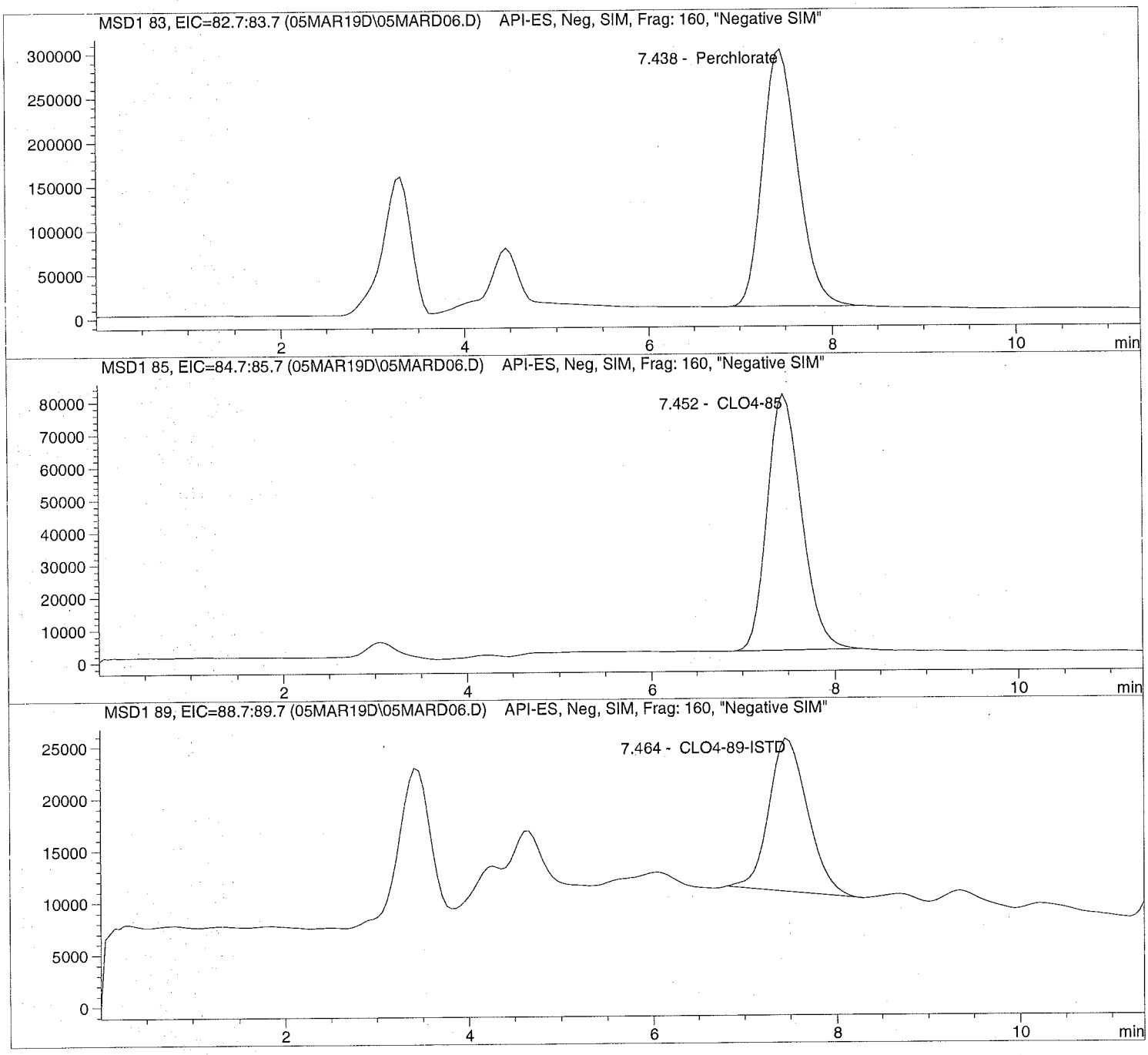
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.438	PBA	7711270.5	51.2515	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.452	PBA	2027855.1	51.1033	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.464	PB	426473.5	5.0000	CLO4-89-ISTD

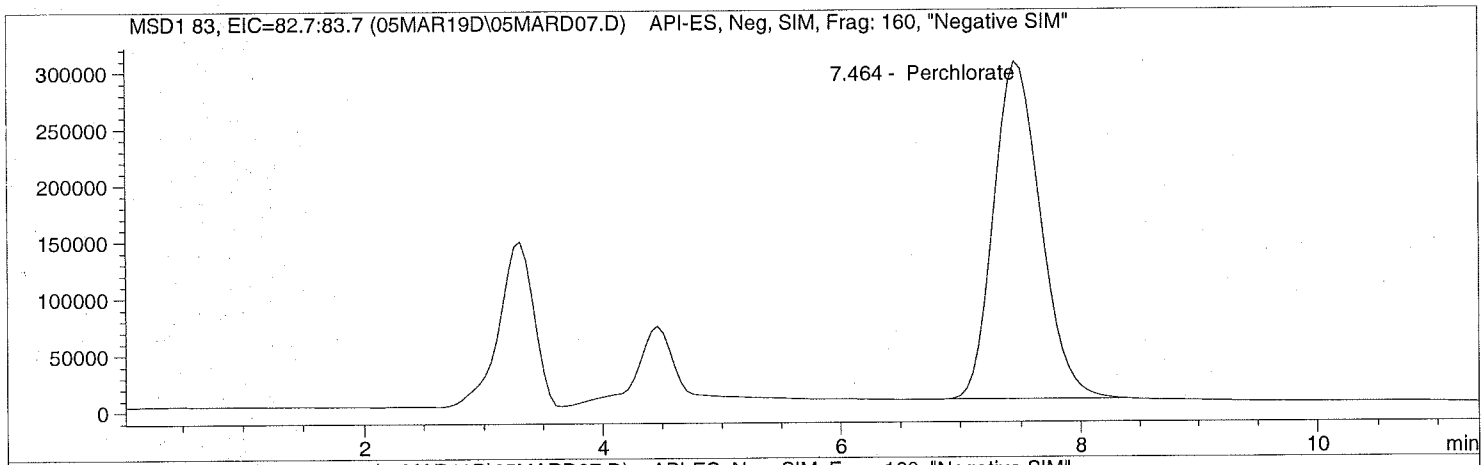
*** End of Report ***

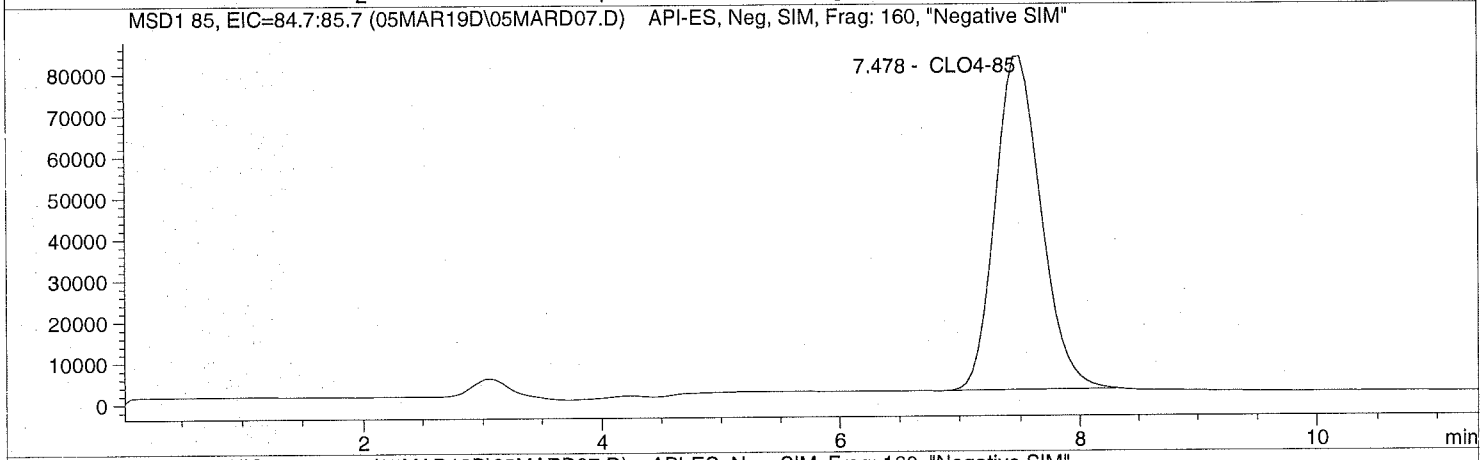
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

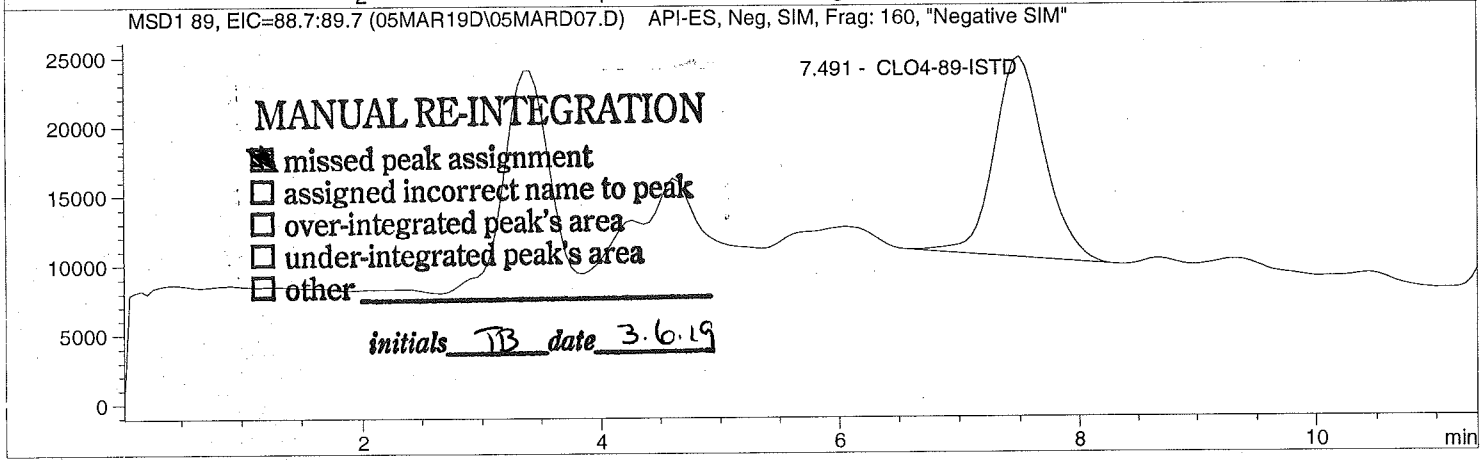
Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







MANUAL RE-INTEGRATION
☒ missed peak assignment
☐ assigned incorrect name to peak
☐ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____
initials JB *date* 3.6.19

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	53.8797	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	54.4680	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.491	MM	419549.0	5.0000	CLO4-89-ISTD

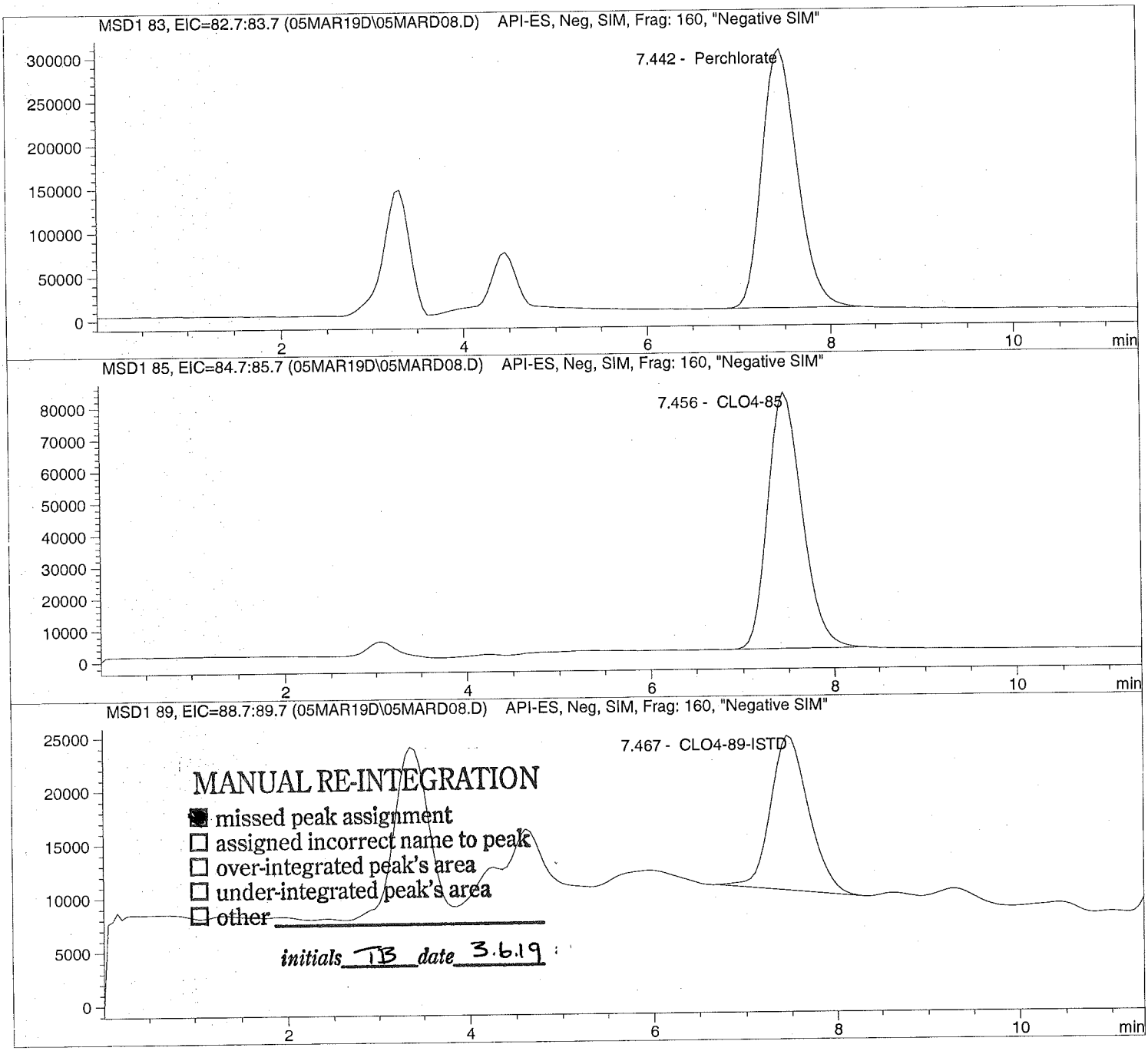
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	53.6994	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	53.9810	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.467	MM	416709.1	5.0000	CLO4-89-ISTD

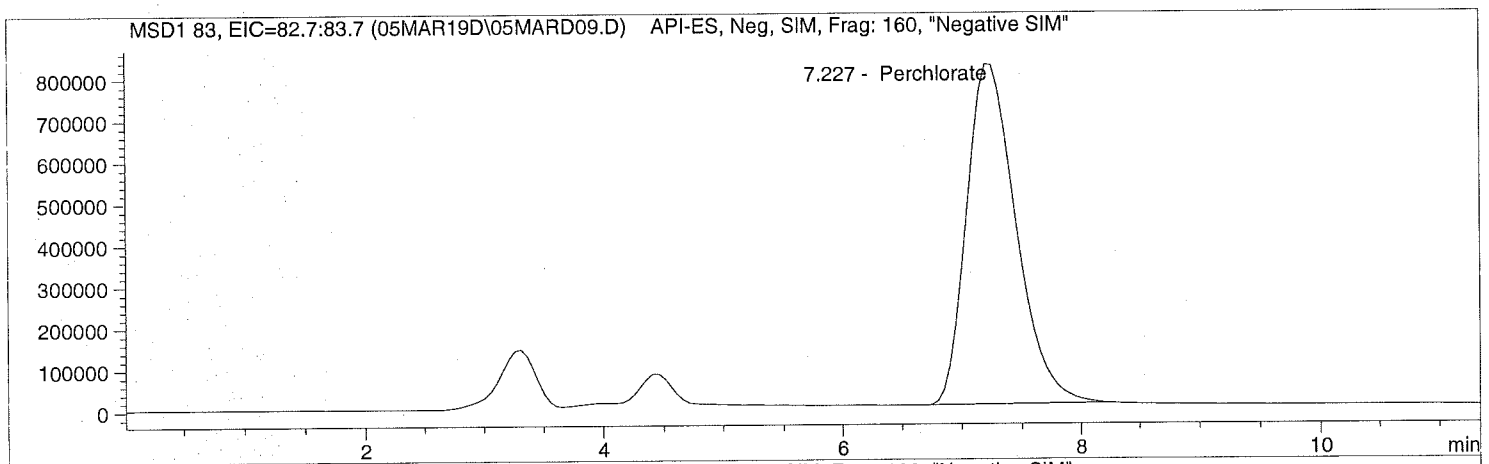
*** End of Report ***

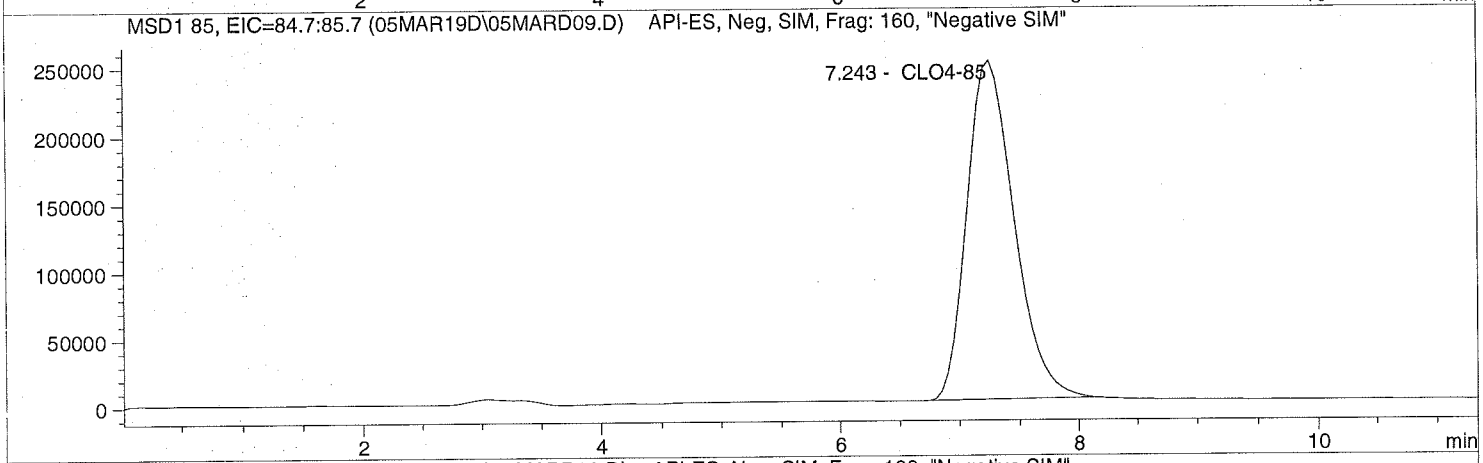
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

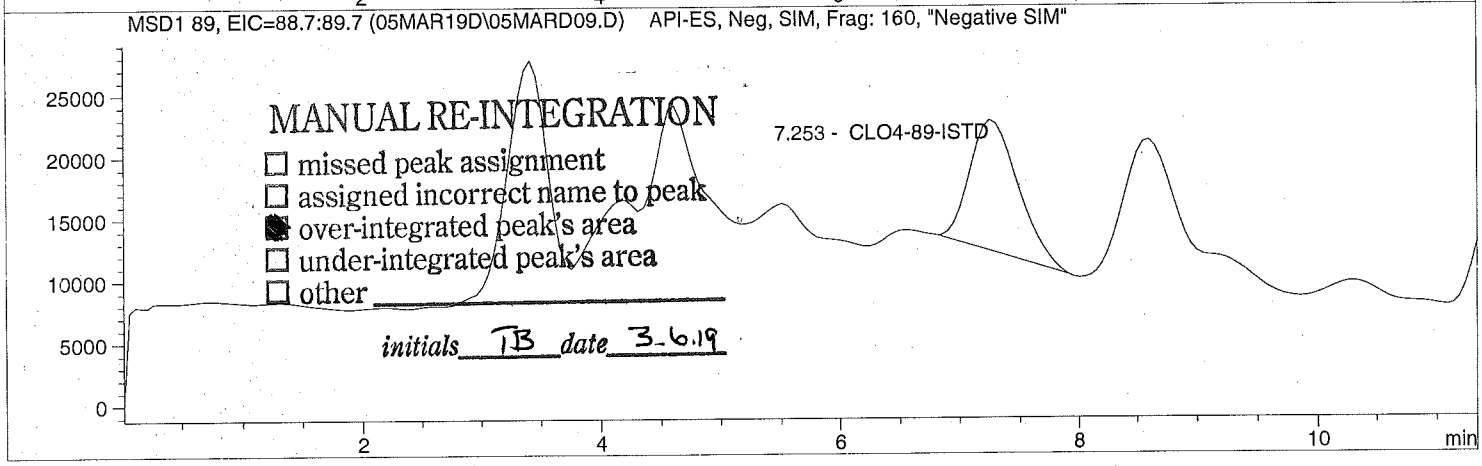
Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____

initials TB *date* 3.6.19

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	172.3652	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	180.4596	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.253	MM	295705.2	5.0000	CLO4-89-ISTD

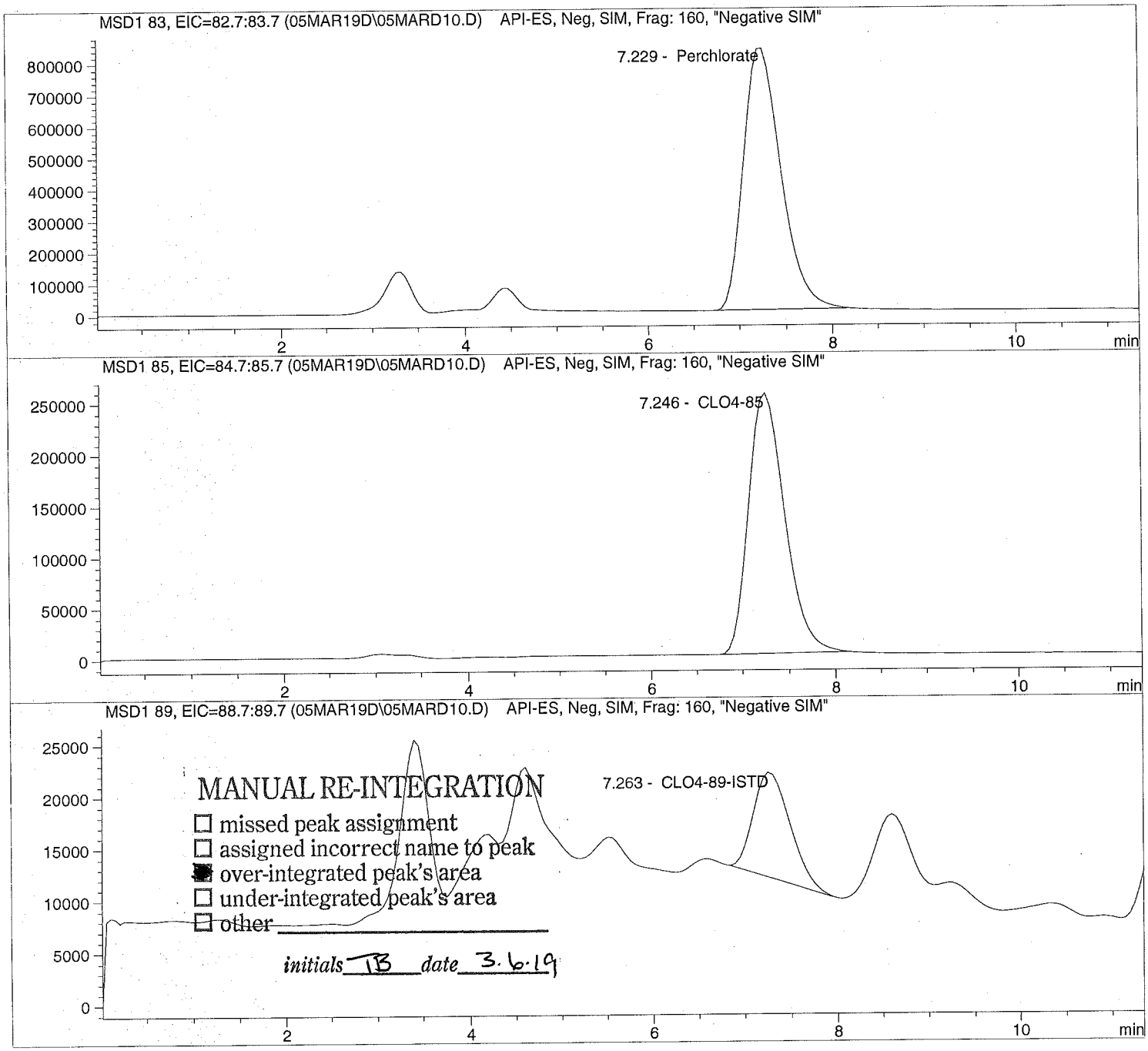
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	180.3857	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	190.3438	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	MM	275946.4	5.0000	CLO4-89-ISTD

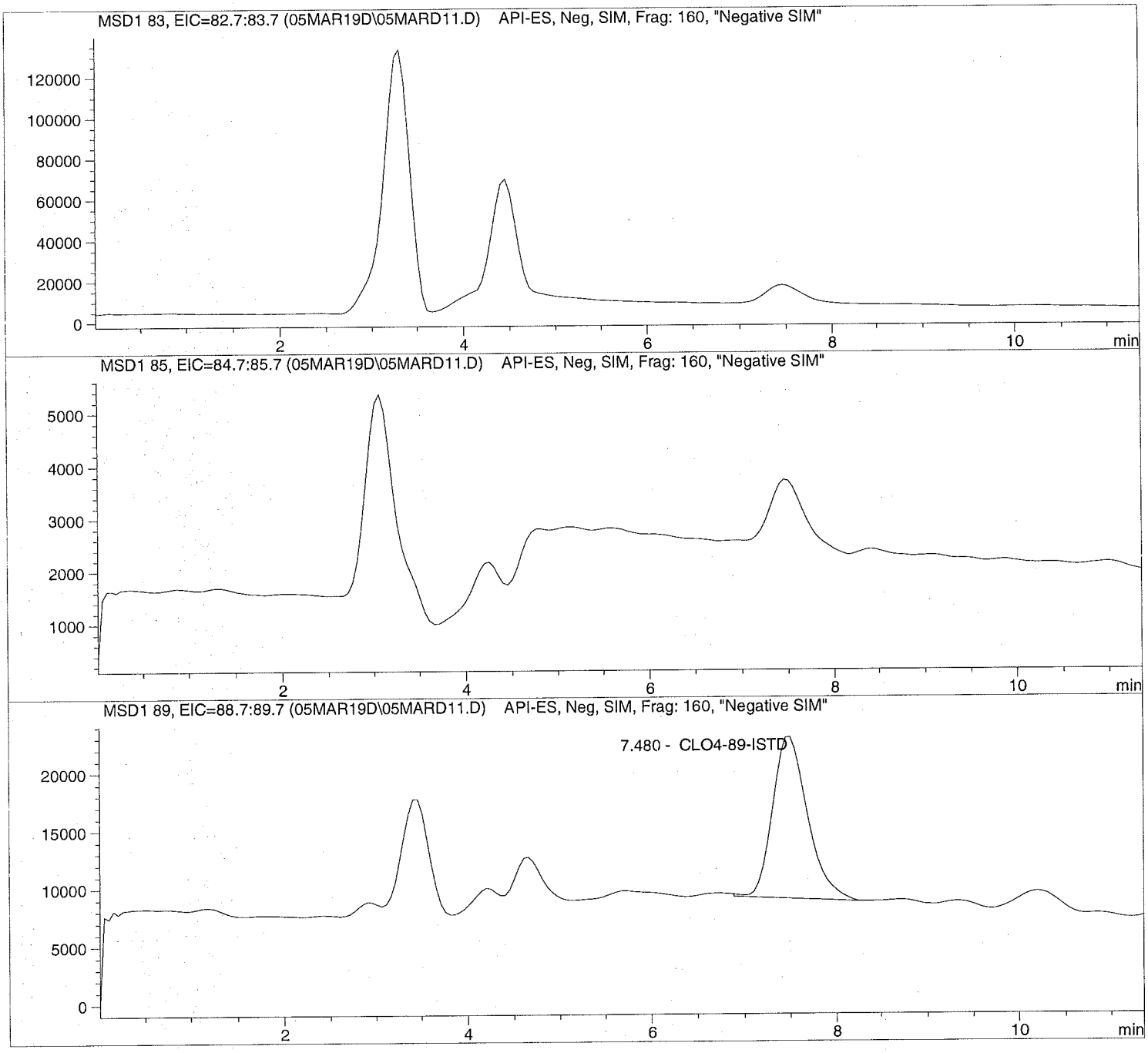
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.480	BBA	373575.4	5.0000	CLO4-89-ISTD

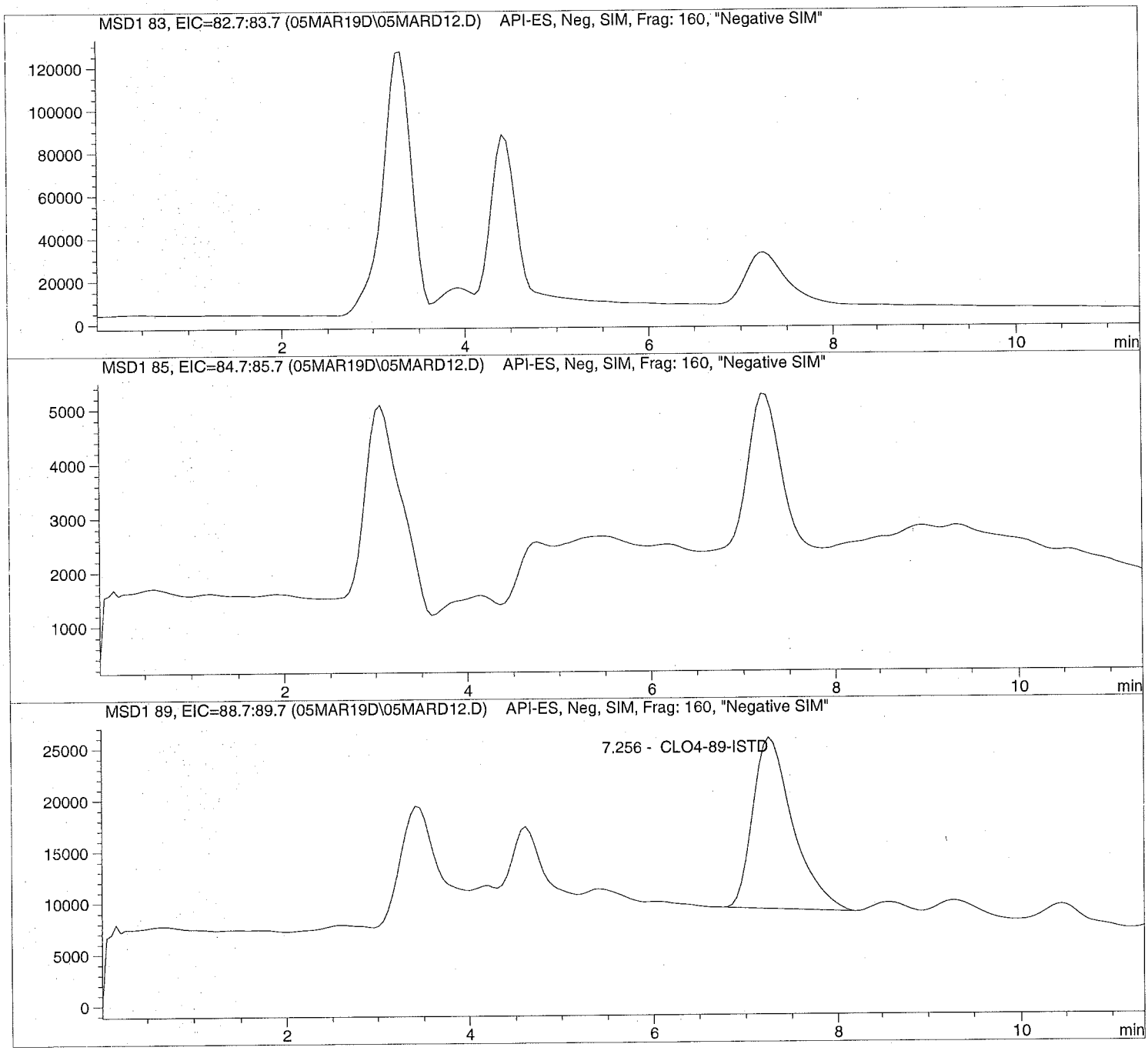
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.256	PB	500532.9	5.0000	CLO4-89-ISTD

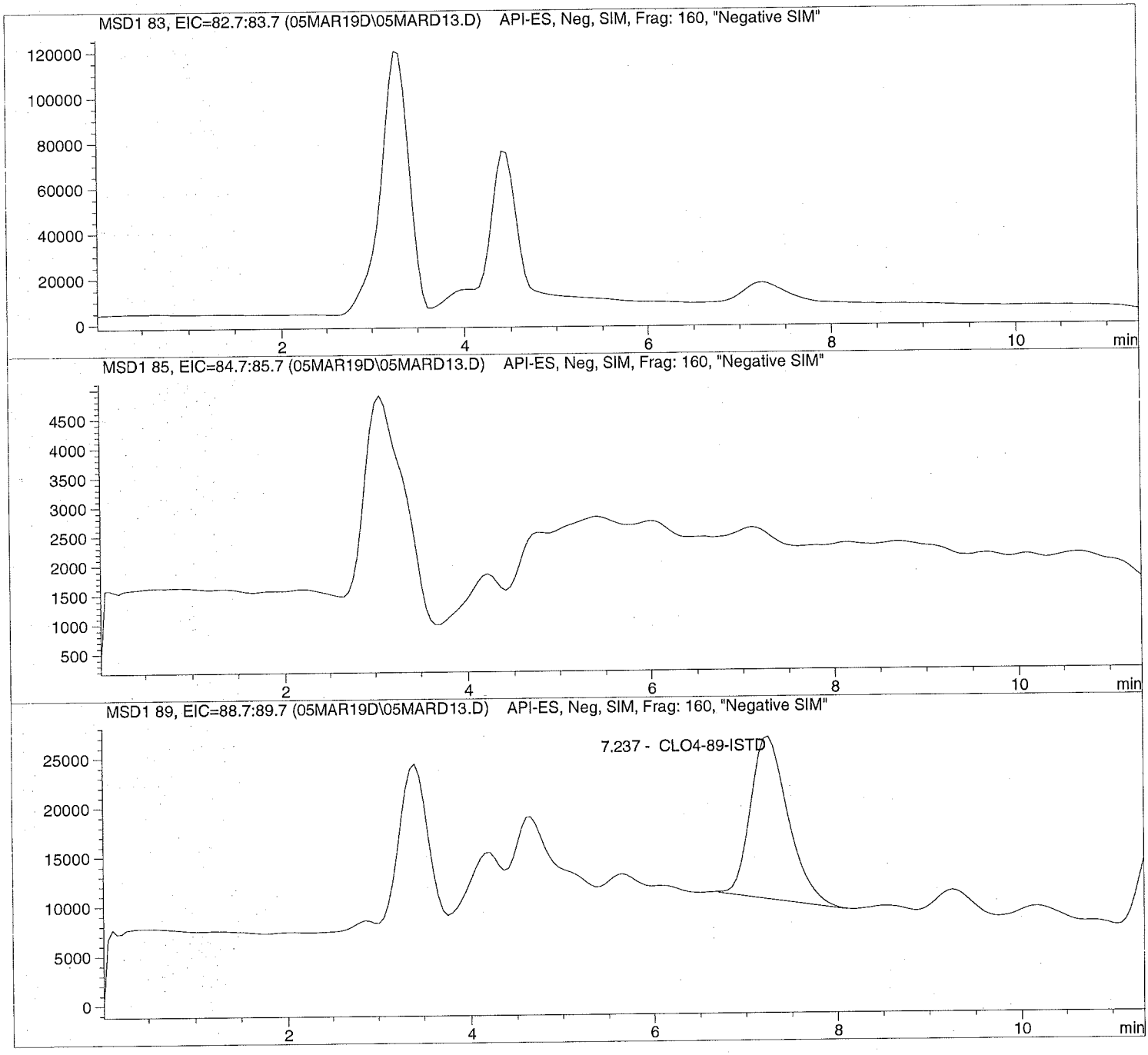
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.237	BBA	465121.2	5.0000	CLO4-89-ISTD

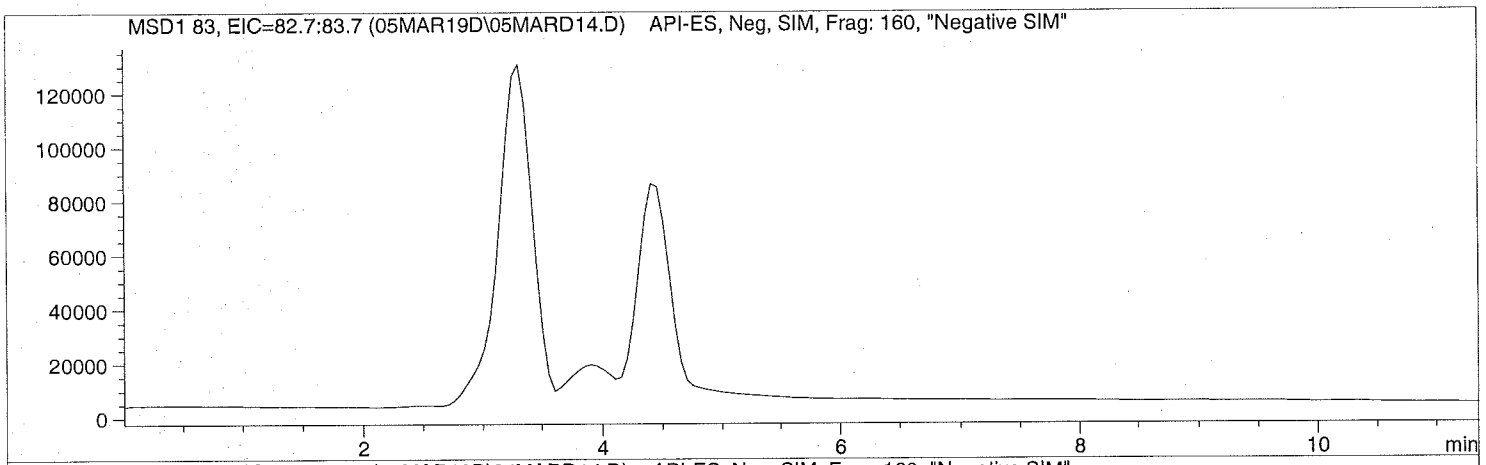
*** End of Report ***

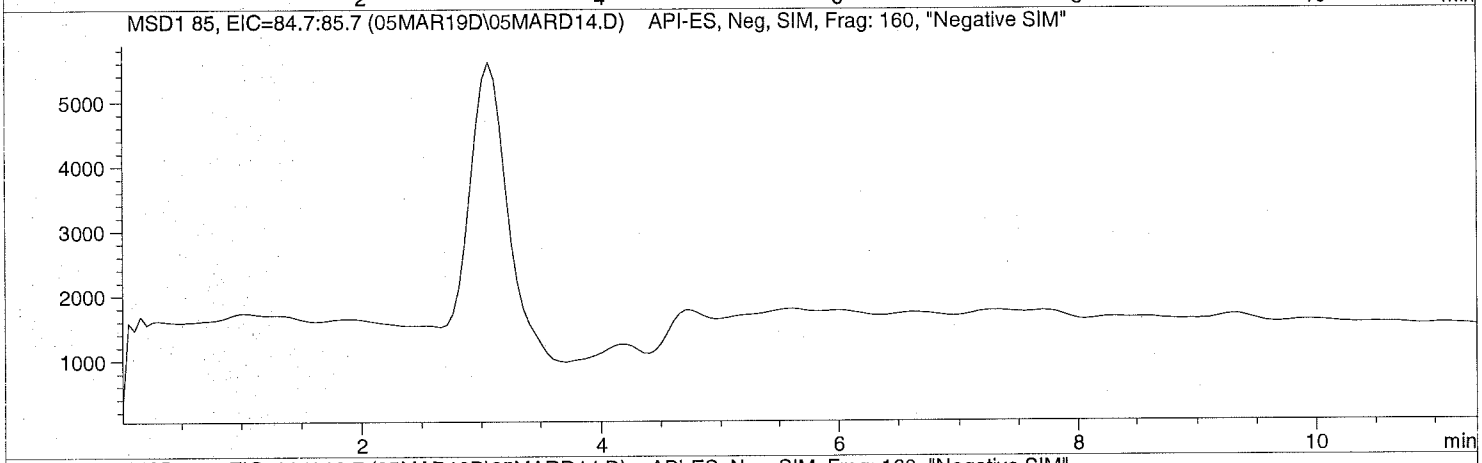
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

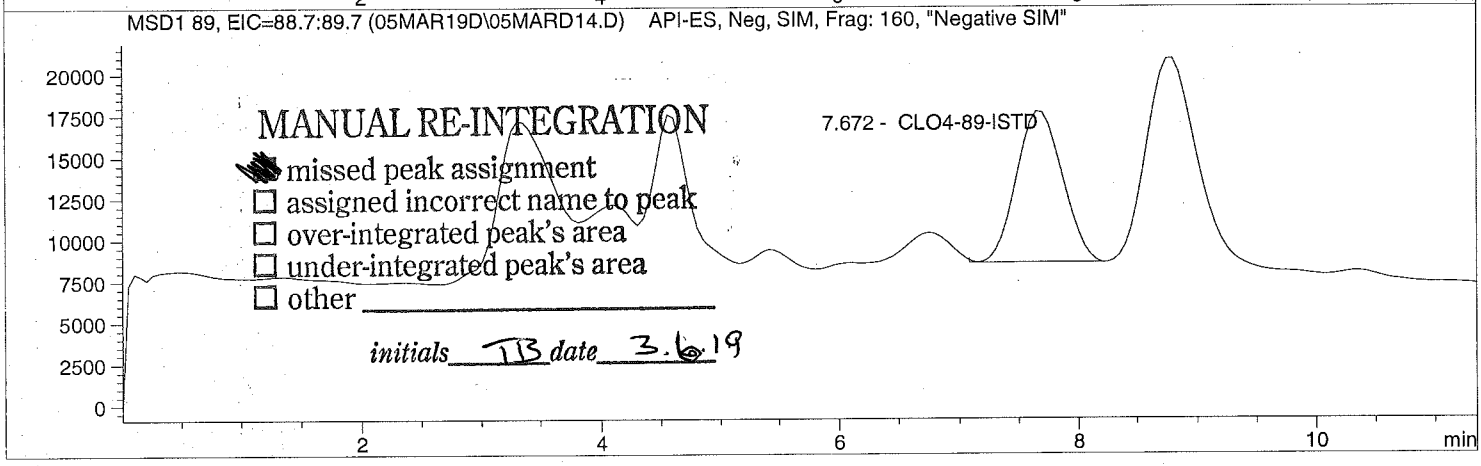
Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	5.0000	CLO4-89-ISTD

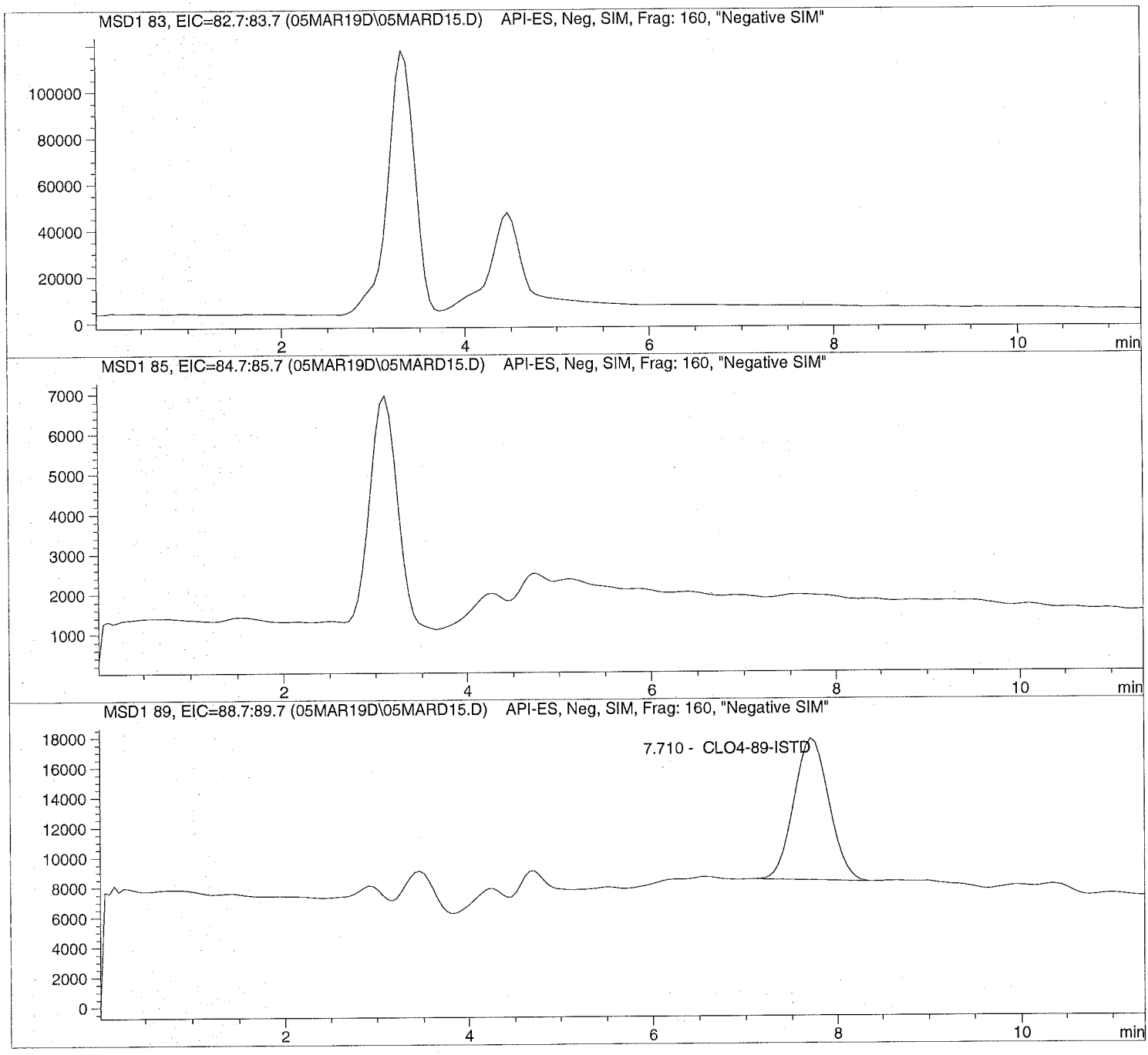
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.710	BBA	251865.4	5.0000	CLO4-89-ISTD

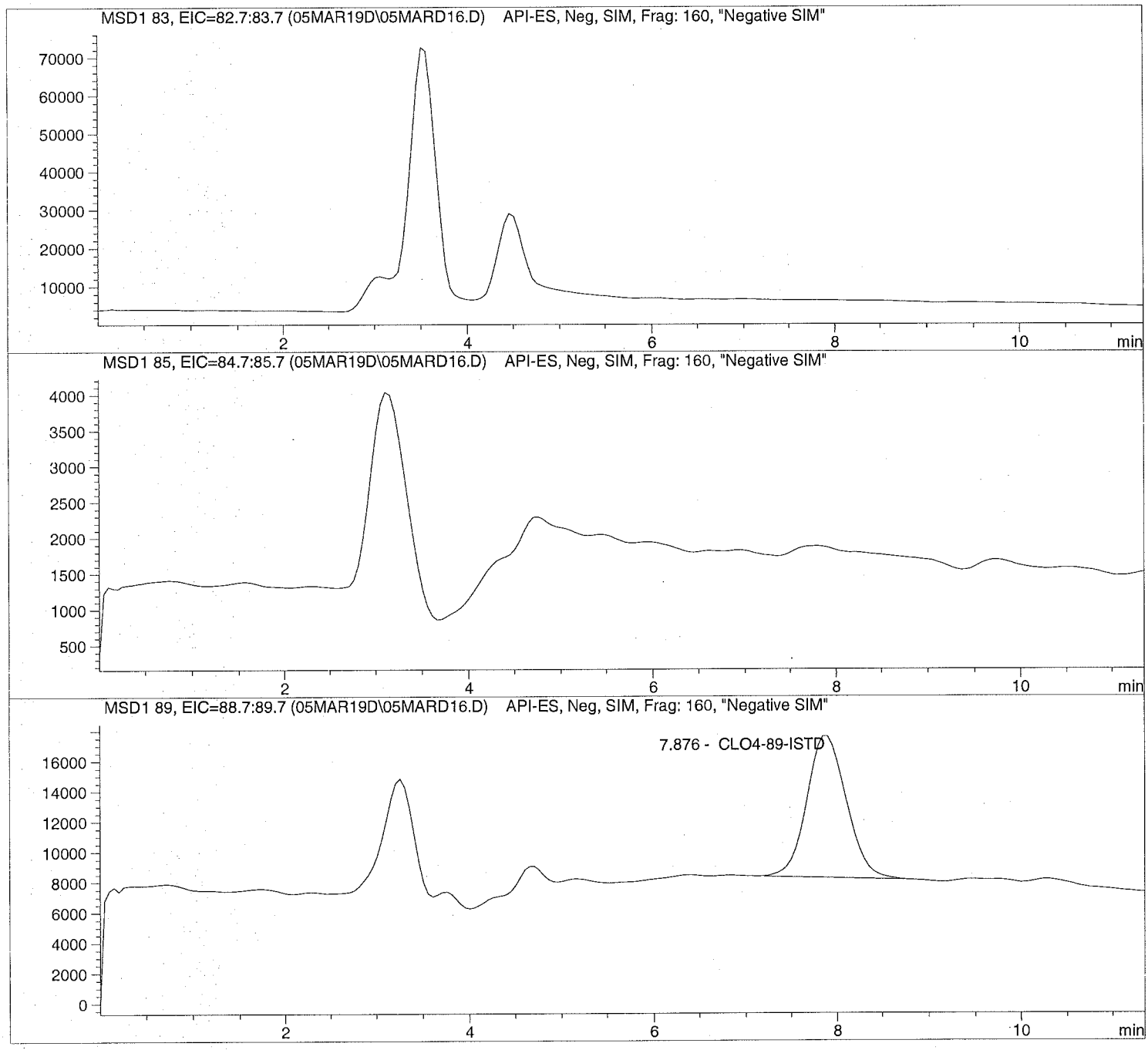
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Tue, 19. Feb. 2019,09:07:33 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
7.876	BBA	280792.2	5.0000	CLO4-89-ISTD

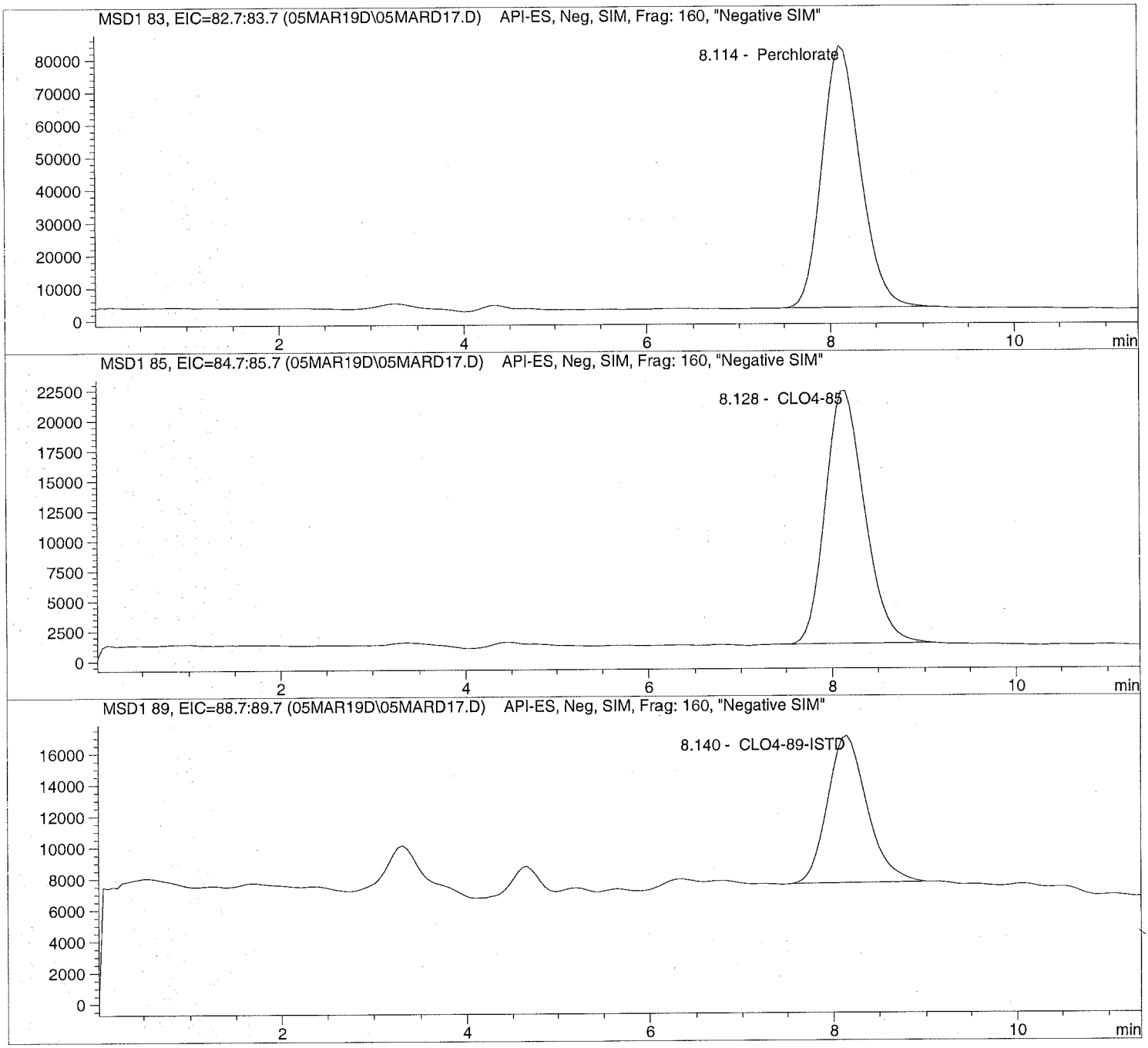
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD17.D Sample Name: 642101 CCV@25

Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD17.D Sample Name: 642101 CCV@25

Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	2336112.7	25.0199	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.128	PBA	628961.2	25.6341	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.140	PBA	283460.4	5.0000	CLO4-89-ISTD

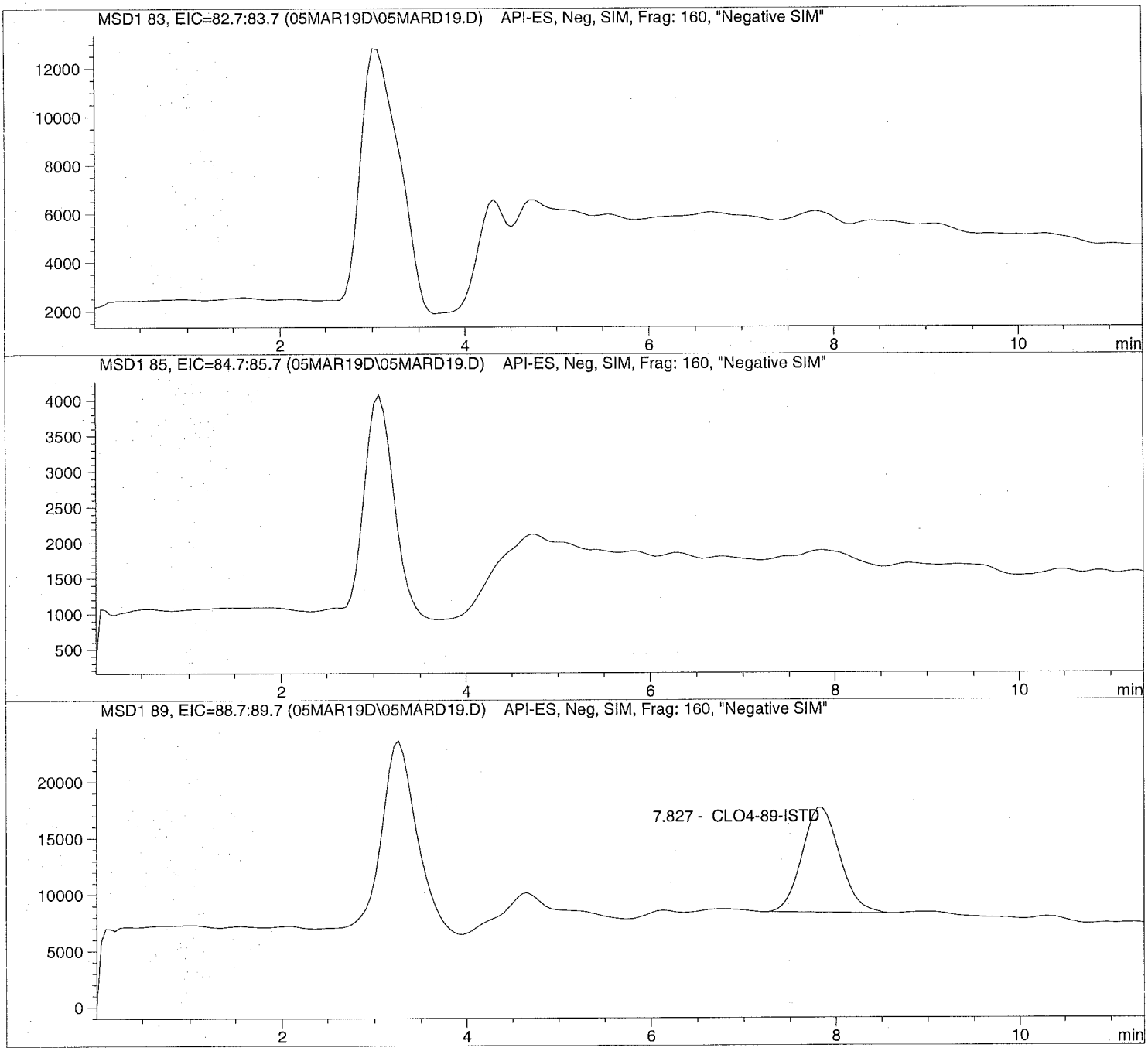
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.827	PBA	264674.3	5.0000	CLO4-89-ISTD

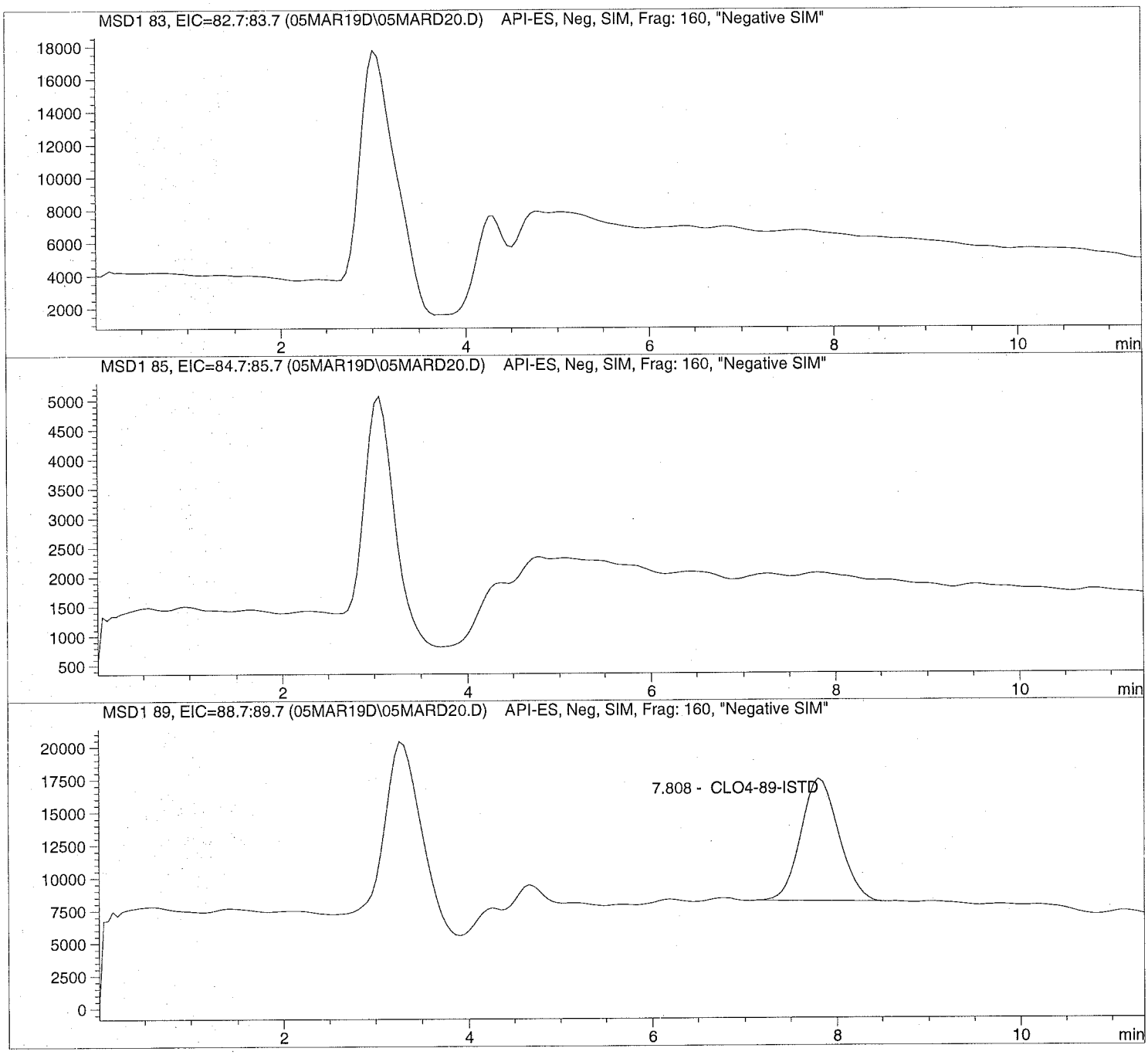
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.808	PBA	265662.0	5.0000	CLO4-89-ISTD

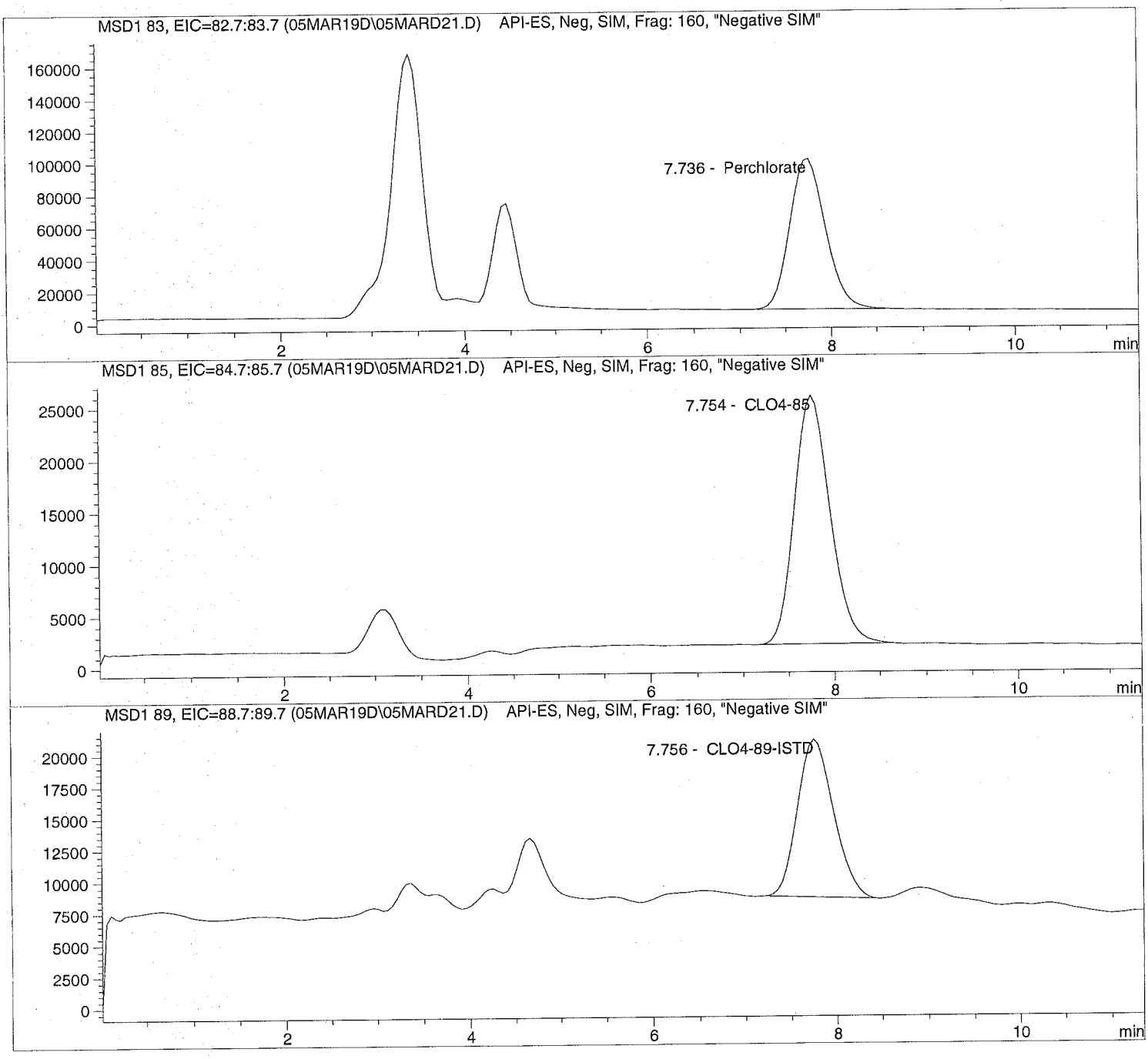
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.736	PBA	2531259.3	226.4815	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.754	PBA	646870.4	220.9191	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	PB	341607.9	50.0000	CLO4-89-ISTD

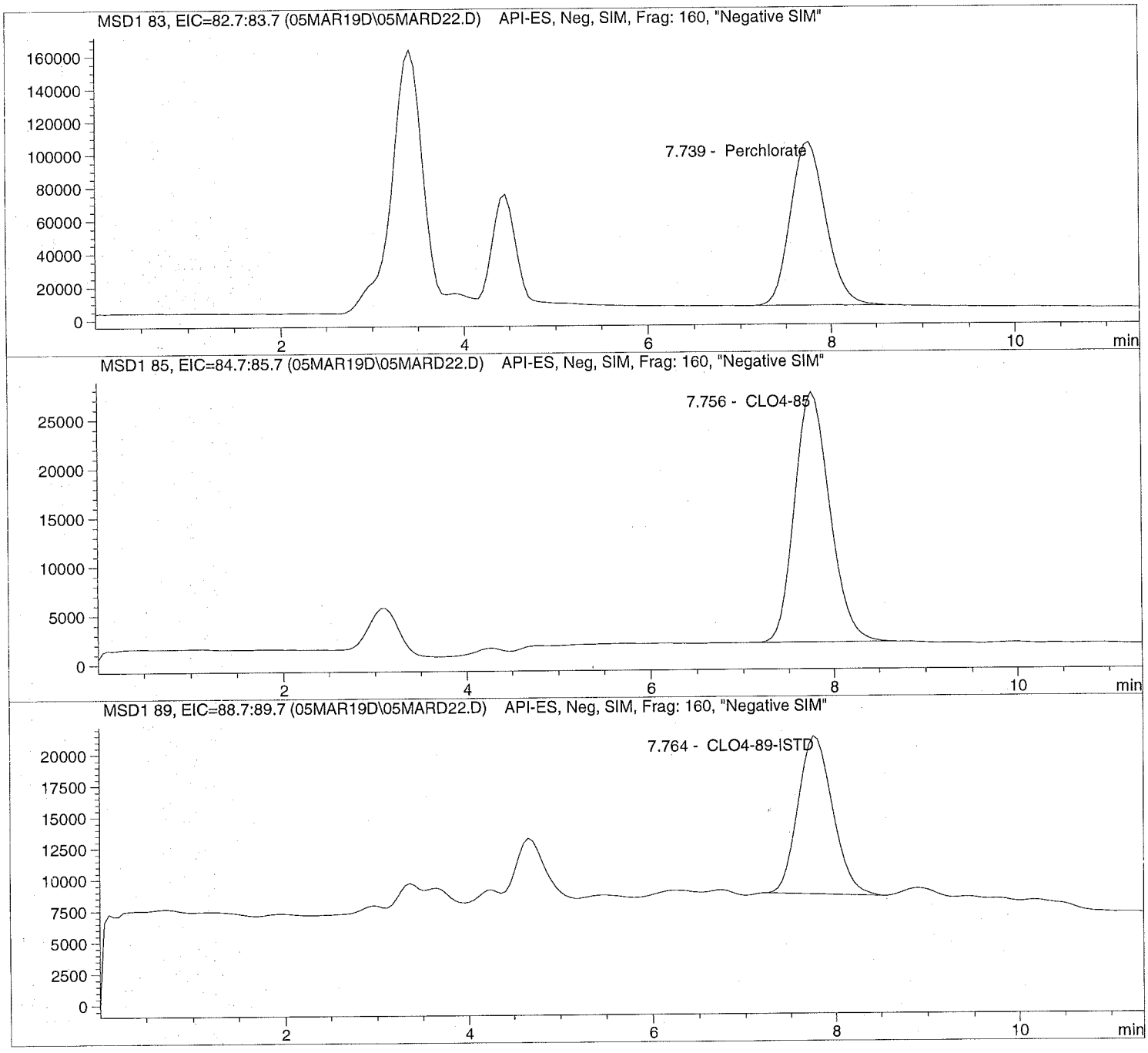
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X

Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X

Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.739	PBA	2682370.5	241.0371	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	BBA	695643.1	238.4467	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.764	PB	338724.1	50.0000	CLO4-89-ISTD

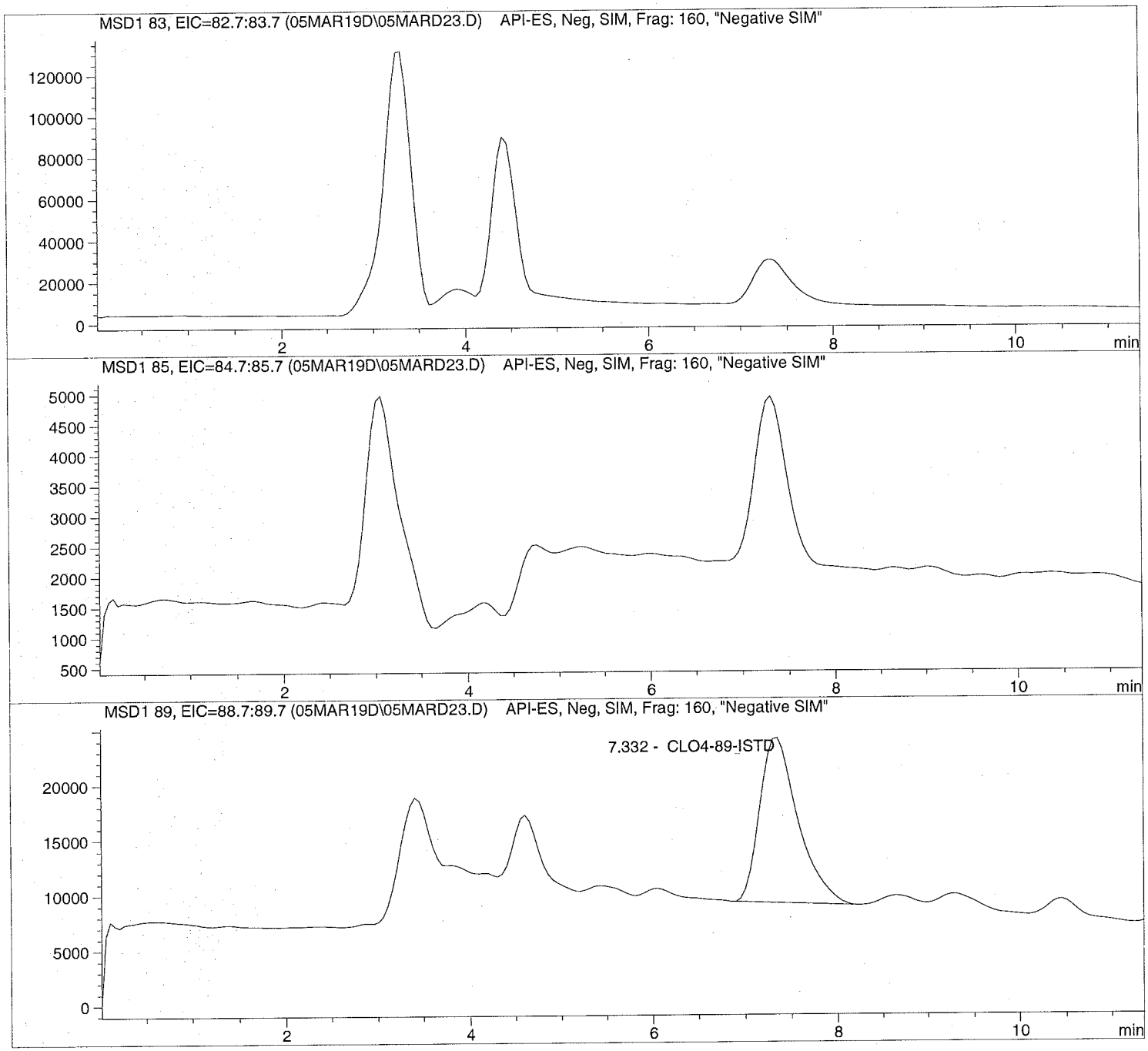
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.332	PB	431134.6	5.0000	CLO4-89-ISTD

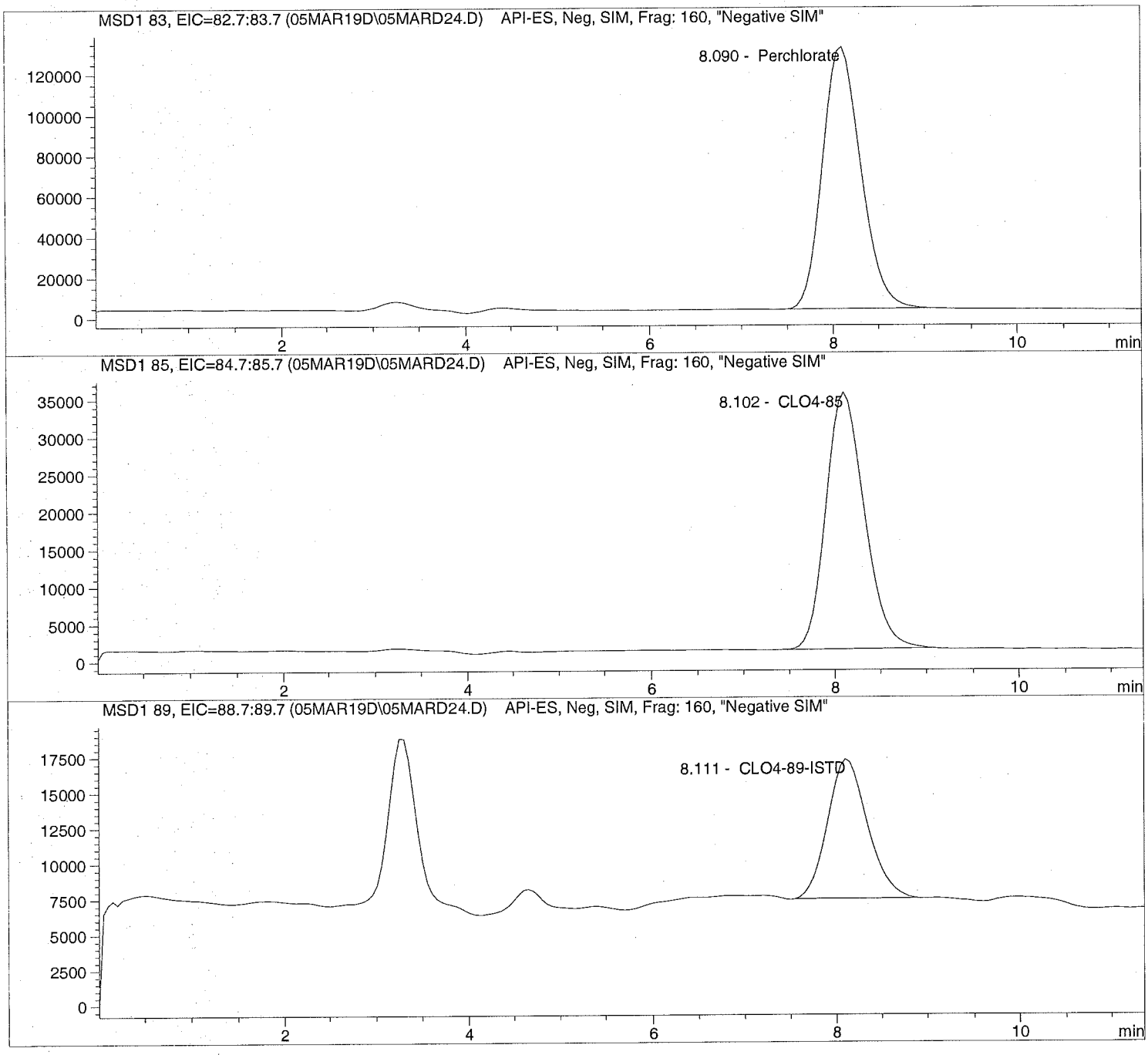
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	100.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.090	PBA	3773628.7	3708.6567	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.102	PBA	1010205.2	3771.6748	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.111	PBA	298984.6	500.0000	CLO4-89-ISTD

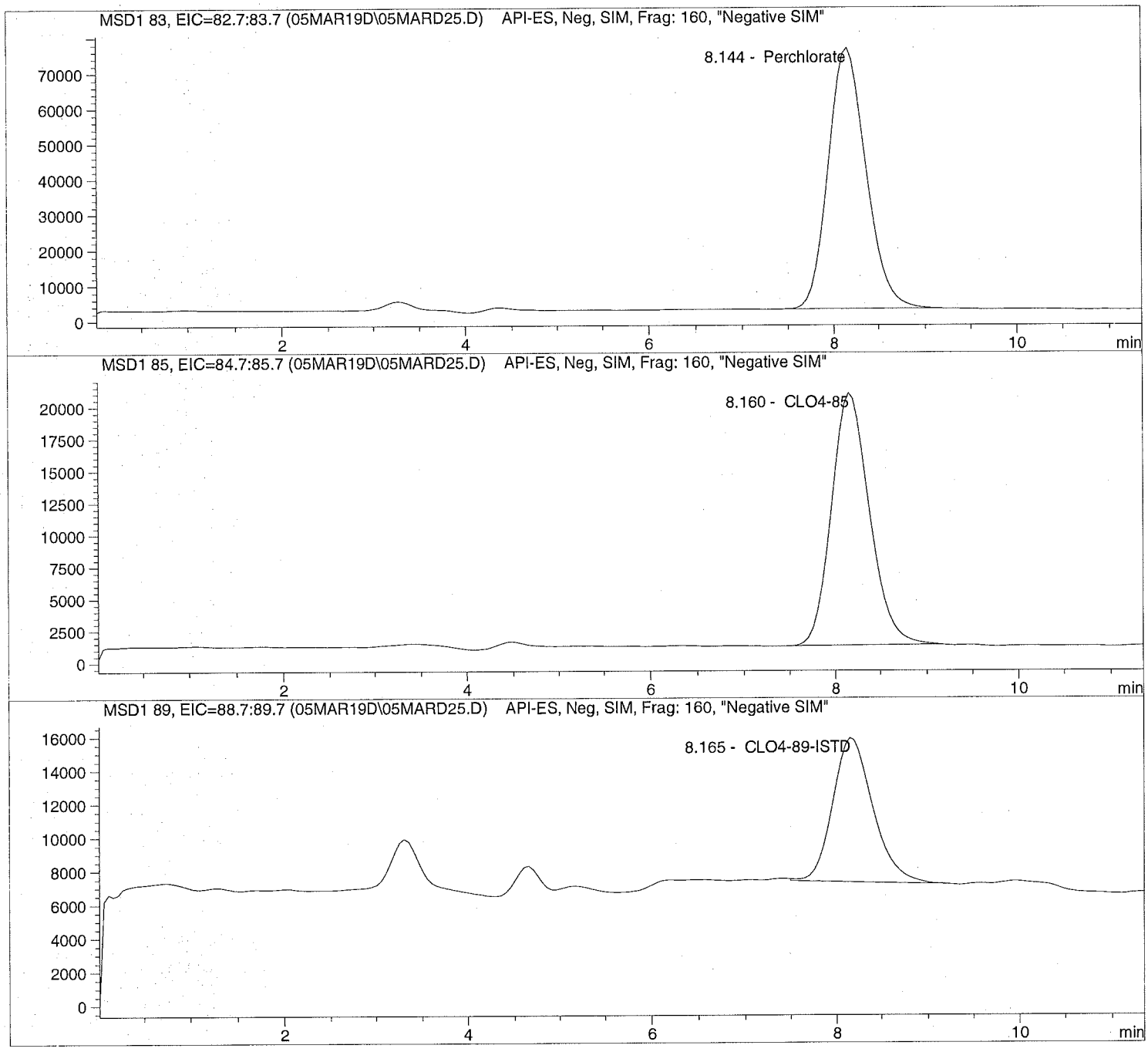
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.144	PBA	2157871.5	24.4553	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.160	PBA	583711.5	25.1665	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.165	BBA	268305.4	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Batch Report: C:\HPCHEM\1\DATA\15FEB19I\15FEB19D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	8.94006e4	7.889	9.89924e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	1.97443e5	8.114	2.26028
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	4.79370e5	7.828	4.65688
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	9.30136e5	7.904	9.14998
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	2.81067e6	7.793	25.52636
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	5.66830e6	7.976	51.07439
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	8.69624e6	7.886	74.30603
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	1.01141e6	7.988	9.46019

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.26121e4	7.914	9.98836e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	5.53134e4	8.127	2.11360
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	1.39247e5	7.842	4.91261
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	2.54396e5	7.923	9.39034
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	7.35969e5	7.811	25.48268
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	1.47152e6	7.993	50.35774
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	2.32809e6	7.900	74.72233
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	2.81230e5	8.007	9.87858

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.41443e5	7.900	5.00000
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	2.99651e5	8.132	5.00000
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	3.38646e5	7.853	5.00000
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	3.25154e5	7.925	5.00000
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	3.33799e5	7.819	5.00000
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	3.14712e5	7.999	5.00000
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	3.13909e5	7.908	5.00000
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	3.41503e5	8.005	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

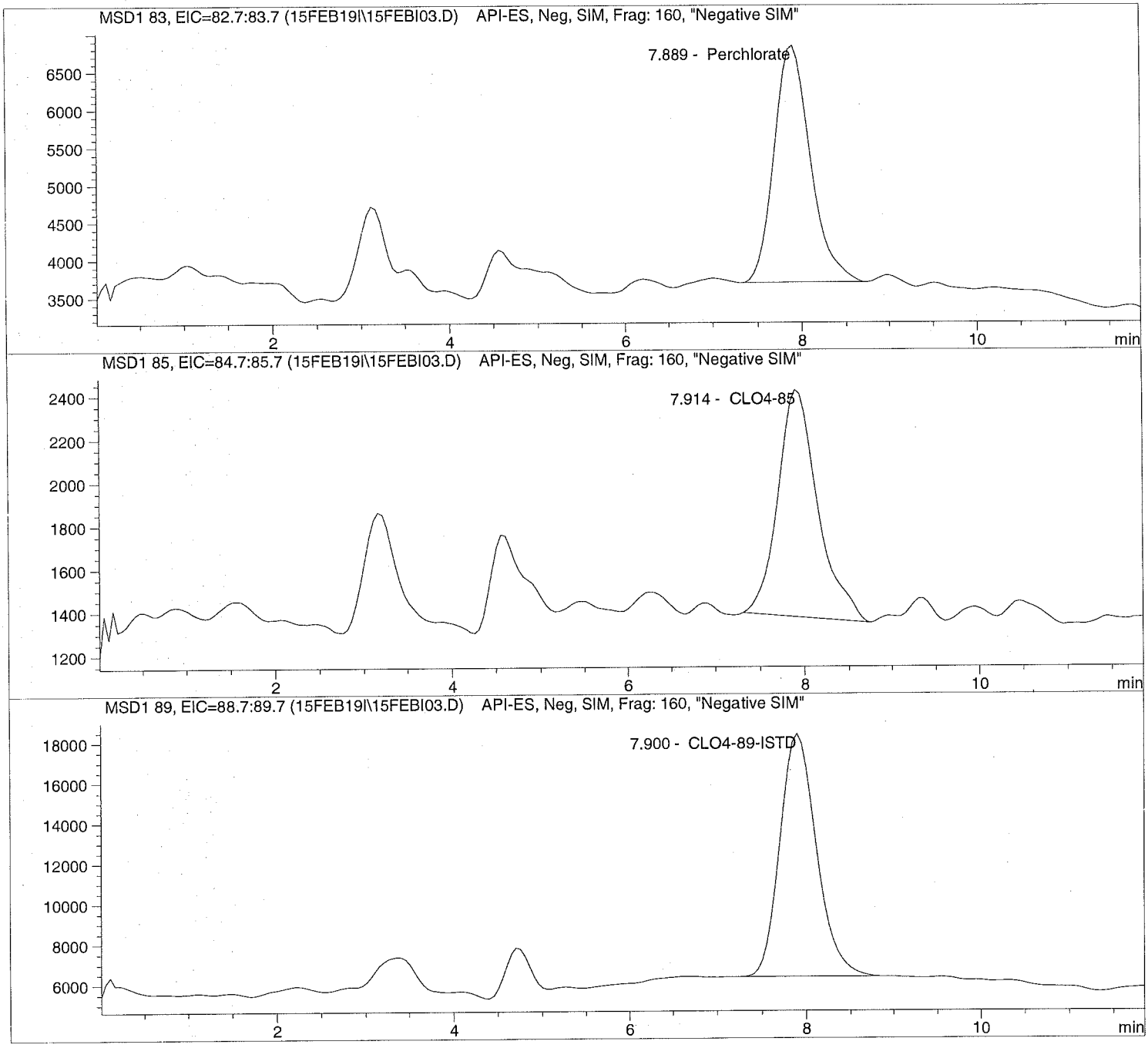
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	CLO4@ .20ug/L	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	CLO4@ 0.5ug/L	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	CLO4@ 1.0ug/L	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	CLO4@ 2.0ug/L	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	CLO4@ 5.0ug/L	CLO4-AQN	1	Ctrl Samp		
6	Vial 76	CLO4@ 10.ug/L	CLO4-AQN	1	Ctrl Samp		
7	Vial 77	CLO4@ 25.ug/L	CLO4-AQN	1	Ctrl Samp		
8	Vial 78	CLO4@ 50.ug/L	CLO4-AQN	1	Ctrl Samp		
9	Vial 79	CLO4@ 75.ug/L	CLO4-AQN	1	Ctrl Samp		
10	Vial 80	ICAL Verf@10ug/L	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.889	PBA	89400.6	0.9899	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.914	BBA	32612.1	0.9988	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	BBA	341443.2	5.0000	CLO4-89-ISTD

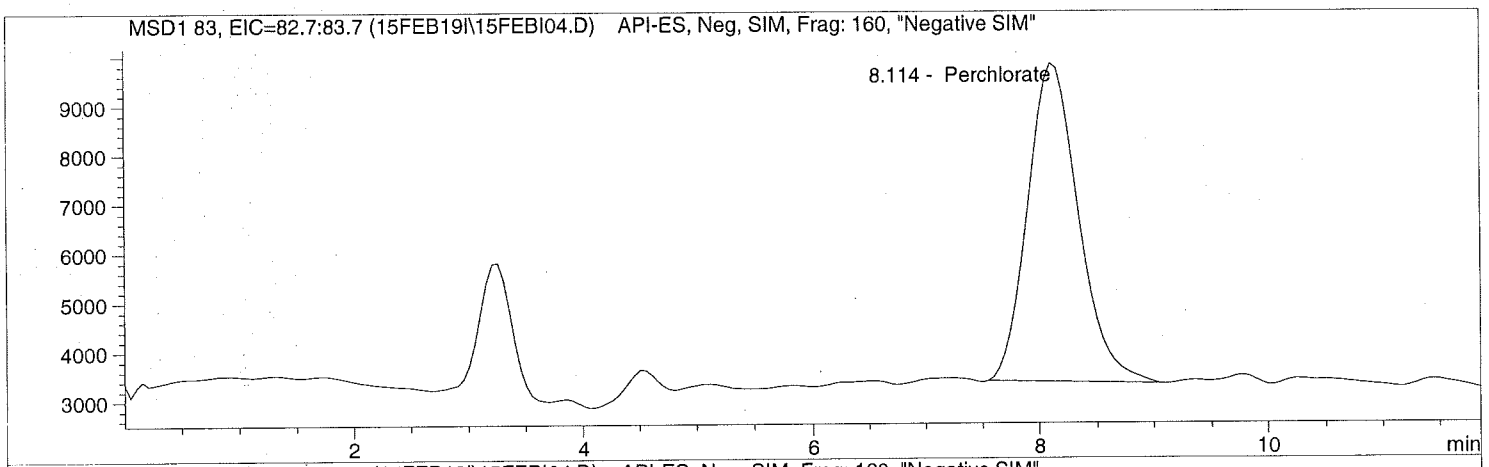
*** End of Report ***

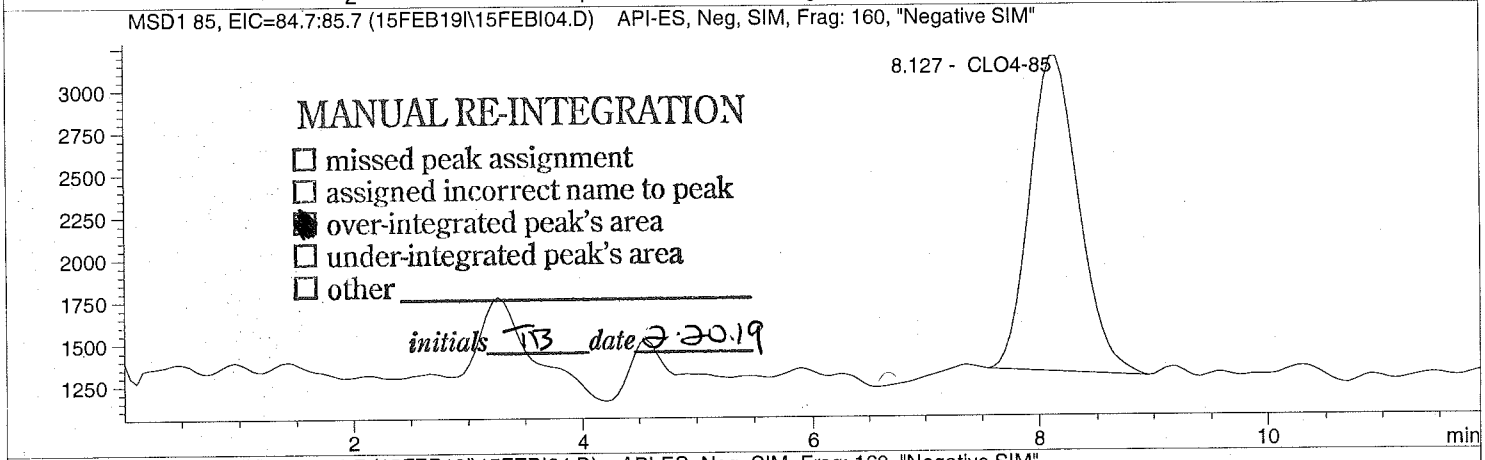
Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

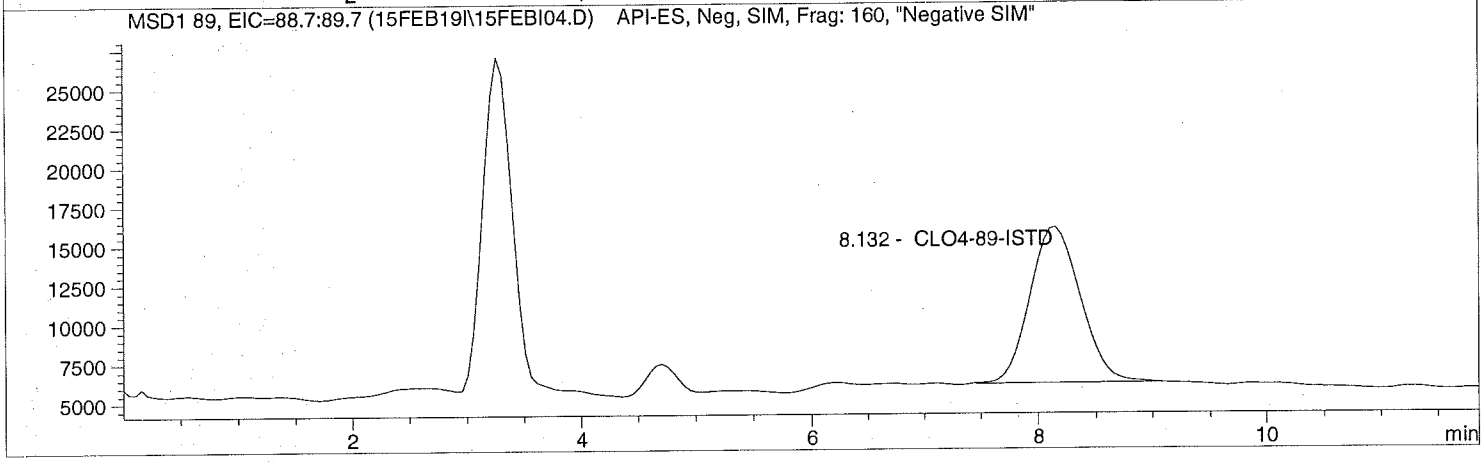
Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	MM	55313.4	2.1136	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

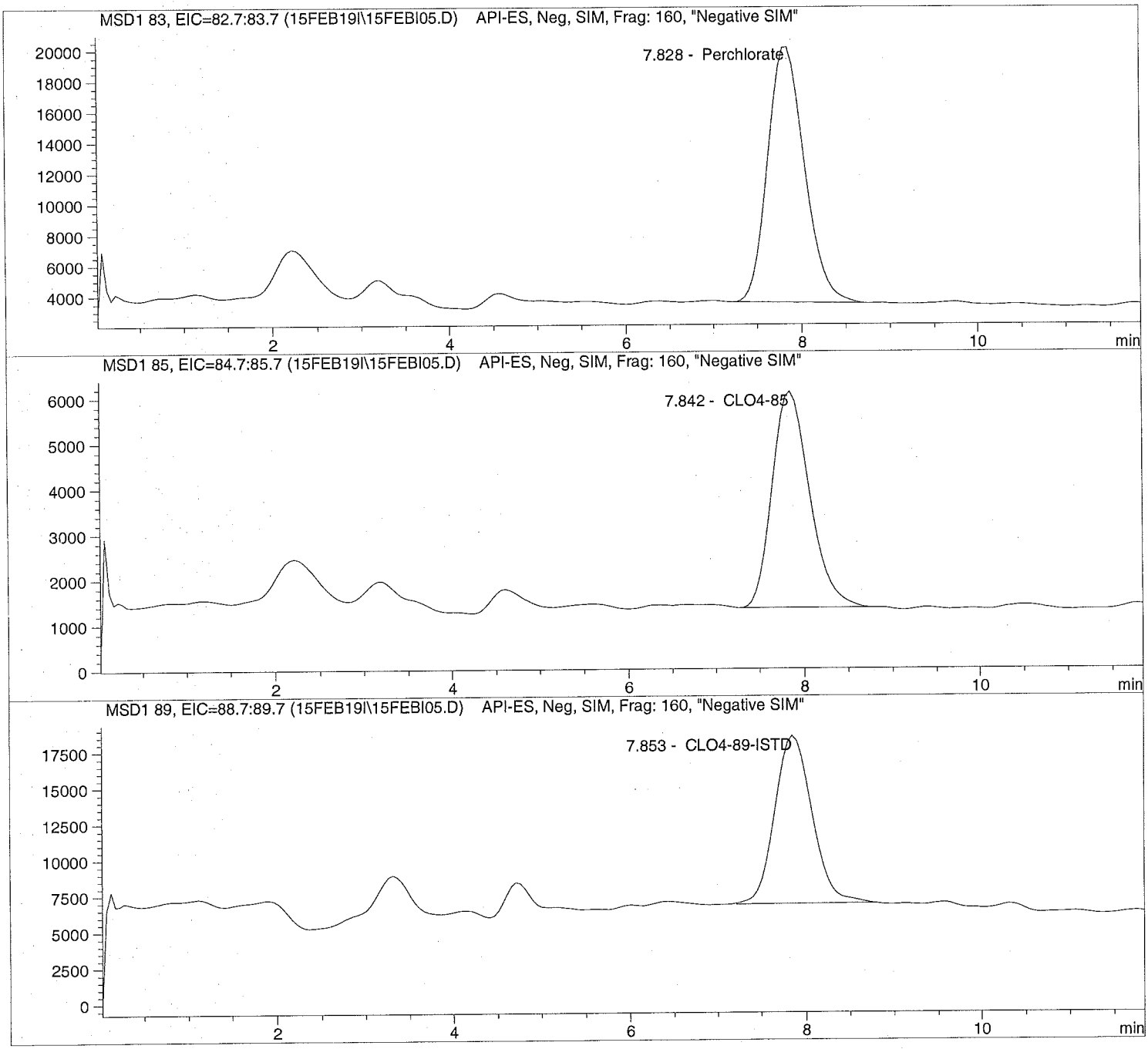
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.828	PBA	479370.4	4.6569	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.842	PBA	139246.9	4.9126	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.853	PBA	338646.3	5.0000	CLO4-89-ISTD

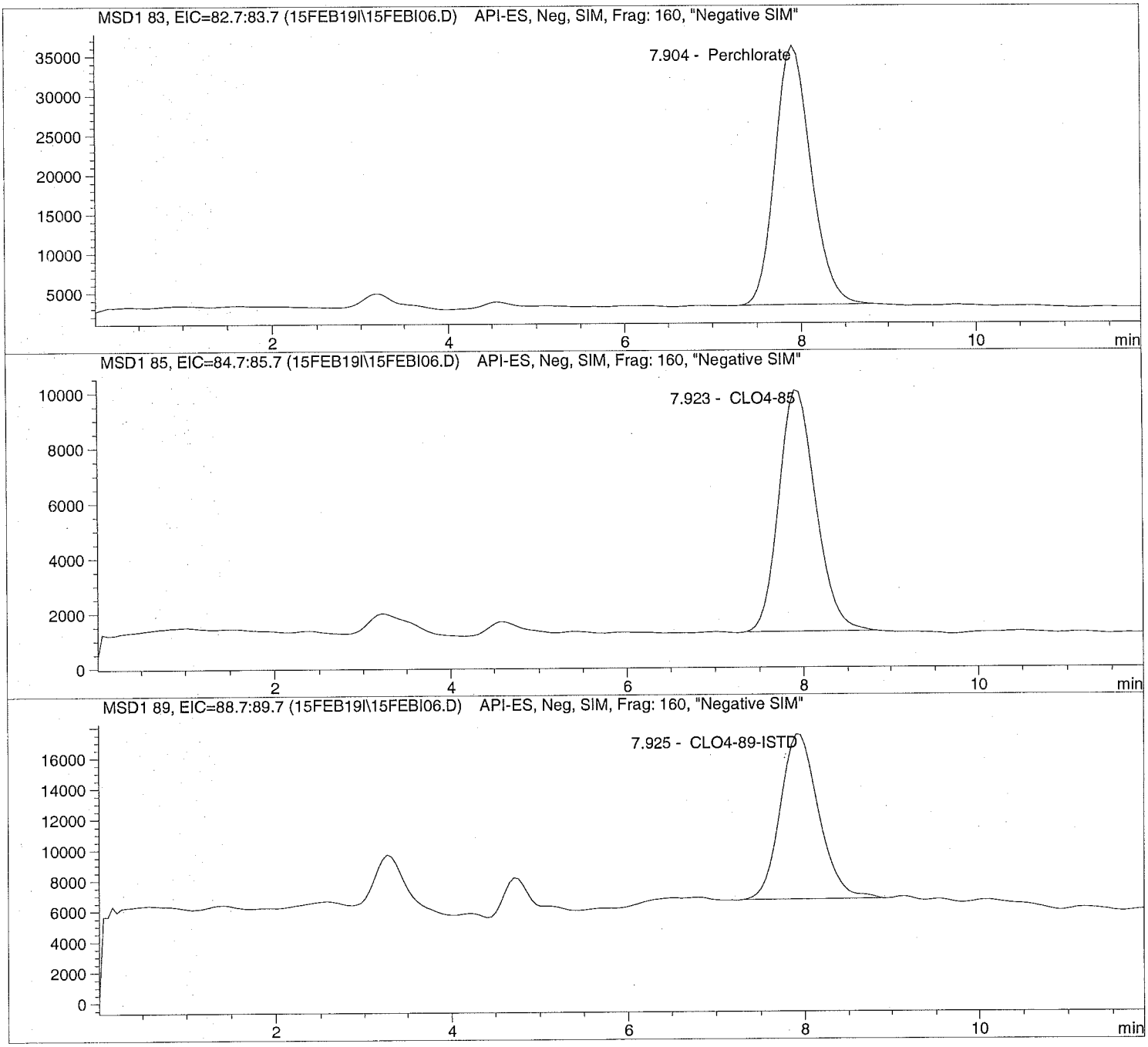
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.904	PBA	930135.8	9.1500	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.923	BBA	254395.6	9.3903	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.925	PBA	325154.4	5.0000	CLO4-89-ISTD

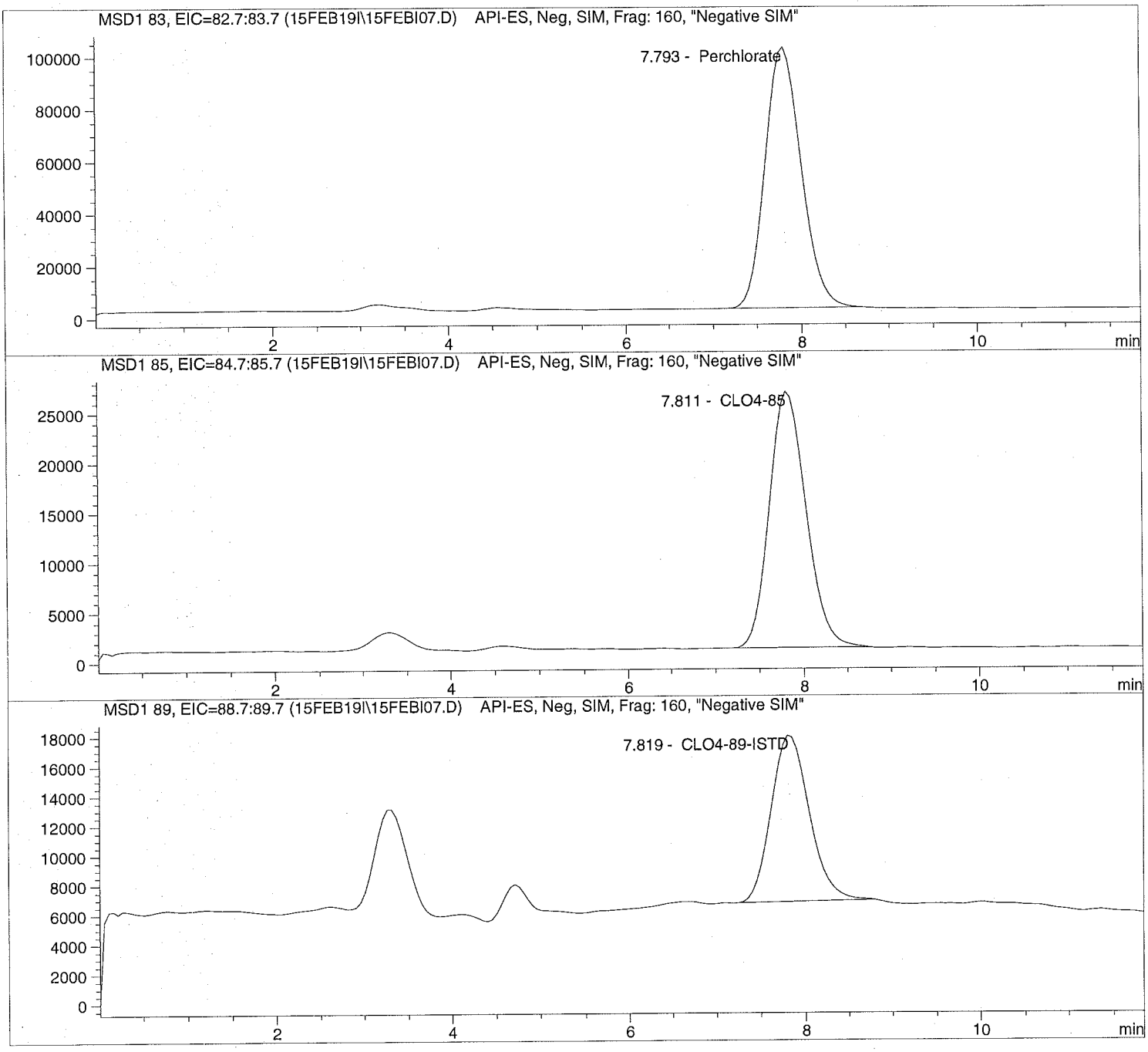
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.793	PBA	2810669.2	25.5264	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.811	BBA	735968.9	25.4827	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.819	PBA	333799.0	5.0000	CLO4-89-ISTD

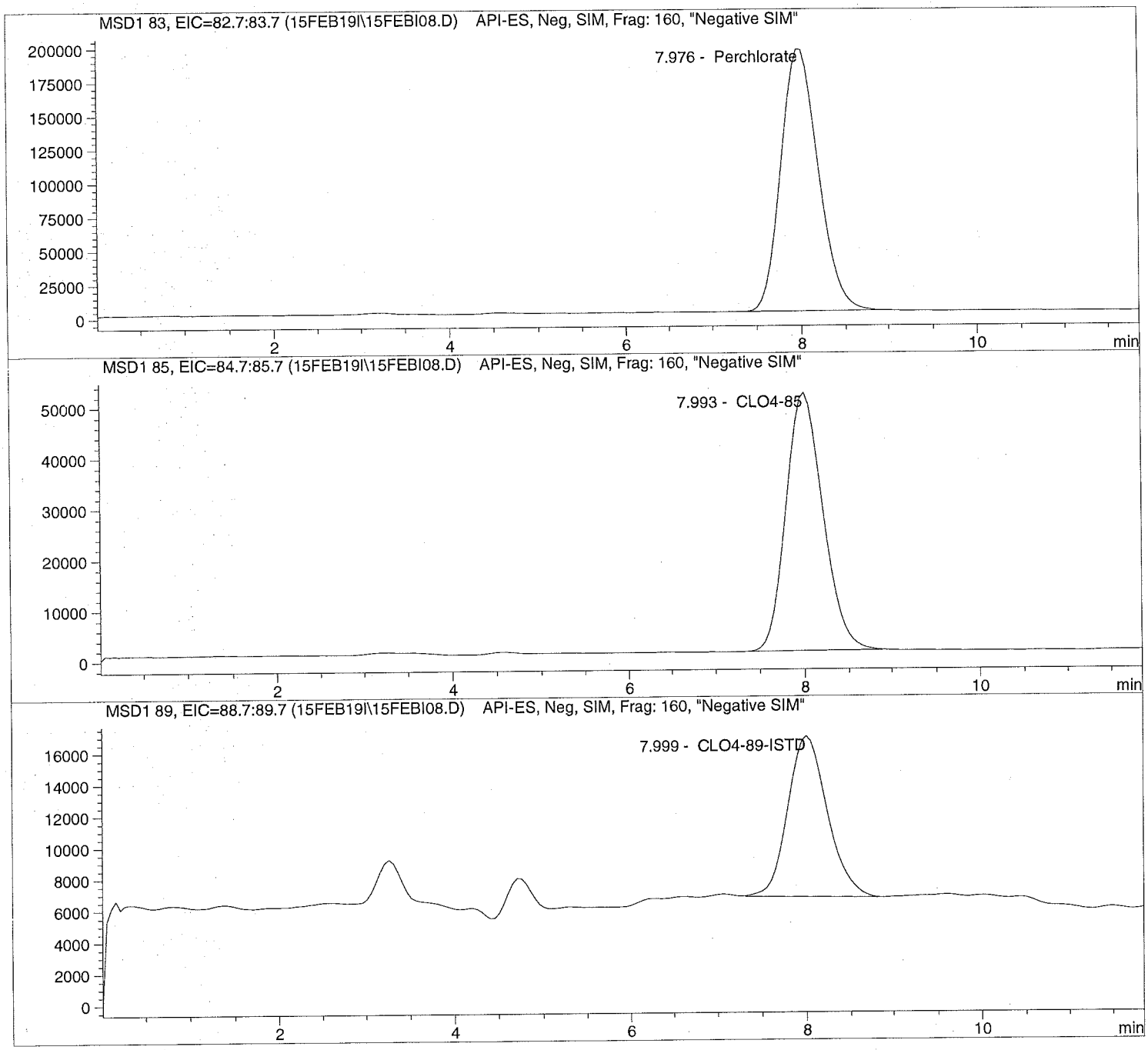
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.976	PBA	5668301.5	51.0744	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.993	PBA	1471522.9	50.3577	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.999	BBA	314711.8	5.0000	CLO4-89-ISTD

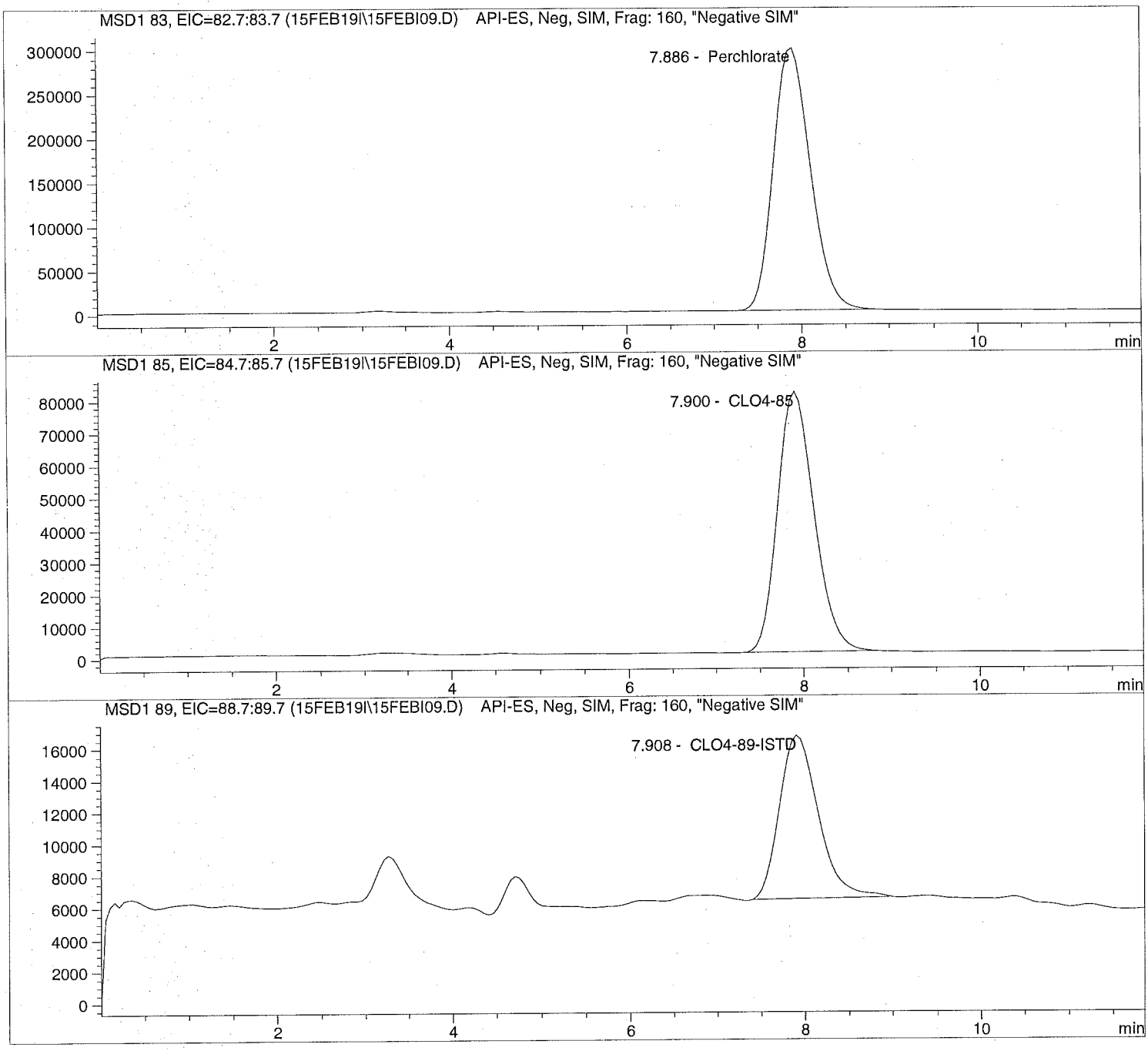
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.886	PBA	8696239.0	74.3060	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	PBA	2328089.5	74.7223	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.908	PBA	313908.9	5.0000	CLO4-89-ISTD

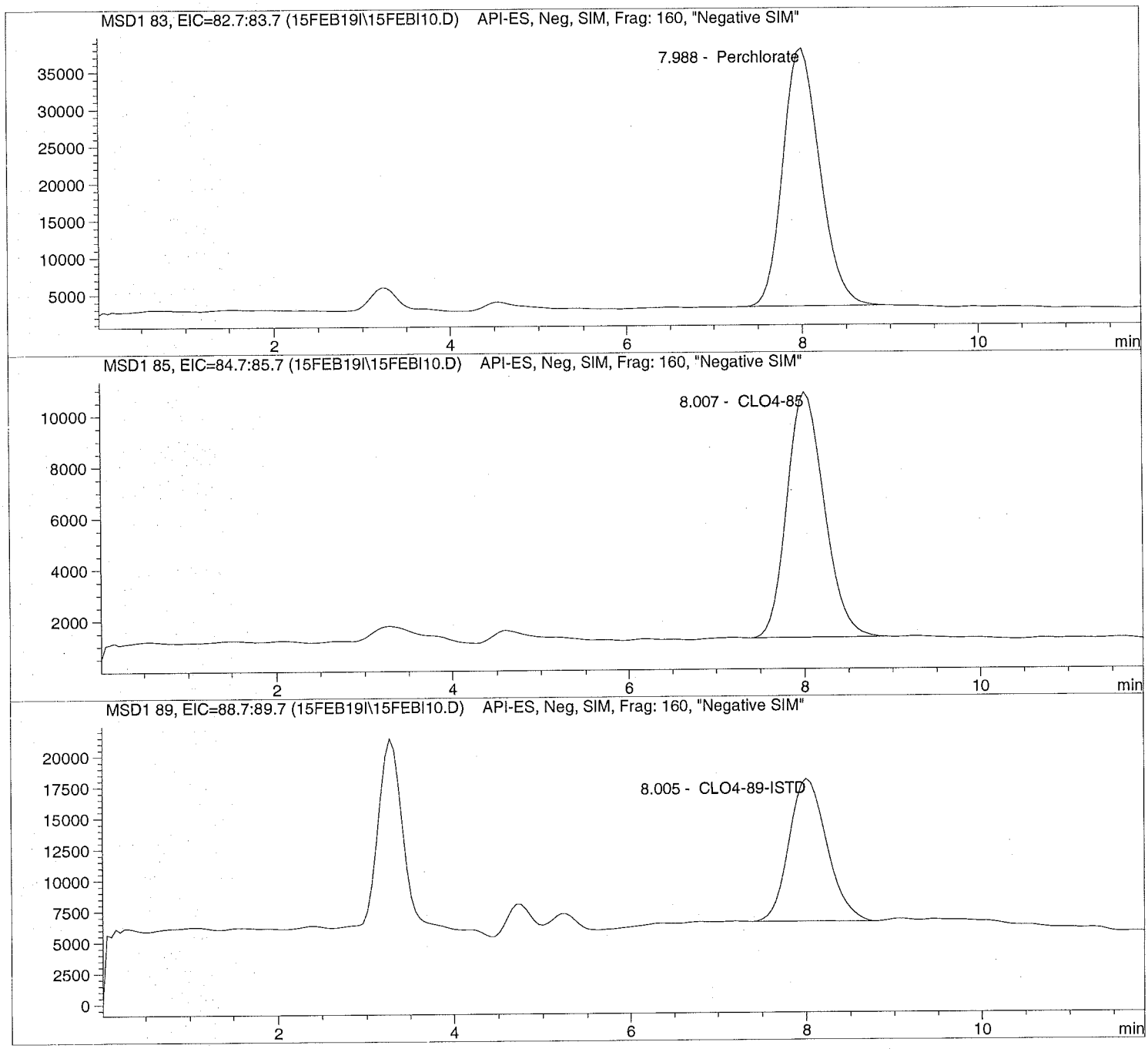
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.988	BBA	1011409.8	9.4602	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.007	BBA	281229.9	9.8786	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.005	BBA	341503.2	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

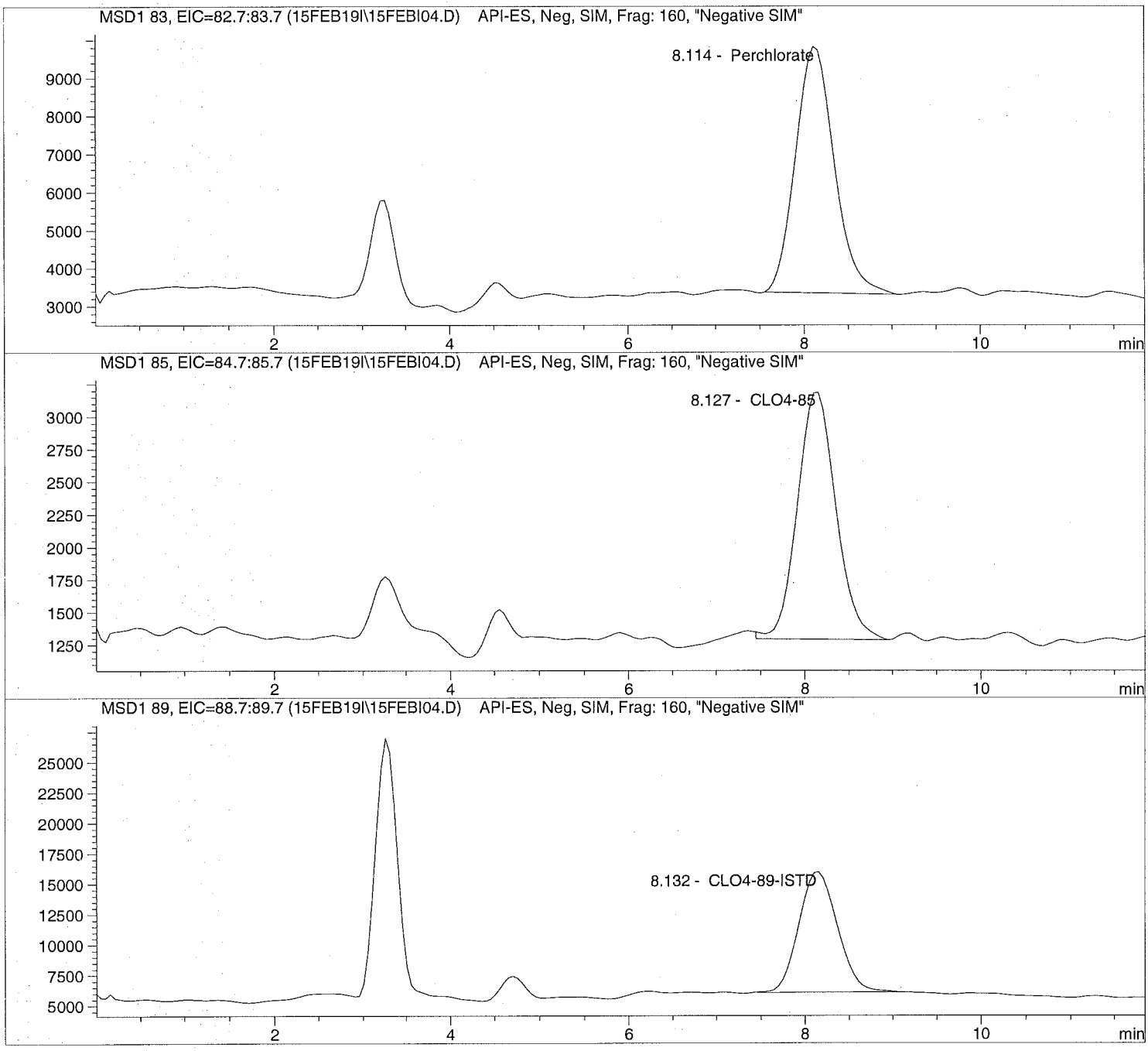
Unmodified

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	BBA	57206.1	2.1923	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

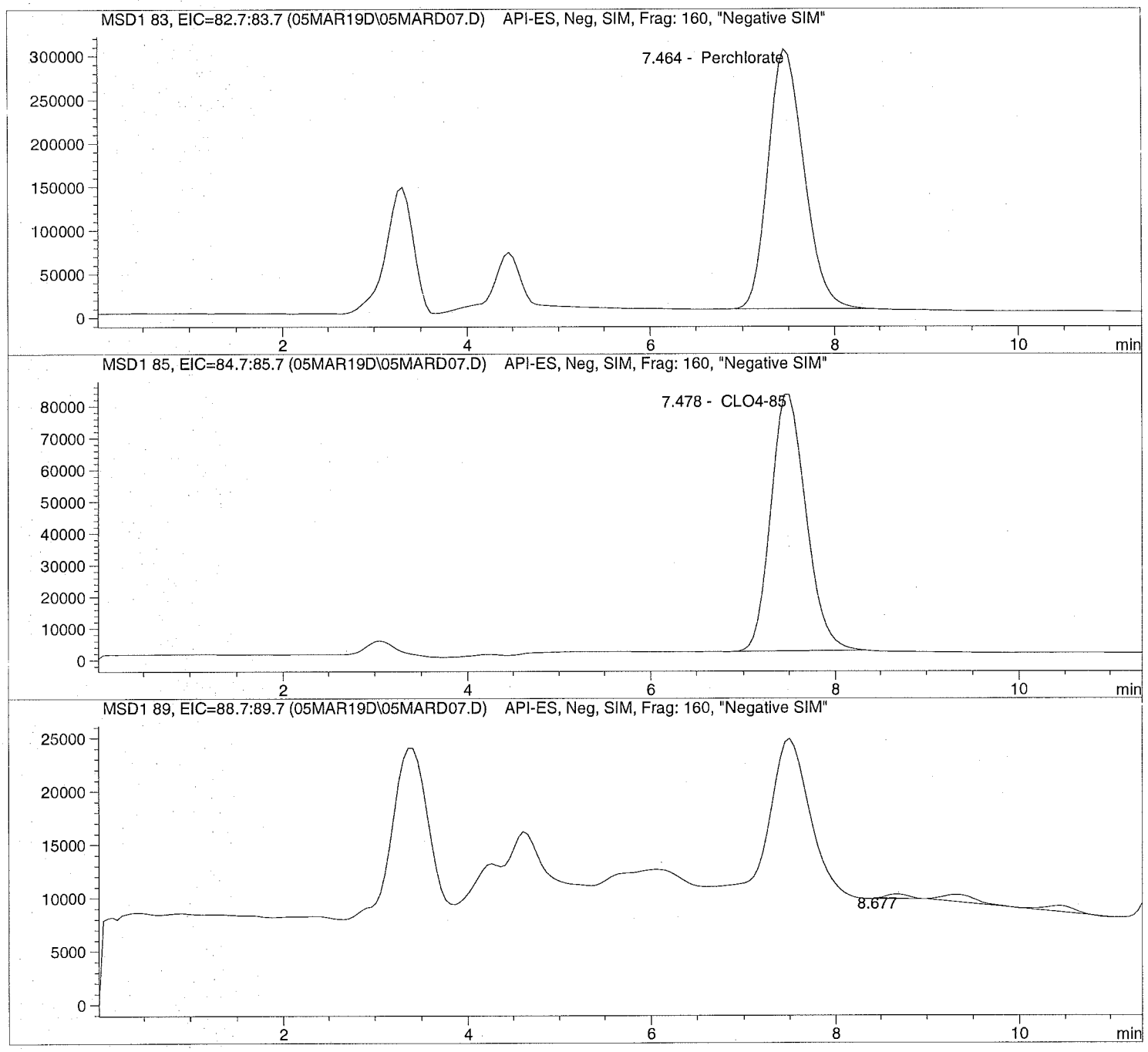
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	419.8794	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	402.6179	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

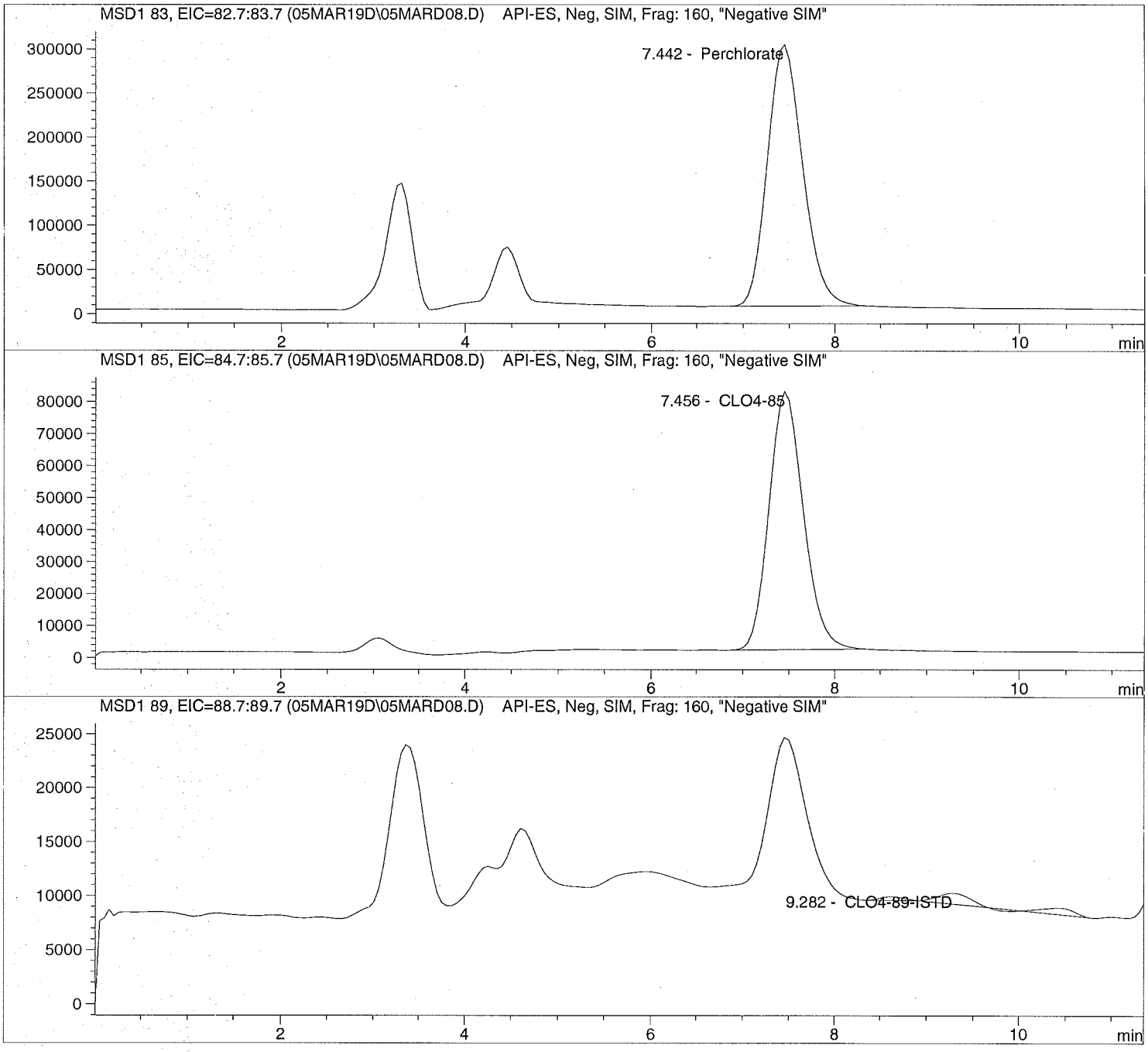
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.677	BB	7208.6	0.0000	
9.316	VBA	28561.1	5.0000	CLO4-89-ISTD

*** End of Report ***

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	359.0996	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	344.2233	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.621	VB	5769.9	0.0000	
9.282	VBA	35831.6	5.0000	CLO4-89-ISTD

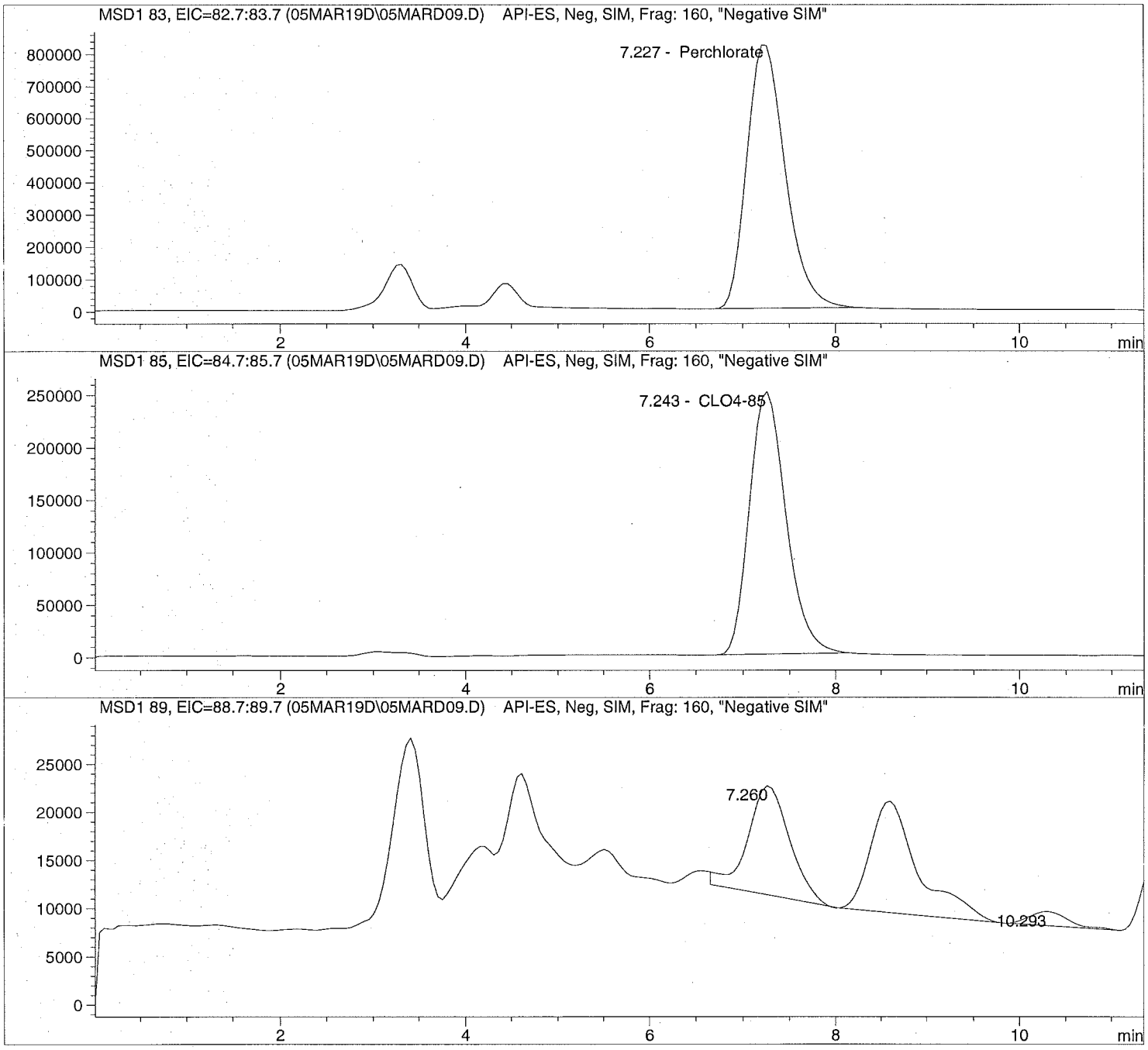
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	131.1742	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	138.8050	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.260	BB	352149.7	0.0000	
8.589	VBA	421141.9	5.0000	CLO4-89-ISTD
10.293	BBA	41603.7	0.0000	

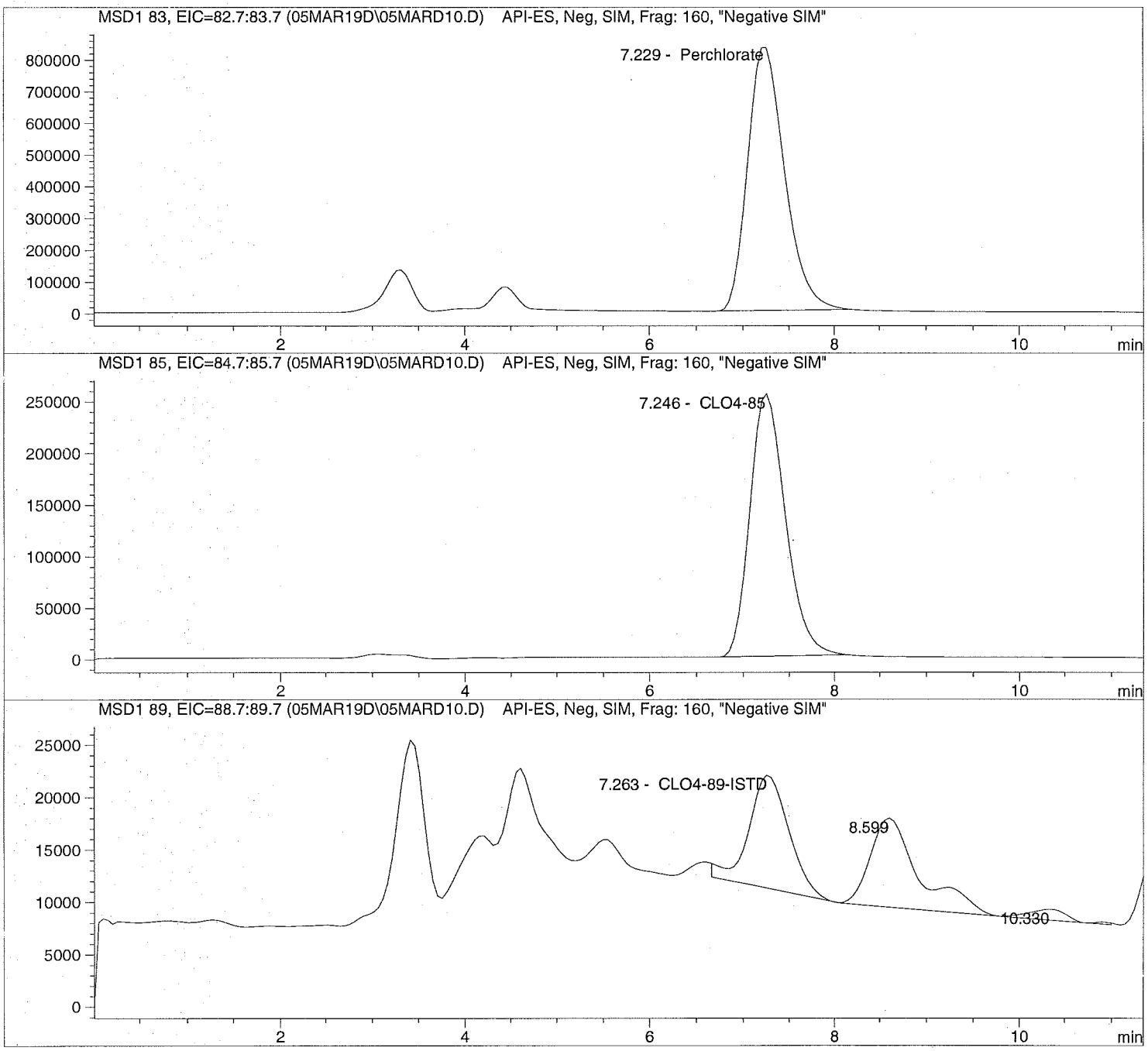
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	159.0418	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	168.6882	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	BB	325841.0	5.0000	CLO4-89-ISTD
8.599	VB	308921.9	0.0000	
10.330	VBA	30210.3	0.0000	

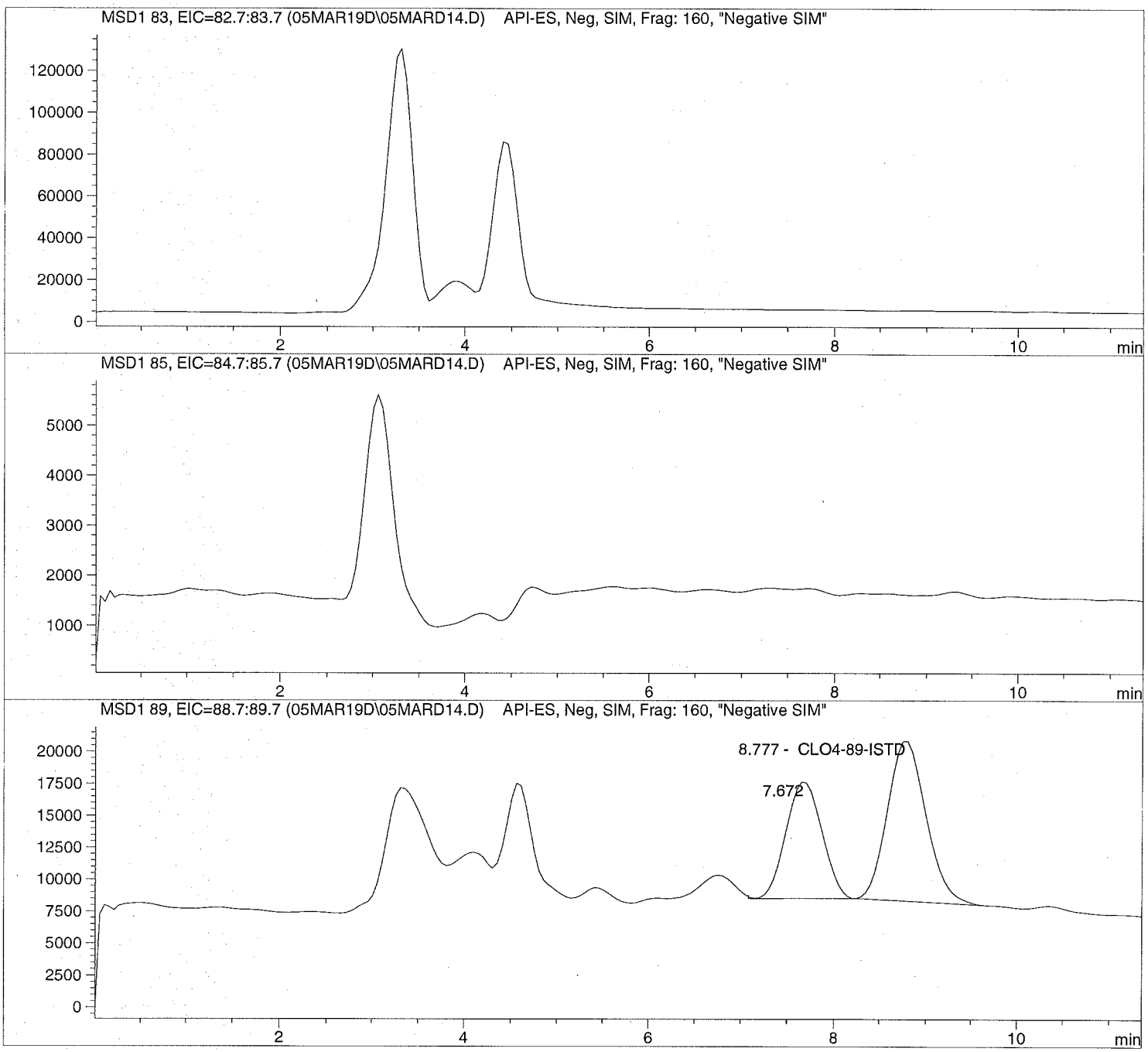
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	0.0000	
8.777	VBA	362717.3	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 18, 2019

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

Work Order: **HS19030014**

Laboratory Results for: **LH18/24 Longhorn GW Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Mar 01, 2019 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 Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
Work Order: HS19030014

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19030014-01	LH18/24-SP650_022819	Water		28-Feb-2019 14:00	01-Mar-2019 08:50	☐
HS19030014-02	LH18/24-SP650_022819_BIX	Water		28-Feb-2019 14:00	01-Mar-2019 08:50	☐

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LH18/24 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.

Work Order Comments

• The analysis for TOC was subcontracted to ALS Environmental in Kelso, WA. Final Report attached.

WetChemistry by Method E350.3

Batch ID: R333997

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

WetChemistry by Method E365.3

Batch ID: R333840

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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.

ANALYTICAL REPORT

Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples WorkOrder:HS19030014

Sample ID: LH18/24-SP650_022819 Lab ID:HS19030014-01

Collection Date: 28-Feb-2019 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: MZD
Nitrogen, Ammonia (As N)	**9.5**		**0.20**	**0.20**	**0.20**	**mg/L**	1	05-Mar-2019 13:40
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**1.69**		**0.100**	**0.250**	**0.250**	**mg/L**	10	01-Mar-2019 12:00
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	18-Mar-2019 10:26

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

ALS Houston, US

Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.

ANALYTICAL REPORT

Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples

WorkOrder:HS19030014

Sample ID: LH18/24-SP650_022819_BIX

Lab ID:HS19030014-02

Collection Date: 28-Feb-2019 14:00

Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	07-Mar-2019 17:47

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

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS19030014

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R333840	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS19030014-01	LH18/24-SP650_022819	28 Feb 2019 14:00			01 Mar 2019 12:00	10
Batch ID R333997	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS19030014-01	LH18/24-SP650_022819	28 Feb 2019 14:00			05 Mar 2019 13:40	1
Batch ID R334176	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS19030014-02	LH18/24-SP650_022819_BIX	28 Feb 2019 14:00			07 Mar 2019 17:47	1
Batch ID R334688	**Test Name :** SUBCONTRACT ANALYSIS - TOC ANALYSIS			**Matrix:** Water		
HS19030014-01	LH18/24-SP650_022819	28 Feb 2019 14:00			18 Mar 2019 10:26	1

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS19030014

QC BATCH REPORT NEW

Batch ID: R333840 (0) **Instrument:** UV-2450 **Method:** ORTHO PHOSPHATE (PO4) AS P BY E365.3

MBLK Sample ID: **MBLK-333840** Units: **mg/L** Analysis Date: **01-Mar-2019 12:00**
Client ID: Run ID: **UV-2450_333840** SeqNo: **4971681** 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-333840** Units: **mg/L** Analysis Date: **01-Mar-2019 12:00**
Client ID: Run ID: **UV-2450_333840** SeqNo: **4971682** 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)	0.227	0.0250	0.25	0	90.8	85 - 115				

MS Sample ID: **HS19030014-01MS** Units: **mg/L** Analysis Date: **01-Mar-2019 12:00**
Client ID: **LH18/24-SP650_022819** Run ID: **UV-2450_333840** SeqNo: **4971684** 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)	4.17	0.250	2.5	1.69	99.2	80 - 120				

MSD Sample ID: **HS19030014-01MSD** Units: **mg/L** Analysis Date: **01-Mar-2019 12:00**
Client ID: **LH18/24-SP650_022819** Run ID: **UV-2450_333840** SeqNo: **4971685** 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)	4.21	0.250	2.5	1.69	101	80 - 120	4.17	0.955	20	

The following samples were analyzed in this batch: HS19030014-01

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS19030014

QC BATCH REPORT NEW

Batch ID: R333997 (0) **Instrument: WetChem_HS** **Method: AMMONIA AS N BY E350.3(ISE)**

MBLK Sample ID: **MBLK-333997** Units: **mg/L** Analysis Date: **05-Mar-2019 13:40**
Client ID: Run ID: **WetChem_HS_333997** SeqNo: **4975026** 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)	0.20	0.20								U

LCS Sample ID: **LCS-333997** Units: **mg/L** Analysis Date: **05-Mar-2019 13:40**
Client ID: Run ID: **WetChem_HS_333997** SeqNo: **4975027** 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)	9.903	0.20	10	0	99.0	80 - 120				

MS Sample ID: **HS19021330-01MS** Units: **mg/L** Analysis Date: **05-Mar-2019 13:40**
Client ID: Run ID: **WetChem_HS_333997** SeqNo: **4975029** 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)	10.68	0.20	10	0.2419	104	80 - 120				

MSD Sample ID: **HS19021330-01MSD** Units: **mg/L** Analysis Date: **05-Mar-2019 13:40**
Client ID: Run ID: **WetChem_HS_333997** SeqNo: **4975030** 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)	10.59	0.20	10	0.2419	103	80 - 120	10.68	0.846	20	

The following samples were analyzed in this batch: HS19030014-01

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: **HS19030014**

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 Houston, US Date: 18-Mar-19

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	20-Dec-2021
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019
North Carolina	624-2019	31-Dec-2019
California	2919, 2018-2019	30-Apr-2019
Maryland	343, 2018-2019	30-Jun-2019

ALS Houston, US Date: 18-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
Work Order: HS19030014

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS19030014-01	LH18/24-SP650_022819	Login	3/1/2019 10:40:31 AM	JRM	WET371
HS19030014-01	LH18/24-SP650_022819	Login	3/1/2019 10:40:31 AM	JRM	WET371
HS19030014-01	LH18/24-SP650_022819	Login	3/1/2019 10:40:31 AM	JRM	Sub
HS19030014-02	LH18/24-SP650_022819_BIX	Login	3/1/2019 10:40:31 AM	JRM	Sub

00934799

ALS Houston, US Date: 18-Mar-19

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS19030014
Date/Time Received: **01-Mar-2019 08:50**
Received by: **JRM**

Checklist completed by: *Jared R. Makan* 1-Mar-2019
eSignature | Date

Reviewed by: *RJ Modashia* 1-Mar-2019
eSignature | 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 ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:N/A
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	1.8c/1.8c UC/C	IR25
Cooler(s)/Kit(s):	43795	
Date/Time sample(s) sent to storage:	03/01/2019 10:45	

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:

00934800

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: R.J Modshia

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_022819	Water	02/28/19 / 14:00		2	X	X			H2SO4	
LH18/24-SP650_022819	Water	02/28/19 / 14:00		1			X		NONE	
LH18/24-SP650_022819_BIX	Water	02/28/19 / 14:00		1				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	02/28/19	14:30	J. MAHAN	3/1/19	08:50						

For Lab Use Only

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

Remarks: Cooler 43795 Temp 1.8
1425 CF0.0

HS19030014

Bhate Environmental Associates, Inc.
I18/24 Longhorn GW Treatment Plant Weekly Sampl

(Word) S:\I-ces\Forms\Chain of Custody - Bi\Weekly

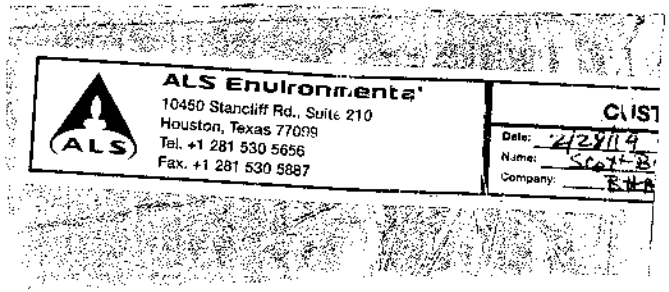
TRK# 4380 9530 9423
0221

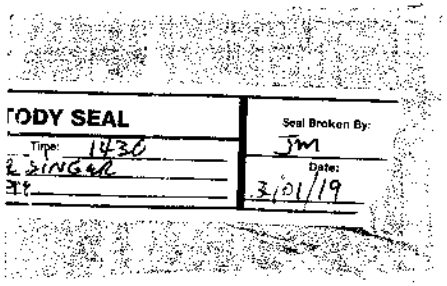
FRI - 01 MAR 10:30A
PRIORITY OVERNIGHT

77099
TX-US
IAH

AB SGRA

3546008 01Mar 00:38 AEWR 547C2/0F2D/A1AC





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March 18, 2019

Analytical Report for Service Request No: K1901895

RJ Modashia
ALS Laboratory Group
10450 Stancliff Road
Suite 210
Houston, TX 77099-4338

RE: HS19030014 / HS19030014

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory March 05, 2019
For your reference, these analyses have been assigned our service request number **K1901895.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3350. You may also contact me via email at Kelley.Lovejoy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kelley Lovejoy

Kelley Lovejoy
Project Manager

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Table of Contents

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

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Client: ALS Environmental - US
Project: HS19030014
Sample Matrix: Water

Service Request: K1901895
Date Received: 03/05/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 03/05/2019. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4ºC upon receipt at the laboratory.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 03/18/2019

Chain of Custody

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K19018900934810

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Subcontract Chain of Custody

COC ID: 10855

SUBCONTRACT TO:

ALS Environmental Kelso
1317 S. 13th Avenue
Kelso, WA 98626

Phone: +1 360 501 3312

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:	HS19030014
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19030014-01**	**LH18/24-SP650_022819**	**Water**	**28 Feb 2019 14:00**
	TOC Analysis for DOD Level IV			15 Mar 2019

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: 3.4.19 1850

Received By: _____ Date/Time: 3/5/19 1145

Cooler ID(s): _____ Temperature(s): _____

00934811

PC KL

Cooler Receipt and Preservation Form

Client ANS - HANSTAN Service Request *K19* 01895

Received: 3/5/19 Opened: 3/5/19 By: BR Unloaded: 3/5/19 By: BR

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? front

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.2	-0.4	4.6	4.4	-0.2	3C0		480978312854	

4. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: temp discrepancy due to sample & ice being separate from blank.

7/25/16 ***Page____of_____***

General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K1901895
Project:	HS19030014/HS19030014	**Date Collected:**	02/28/19
Sample Matrix:	Water	**Date Received:**	03/5/19
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Carbon, Total Organic

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_022819	K1901895-001	**5.10**	0.50	0.20	0.07	1	03/13/19 12:59	
Method Blank	K1901895-MB	**0.32 J**	0.50	0.20	0.07	1	03/13/19 12:26	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1901895
Project	HS19030014/HS19030014	**Date Collected:**	02/28/19
Sample Matrix:	Water	**Date Received:**	03/05/19
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Carbon, Total Organic

Sample Name:	Lab Code:	LOQ	LOD	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
LH18/24-SP650_022819	K1901895-001DUP	0.50	0.20	0.07	5.10	4.90	5.00	4	10	03/13/19

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1901895
Project:	HS19030014/HS19030014	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	03/13/19
		Date Extracted:	NA

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1901955-001	**Basis:**	NA
Analysis Method:	SM 5310 C		
Prep Method:	None		

Matrix Spike
K1901955-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	3.02	29.7	25.0	107	83-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1901895
Project:	HS19030014/HS19030014	**Date Analyzed:**	03/13/19
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	628234

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1901895-LCS	25.8	25.0	103	83-117

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: ALS Environmental - US **Service Request:** K1901895
Project: HS19030014/HS19030014

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	628234	KQ1903351-05	03/13/19 06:29	25.0	24.7	99	90-110
CCV2	628234	KQ1903351-06	03/13/19 11:53	25.0	24.4	98	90-110
CCV3	628234	KQ1903351-07	03/13/19 17:00	25.0	24.6	98	90-110
CCV4	628234	KQ1903351-08	03/14/19 00:30	25.0	24.3	97	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: ALS Environmental - US **Service Request:**K1901895
Project: HS19030014/HS19030014

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic

Analysis Method: SM 5310 C **Units:**mg/L

	Analysis Lot	Lab Code	Date Analyzed	LOQ	LOD	MDL	Result	Q
CCB1	628234	KQ1903351-01	03/13/19 06:46	0.50	0.20	0.07	ND	U
CCB2	628234	KQ1903351-02	03/13/19 12:09	0.50	0.20	0.07	ND	U
CCB3	628234	KQ1903351-03	03/13/19 17:17	0.50	0.20	0.07	ND	U
CCB4	628234	KQ1903351-04	03/14/19 00:47	0.50	0.20	0.07	ND	U

Raw Data

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Work Request # Original (______) K1902025; 2074, 1653, 1698, 1701, 1719, 1940, 1830, 1875, 1895, 1926, 1955, 1956, 2084, 1725, 1786, 1941

Tier: II II II II II II I II II IV I IV IV IV II IV II

Date Analyzed: 3/12/2019

Analyst: BCD

Analysis: TOC/DOC

Run # TOC: 628233, 628234 DOC: 628232, 628235

DATA QUALITY REPORT
INORGANICS

Explain any "no" responses to questions below, and any corrective actions in the comments section below.

1.	Is the method name and number correct and appropriate?	**yes**/no/NA
2.	Holding times met for all analyses and for all samples?	**yes**/no/NA
3.	Are calculations correct?	**yes**/no/NA
4.	Is the reporting basis correct? (Dry Weight)	**yes**/no/NA
5.	All quality control criteria met?	**yes**/no/NA
6.	Is the calibration curve correlation coefficient ≥ 0.995?	**yes**/no
7.	MBs, CCVs, CCBs, LCSs, Dups, and Spikes, analyzed at proper frequency?	**yes**/no/NA
8.	Are ICVs, CCVs, and CCBs all within acceptance limits?	**yes**/no/NA
9.	Are results for methods blanks all ND?	yes/**no**/NA
10.	Are all QC samples within acceptance criteria? (LCS % rec, MS/DMS % rec, DUP or MS/DMS RPDs, etc.)	**yes**/no/NA
11.	Are all exceptions explained?	yes/**no**/NA
12.	Have all applicable service requests been reviewed?	**yes**/no/NA
13.	Are all samples labeled correctly?	**yes**/no/NA
14.	Have all instructions on the service request been followed? (e.g. Special MRLs, QC on a specific sample, Form V)	**yes**/no/NA
15.	Are detection limits and units reported correctly?	**yes**/no/NA
16.	Is the unused space on the benchsheet crossed out?	**yes**/no/NA
17.	Was analysis turned in by the due date? (n-2) (If not record SR#)	**yes**/no/NA

① BCD 3/15/19

COMMENTS: K1902074-1/2, 1653-1/2/3/4/5/6, 1719-1/2/3/4/5/6/7, 1698-1/2/3, 1701-1, and 1940-1 sent for RA due to high CCB.
K1902084-1/1d, 1926-3/3d report a high %RSD due to non-homogeneous dirty sample.
K1901875-2/2d, 1926-1/1d, 1941-1/1d/1t report a high %RSD, but these samples are less than 5x the MRL
K1901926-2/1d, 1941-1 require a minimum dilution due to dirty samples.
K1901941-7/MS's report a high %RSD and low recovery due to dirty sample interference.

Final Approved by: [signature] Date: 03/15/19

DQREPORT

C:\Documents and Settings\adam.bradbury\My Documents\DATAQUAL.DOC

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628232 **Method/Testcode:** SM 5310 C/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	T
K1902025-002	Carbon, Dissolved Organic (DOC)	N/A		Water	3.24 mg/L	10 ml	3.24 mg/L	1	0.07	0.50			3/12/19 17:50	N	II
K1902025-004	Carbon, Dissolved Organic (DOC)	N/A		Water	2.46 mg/L	10 ml	2.46 mg/L	1	0.07	0.50			3/12/19 18:55	N	II
K1902074-001	Carbon, Dissolved Organic (DOC)	N/A		Effluent	1.39 mg/L	10 ml	1.39 mg/L	1	0.07	0.50			3/12/19 20:01	N	II
K1902074-002	Carbon, Dissolved Organic (DOC)	N/A		Water	1.49 mg/L	10 ml	1.49 mg/L	1	0.07	0.50			3/12/19 20:33	N	II
KQ1903346-01	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/12/19 14:04	N	II
KQ1903346-02	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.09 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/12/19 19:44	N	II
KQ1903346-03	Carbon, Dissolved Organic (DOC)	CCB		Water	1.40 mg/L	10 ml	1.40 mg/L	1	0.07	0.50			3/13/19 01:22	N	II
KQ1903346-04	Carbon, Dissolved Organic (DOC)	CCV		Water	24.82 mg/L	10 ml	24.8 mg/L	1			99		3/12/19 13:47	N	II
KQ1903346-05	Carbon, Dissolved Organic (DOC)	CCV		Water	25.19 mg/L	10 ml	25.2 mg/L	1			101		3/12/19 19:27	N	II
KQ1903346-06	Carbon, Dissolved Organic (DOC)	CCV		Water	24.85 mg/L	10 ml	24.8 mg/L	1			99		3/13/19 01:06	N	II
KQ1903346-07	Carbon, Dissolved Organic (DOC)	MS	K1902025-002	Water	30.63 mg/L	10 ml	30.6 mg/L	1	0.07	0.50	110		3/12/19 18:22	N	II
KQ1903346-08	Carbon, Dissolved Organic (DOC)	DUP	K1902025-002	Water	3.13 mg/L	10 ml	3.13 mg/L	1	0.07	0.50		3	3/12/19 17:50	N	II
KQ1903346-09	Carbon, Dissolved Organic (DOC)	DUP	K1902025-004	Water	2.68 mg/L	10 ml	2.68 mg/L	1	0.07	0.50		9	3/12/19 18:55	N	II
KQ1903346-10	Carbon, Dissolved Organic (DOC)	DUP	K1902074-001	Effluent	1.77 mg/L	10 ml	1.77 mg/L	1	0.07	0.50		24*	3/12/19 20:01	N	II
KQ1903346-11	Carbon, Dissolved Organic (DOC)	DUP	K1902074-002	Water	1.47 mg/L	10 ml	1.47 mg/L	1	0.07	0.50		1	3/12/19 20:33	N	II
KQ1903346-12	Carbon, Dissolved Organic (DOC)	MB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/12/19 14:21	N	II
KQ1903346-13	Carbon, Dissolved Organic (DOC)	LCS		Water	25.83 mg/L	10 ml	25.8 mg/L	1	0.07	0.50	103		3/12/19 14:37	N	II

03/15/19

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Printed 3/15/19 10:07

Results Summary

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628233 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1901653-001	Carbon, Total Organic	N/A		Brackish Water	0.91 mg/L	10 ml	1.8 mg/L	2	0.2	1.0			3/12/19 21:05	N	II
K1901653-002	Carbon, Total Organic	N/A		Brackish Water	0.45 mg/L	10 ml	0.9 mg/L J	2	0.2	1.0			3/12/19 21:37	N	II
K1901653-003	Carbon, Total Organic	N/A		Brackish Water	0.76 mg/L	10 ml	1.5 mg/L	2	0.2	1.0			3/12/19 22:09	N	II
K1901653-004	Carbon, Total Organic	N/A		Brackish Water	0.82 mg/L	10 ml	1.6 mg/L	2	0.2	1.0			3/12/19 22:41	N	II
K1901653-005	Carbon, Total Organic	N/A		Brackish Water	0.43 mg/L	10 ml	0.9 mg/L J	2	0.2	1.0			3/12/19 23:45	Y	II
K1901653-006	Carbon, Total Organic	N/A		Brackish Water	0.57 mg/L	10 ml	1.1 mg/L	2	0.2	1.0			3/12/19 23:13	N	II
K1901698-001	Carbon, Total Organic	N/A		Water	0.48 mg/L	10 ml	5.0 mg/L U	10	0.7	5.0			3/13/19 07:03	N	II
K1901698-002	Carbon, Total Organic	N/A		Water	2.16 mg/L	10 ml	21.6 mg/L	10	0.7	5.0			3/13/19 08:23	N	II
K1901698-003	Carbon, Total Organic	N/A		Water	-0.18 mg/L	10 ml	5.0 mg/L U	10	0.7	5.0			3/13/19 08:55	N	II
K1901701-001	Carbon, Total Organic	N/A		Water	7.35 mg/L	10 ml	73.5 mg/L	10	0.7	5.0			3/13/19 09:28	N	II
K1901719-001	Carbon, Total Organic	N/A		Brackish Water	0.60 mg/L	10 ml	1.2 mg/L	2	0.2	1.0			3/13/19 02:12	N	II
K1901719-002	Carbon, Total Organic	N/A		Brackish Water	0.87 mg/L	10 ml	1.7 mg/L	2	0.2	1.0			3/13/19 02:44	N	II
K1901719-003	Carbon, Total Organic	N/A		Brackish Water	18.64 mg/L	10 ml	37.3 mg/L	2	0.2	1.0			3/13/19 03:17	N	II
K1901719-004	Carbon, Total Organic	N/A		Brackish Water	1.15 mg/L	10 ml	4.6 mg/L	4	0.3	2.0			3/13/19 03:49	N	II
K1901719-005	Carbon, Total Organic	N/A		Brackish Water	1.95 mg/L	10 ml	3.9 mg/L	2	0.2	1.0			3/13/19 04:21	N	II
K1901719-006	Carbon, Total Organic	N/A		Brackish Water	0.76 mg/L	10 ml	1.5 mg/L	2	0.2	1.0			3/13/19 04:53	N	II
K1901719-007	Carbon, Total Organic	N/A		Brackish Water	6.40 mg/L	10 ml	25.6 mg/L	4	0.3	2.0			3/13/19 05:25	N	II
K1901940-001	Carbon, Total Organic	N/A		Drinking Water	0.27 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 10:32	N	I
KQ1903349-02	Carbon, Total Organic	CCB		Brackish Water	-0.09 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/12/19 19:44	N	II
KQ1903349-03	Carbon, Total Organic	CCB		Brackish Water	1.40 mg/L	10 ml	1.40 mg/L	1	0.07	0.50			3/13/19 01:22	N	II
KQ1903349-04	Carbon, Total Organic	CCB		Brackish Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 06:46	N	II
KQ1903349-05	Carbon, Total Organic	CCB		Brackish Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 12:09	N	II
KQ1903349-07	Carbon, Total Organic	CCV		Brackish Water	25.19 mg/L	10 ml	25.2 mg/L	1			101		3/12/19 19:27	N	II
KQ1903349-08	Carbon, Total Organic	CCV		Brackish Water	24.85 mg/L	10 ml	24.8 mg/L	1			99		3/13/19 01:06	N	II
KQ1903349-09	Carbon, Total Organic	CCV		Brackish Water	24.74 mg/L	10 ml	24.7 mg/L	1			99		3/13/19 06:29	N	II
KQ1903349-10	Carbon, Total Organic	CCV		Brackish Water	24.42 mg/L	10 ml	24.4 mg/L	1			98		3/13/19 11:53	N	II
KQ1903349-11	Carbon, Total Organic	LCS		Brackish Water	26.52 mg/L	10 ml	26.5 mg/L	1	0.07	0.50	106		3/13/19 01:56	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Printed 3/15/19 10:11

Results Summary

03/15/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628233 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1903349-12	Carbon, Total Organic	MB		Brackish Water	0.12 mg/L	10 ml	0.12 mg/L J	1	0.07	0.50			3/13/19 01:39	N	II
KQ1903349-13	Carbon, Total Organic	MS	K1901653-005	Brackish Water	20.19 mg/L	10 ml	40.4 mg/L	2	0.2	1.0	79*		3/13/19 00:17	N	II
KQ1903349-14	Carbon, Total Organic	MS	K1901698-001	Water	27.78 mg/L	10 ml	278 mg/L	10	0.7	5.0	111		3/13/19 07:35	N	II
KQ1903349-15	Carbon, Total Organic	DUP	K1901653-001	Brackish Water	0.82 mg/L	10 ml	1.6 mg/L	2	0.2	1.0		11*	3/12/19 21:05	N	II
KQ1903349-16	Carbon, Total Organic	DUP	K1901653-002	Brackish Water	0.67 mg/L	10 ml	1.3 mg/L	2	0.2	1.0		39*	3/12/19 21:37	N	II
KQ1903349-17	Carbon, Total Organic	DUP	K1901653-003	Brackish Water	0.67 mg/L	10 ml	1.3 mg/L	2	0.2	1.0		12*	3/12/19 22:09	N	II
KQ1903349-18	Carbon, Total Organic	DUP	K1901653-004	Brackish Water	0.83 mg/L	10 ml	1.7 mg/L	2	0.2	1.0		<1	3/12/19 22:41	N	II
KQ1903349-19	Carbon, Total Organic	DUP	K1901653-006	Brackish Water	0.44 mg/L	10 ml	0.9 mg/L J	2	0.2	1.0		26*	3/12/19 23:13	N	II
KQ1903349-20	Carbon, Total Organic	DUP	K1901653-005	Brackish Water	0.34 mg/L	10 ml	0.7 mg/L J	2	0.2	1.0		23*	3/12/19 23:45	N	II
KQ1903349-21	Carbon, Total Organic	DUP	K1901719-001	Brackish Water	0.44 mg/L	10 ml	0.9 mg/L J	2	0.2	1.0		29*	3/13/19 02:12	N	II
KQ1903349-22	Carbon, Total Organic	DUP	K1901719-002	Brackish Water	0.82 mg/L	10 ml	1.6 mg/L	2	0.2	1.0		6	3/13/19 02:44	N	II
KQ1903349-23	Carbon, Total Organic	DUP	K1901719-003	Brackish Water	18.78 mg/L	10 ml	37.6 mg/L	2	0.2	1.0		<1	3/13/19 03:17	N	II
KQ1903349-24	Carbon, Total Organic	DUP	K1901719-004	Brackish Water	1.06 mg/L	10 ml	4.3 mg/L	4	0.3	2.0		8	3/13/19 03:49	N	II
KQ1903349-25	Carbon, Total Organic	DUP	K1901719-005	Brackish Water	1.80 mg/L	10 ml	3.6 mg/L	2	0.2	1.0		8	3/13/19 04:21	N	II
KQ1903349-26	Carbon, Total Organic	DUP	K1901719-006	Brackish Water	0.68 mg/L	10 ml	1.4 mg/L	2	0.2	1.0		12*	3/13/19 04:53	N	II
KQ1903349-27	Carbon, Total Organic	DUP	K1901719-007	Brackish Water	6.26 mg/L	10 ml	25.1 mg/L	4	0.3	2.0		2	3/13/19 05:25	N	II
KQ1903349-28	Carbon, Total Organic	DUP	K1901698-001	Water	0.52 mg/L	10 ml	5.2 mg/L	10	0.7	5.0		NC	3/13/19 07:03	N	II
KQ1903349-29	Carbon, Total Organic	DUP	K1901698-002	Water	2.10 mg/L	10 ml	21.0 mg/L	10	0.7	5.0		3	3/13/19 08:23	N	II
KQ1903349-30	Carbon, Total Organic	DUP	K1901698-003	Water	-0.18 mg/L	10 ml	5.0 mg/L U	10	0.7	5.0		NC	3/13/19 08:55	N	II
KQ1903349-31	Carbon, Total Organic	DUP	K1901701-001	Water	7.35 mg/L	10 ml	73.5 mg/L	10	0.7	5.0		<1	3/13/19 09:28	N	II
KQ1903349-32	Carbon, Total Organic	DUP	K1901940-001	Drinking Water	0.37 mg/L	10 ml	0.37 mg/L J	1	0.07	0.50		NC	3/13/19 10:32	N	I

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628234 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1901830-001	Carbon, Total Organic	N/A		Drinking Water	0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 16:12	N	II
K1901875-001	Carbon, Total Organic	N/A		Water	5.56 mg/L	10 ml	556 mg/L	100	7	50			3/13/19 17:34	N	II
K1901875-002	Carbon, Total Organic	N/A		Water	0.61 mg/L	10 ml	61 mg/L	100	7	50			3/13/19 18:06	N	II
K1901875-003	Carbon, Total Organic	N/A		Water	1.34 mg/L	10 ml	134 mg/L	100	7	50			3/13/19 18:38	N	II
K1901895-001	Carbon, Total Organic	N/A		Water	5.10 mg/L	10 ml	5.10 mg/L	1	0.07	0.50			3/13/19 12:59	N	IV
K1901926-001	Carbon, Total Organic	N/A		Ground Water	0.60 mg/L	10 ml	60 mg/L	100	7	50			3/13/19 19:43	N	I
K1901926-002	Carbon, Total Organic	N/A		Ground Water	0.07 mg/L	10 ml	50 mg/L U	100	7	50			3/13/19 20:15	N	I
K1901926-003	Carbon, Total Organic	N/A		Ground Water	2.38 mg/L	10 ml	2.38 mg/L	1	0.07	0.50			3/13/19 20:47	N	I
K1901955-001	Carbon, Total Organic	N/A		Water	3.02 mg/L	10 ml	3.02 mg/L	1	0.07	0.50			3/13/19 11:04	Y	IV
K1901956-001	Carbon, Total Organic	N/A		Water	30.12 mg/L	10 ml	30.1 mg/L	1	0.07	0.50			3/13/19 13:31	N	IV
K1901956-002	Carbon, Total Organic	N/A		Water	31.32 mg/L	10 ml	31.3 mg/L	1	0.07	0.50			3/13/19 14:04	N	IV
K1902084-001	Carbon, Total Organic	N/A		Water	4.41 mg/L	10 ml	4.41 mg/L	1	0.07	0.50			3/13/19 14:36	N	IV
K1902084-002	Carbon, Total Organic	N/A		Water	3.20 mg/L	10 ml	3.20 mg/L	1	0.07	0.50			3/13/19 15:08	N	IV
K1902084-003	Carbon, Total Organic	N/A		Water	3.31 mg/L	10 ml	3.31 mg/L	1	0.07	0.50			3/13/19 15:40	N	IV
KQ1903351-01	Carbon, Total Organic	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 06:46	N	IV
KQ1903351-02	Carbon, Total Organic	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 12:09	N	IV
KQ1903351-03	Carbon, Total Organic	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 17:17	N	IV
KQ1903351-04	Carbon, Total Organic	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 00:47	N	IV
KQ1903351-05	Carbon, Total Organic	CCV		Water	24.74 mg/L	10 ml	24.7 mg/L	1			99		3/13/19 06:29	N	IV
KQ1903351-06	Carbon, Total Organic	CCV		Water	24.42 mg/L	10 ml	24.4 mg/L	1			98		3/13/19 11:53	N	IV
KQ1903351-07	Carbon, Total Organic	CCV		Water	24.59 mg/L	10 ml	24.6 mg/L	1			98		3/13/19 17:00	N	IV
KQ1903351-08	Carbon, Total Organic	CCV		Water	24.30 mg/L	10 ml	24.3 mg/L	1			97		3/14/19 00:30	N	IV
KQ1903351-09	Carbon, Total Organic	MB		Water	0.32 mg/L	10 ml	0.32 mg/L J	1	0.07	0.50			3/13/19 12:26	N	IV
KQ1903351-10	Carbon, Total Organic	LCS		Water	25.77 mg/L	10 ml	25.8 mg/L	1	0.07	0.50	103		3/13/19 12:43	N	IV
KQ1903351-11	Carbon, Total Organic	MS	K1901955-001	Water	29.69 mg/L	10 ml	29.7 mg/L	1	0.07	0.50	107		3/13/19 11:36	N	IV
KQ1903351-12	Carbon, Total Organic	DUP	K1901955-001	Water	3.04 mg/L	10 ml	3.04 mg/L	1	0.07	0.50		<1	3/13/19 11:04	N	IV
KQ1903351-13	Carbon, Total Organic	DUP	K1901895-001	Water	4.90 mg/L	10 ml	4.90 mg/L	1	0.07	0.50		4	3/13/19 12:59	N	IV
KQ1903351-14	Carbon, Total Organic	DUP	K1901956-001	Water	30.97 mg/L	10 ml	31.0 mg/L	1	0.07	0.50		3	3/13/19 13:31	N	IV
KQ1903351-15	Carbon, Total Organic	DUP	K1901956-002	Water	31.78 mg/L	10 ml	31.8 mg/L	1	0.07	0.50		1	3/13/19 14:04	N	IV
KQ1903351-16	Carbon, Total Organic	DUP	K1902084-001	Water	3.61 mg/L	10 ml	3.61 mg/L	1	0.07	0.50		20*	3/13/19 14:36	N	IV
KQ1903351-17	Carbon, Total Organic	DUP	K1902084-002	Water	2.91 mg/L	10 ml	2.91 mg/L	1	0.07	0.50		10	3/13/19 15:08	N	IV
KQ1903351-18	Carbon, Total Organic	DUP	K1902084-003	Water	3.23 mg/L	10 ml	3.23 mg/L	1	0.07	0.50		2	3/13/19 15:40	N	IV
KQ1903351-19	Carbon, Total Organic	DUP	K1901830-001	Drinking Water	0.15 mg/L	10 ml	0.15 mg/L J	1	0.07	0.50		NC	3/13/19 16:12	N	II
KQ1903351-20	Carbon, Total Organic	DUP	K1901875-001	Water	5.53 mg/L	10 ml	553 mg/L	100	7	50		<1	3/13/19 17:34	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Printed 3/15/19 10:15

Results Summary

03/15/19 Freeman

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628234 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1903351-21	Carbon, Total Organic	DUP	K1901875-002	Water	0.55 mg/L	10 ml	55 mg/L	100	7	50		11*	3/13/19 18:06	N	II
KQ1903351-22	Carbon, Total Organic	DUP	K1901875-003	Water	1.23 mg/L	10 ml	123 mg/L	100	7	50		8	3/13/19 18:38	N	II
KQ1903351-23	Carbon, Total Organic	DUP	K1901926-001	Ground Water	0.45 mg/L	10 ml	45 mg/L J	100	7	50		27*	3/13/19 19:43	N	I
KQ1903351-24	Carbon, Total Organic	DUP	K1901926-002	Ground Water	3.00 mg/L	10 ml	300 mg/L	100	7	50		NC	3/13/19 20:15	N	I
KQ1903351-25	Carbon, Total Organic	DUP	K1901926-003	Ground Water	1.92 mg/L	10 ml	1.92 mg/L	1	0.07	0.50		21*	3/13/19 20:47	N	I

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

00934827

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628235 **Method/Testcode:** 9060/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1901725-001	Carbon, Dissolved Organic (DOC)	N/A		Water	2.68 mg/L	10 ml	10.7 mg/L	4	0.3	2.0			3/13/19 21:19	N	II
K1901725-002	Carbon, Dissolved Organic (DOC)	N/A		Water	1.59 mg/L	10 ml	6.4 mg/L	4	0.3	2.0			3/13/19 22:22	N	II
K1901725-003	Carbon, Dissolved Organic (DOC)	N/A		Water	2.36 mg/L	10 ml	9.4 mg/L	4	0.3	2.0			3/13/19 23:26	Y	II
K1901786-001	Carbon, Dissolved Organic (DOC)	N/A		Water	0.28 mg/L	10 ml	0.28 mg/L J	1	0.07	0.50			3/14/19 03:13	N	IV
K1901786-002	Carbon, Dissolved Organic (DOC)	N/A		Water	1.50 mg/L	10 ml	750 mg/L	500	40	250			3/14/19 04:16	Y	IV
K1901941-001	Carbon, Dissolved Organic (DOC)	N/A		Water	0.18 mg/L	10 ml	1.8 mg/L J	10	0.7	5.0			3/14/19 06:56	N	II
K1901941-002	Carbon, Dissolved Organic (DOC)	N/A		Water	0.56 mg/L	10 ml	5.6 mg/L	10	0.7	5.0			3/14/19 08:00	N	II
K1901941-003	Carbon, Dissolved Organic (DOC)	N/A		Water	0.58 mg/L	10 ml	5.8 mg/L	10	0.7	5.0			3/14/19 09:37	Y	II
K1901941-004	Carbon, Dissolved Organic (DOC)	N/A		Water	1.13 mg/L	10 ml	1.13 mg/L	1	0.07	0.50			3/14/19 12:16	N	II
K1901941-005	Carbon, Dissolved Organic (DOC)	N/A		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 13:20	N	II
KQ1903347-03	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/13/19 17:17	N	II
KQ1903347-04	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 00:47	N	II
KQ1903347-05	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 09:20	N	II
KQ1903347-06	Carbon, Dissolved Organic (DOC)	CCV		Water	24.59 mg/L	10 ml	24.6 mg/L	1					3/13/19 17:00	N	II
KQ1903347-07	Carbon, Dissolved Organic (DOC)	CCV		Water	24.30 mg/L	10 ml	24.3 mg/L	1					3/14/19 00:30	N	II
KQ1903347-08	Carbon, Dissolved Organic (DOC)	CCV		Water	24.38 mg/L	10 ml	24.4 mg/L	1					3/14/19 09:03	N	II
KQ1903347-09	Carbon, Dissolved Organic (DOC)	MB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 01:03	N	II
KQ1903347-10	Carbon, Dissolved Organic (DOC)	LCS		Water	25.49 mg/L	10 ml	25.5 mg/L	1	0.07	0.50	102		3/14/19 01:20	N	II
KQ1903347-24	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 16:48	N	II
KQ1903347-25	Carbon, Dissolved Organic (DOC)	CCV		Water	24.23 mg/L	10 ml	24.2 mg/L	1					3/14/19 16:32	N	II
KQ1903347-26	Carbon, Dissolved Organic (DOC)	MB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 14:56	N	II
KQ1903347-27	Carbon, Dissolved Organic (DOC)	MB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 14:56	N	II
KQ1903347-28	Carbon, Dissolved Organic (DOC)	MB		Water	-0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/14/19 14:56	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

03/15/19

Printed 3/15/19 11:12

Results Summary

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628235 **Method/Testcode:** 9060/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1903347-29	Carbon, Dissolved Organic (DOC)	LCS		Water	25.26 mg/L	10 ml	25.3 mg/L	1	0.07	0.50	101		3/14/19 15:44	N	II
KQ1903347-30	Carbon, Dissolved Organic (DOC)	LCS		Water	25.55 mg/L	10 ml	25.6 mg/L	1	0.07	0.50	102		3/14/19 15:44	N	II
KQ1903347-31	Carbon, Dissolved Organic (DOC)	LCS		Water	25.77 mg/L	10 ml	25.8 mg/L	1	0.07	0.50	103		3/14/19 15:44	N	II
KQ1903347-32	Carbon, Dissolved Organic (DOC)	MS	K1901725-003	Water	28.75 mg/L	10 ml	115 mg/L	4	0.3	2.0	106		3/14/19 01:37	N	II
KQ1903347-33	Carbon, Dissolved Organic (DOC)	MS	K1901725-003	Water	28.99 mg/L	10 ml	116 mg/L	4	0.3	2.0	107		3/14/19 01:37	N	II
KQ1903347-34	Carbon, Dissolved Organic (DOC)	MS	K1901725-003	Water	28.87 mg/L	10 ml	115 mg/L	4	0.3	2.0	106		3/14/19 01:37	N	II
KQ1903347-35	Carbon, Dissolved Organic (DOC)	MS	K1901725-003	Water	28.98 mg/L	10 ml	116 mg/L	4	0.3	2.0	106		3/14/19 01:37	N	II
KQ1903347-36	Carbon, Dissolved Organic (DOC)	MS	K1901786-002	Water	27.55 mg/L	10 ml	13800 mg/L	500	40	250	104		3/14/19 05:20	N	IV
KQ1903347-37	Carbon, Dissolved Organic (DOC)	MS	K1901786-002	Water	27.78 mg/L	10 ml	13900 mg/L	500	40	250	105		3/14/19 05:20	N	IV
KQ1903347-38	Carbon, Dissolved Organic (DOC)	MS	K1901786-002	Water	27.59 mg/L	10 ml	13800 mg/L	500	40	250	104		3/14/19 05:20	N	IV
KQ1903347-39	Carbon, Dissolved Organic (DOC)	MS	K1901786-002	Water	27.80 mg/L	10 ml	13900 mg/L	500	40	250	105		3/14/19 05:20	N	IV
KQ1903347-40	Carbon, Dissolved Organic (DOC)	MS	K1901941-003	Water	27.52 mg/L	10 ml	275 mg/L	10	0.7	5.0	108		3/14/19 10:41	N	II
KQ1903347-41	Carbon, Dissolved Organic (DOC)	MS	K1901941-003	Water	27.04 mg/L	10 ml	270 mg/L	10	0.7	5.0	106		3/14/19 10:41	N	II
KQ1903347-42	Carbon, Dissolved Organic (DOC)	MS	K1901941-003	Water	0.62 mg/L	10 ml	6.2 mg/L	10	0.7	5.0	0*		3/14/19 10:41	N	II
KQ1903347-43	Carbon, Dissolved Organic (DOC)	MS	K1901941-003	Water	-0.06 mg/L	10 ml	5.0 mg/L U	10	0.7	5.0	-2*		3/14/19 10:41	N	II
KQ1903347-44	Carbon, Dissolved Organic (DOC)	DUP	K1901725-001	Water	2.35 mg/L	10 ml	9.4 mg/L	4	0.3	2.0		13	3/13/19 21:19	N	II
KQ1903347-45	Carbon, Dissolved Organic (DOC)	TRP	K1901725-001	Water	2.23 mg/L	10 ml	8.9 mg/L	4	0.3	2.0		10	3/13/19 21:19	N	II
KQ1903347-46	Carbon, Dissolved Organic (DOC)	QUAD	K1901725-001	Water	2.23 mg/L	10 ml	8.9 mg/L	4	0.3	2.0		9	3/13/19 21:19	N	II
KQ1903347-47	Carbon, Dissolved Organic (DOC)	DUP	K1901725-002	Water	1.53 mg/L	10 ml	6.1 mg/L	4	0.3	2.0		4	3/13/19 22:22	N	II
KQ1903347-48	Carbon, Dissolved Organic (DOC)	TRP	K1901725-002	Water	1.42 mg/L	10 ml	5.7 mg/L	4	0.3	2.0		6	3/13/19 22:22	N	II
KQ1903347-49	Carbon, Dissolved Organic (DOC)	QUAD	K1901725-002	Water	1.52 mg/L	10 ml	6.1 mg/L	4	0.3	2.0		5	3/13/19 22:22	N	II
KQ1903347-50	Carbon, Dissolved Organic (DOC)	DUP	K1901725-003	Water	2.34 mg/L	10 ml	9.4 mg/L	4	0.3	2.0		<1	3/13/19 23:26	N	II
KQ1903347-51	Carbon, Dissolved Organic (DOC)	TRP	K1901725-003	Water	2.42 mg/L	10 ml	9.7 mg/L	4	0.3	2.0		2	3/13/19 23:26	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 628235 **Method/Testcode:** 9060/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1903347-52	Carbon, Dissolved Organic (DOC)	QUAD	K1901725-003	Water	2.40 mg/L	10 ml	9.6 mg/L	4	0.3	2.0		1	3/13/19 23:26	N	II
KQ1903347-53	Carbon, Dissolved Organic (DOC)	DUP	K1901786-001	Water	0.28 mg/L	10 ml	0.28 mg/L J	1	0.07	0.50		<1	3/14/19 03:13	N	IV
KQ1903347-54	Carbon, Dissolved Organic (DOC)	TRP	K1901786-001	Water	0.28 mg/L	10 ml	0.28 mg/L J	1	0.07	0.50		<1	3/14/19 03:13	N	IV
KQ1903347-55	Carbon, Dissolved Organic (DOC)	QUAD	K1901786-001	Water	0.23 mg/L	10 ml	0.23 mg/L J	1	0.07	0.50		9	3/14/19 03:13	N	IV
KQ1903347-56	Carbon, Dissolved Organic (DOC)	DUP	K1901786-002	Water	1.56 mg/L	10 ml	780 mg/L	500	40	250		4	3/14/19 04:16	N	IV
KQ1903347-57	Carbon, Dissolved Organic (DOC)	TRP	K1901786-002	Water	1.55 mg/L	10 ml	770 mg/L	500	40	250		2	3/14/19 04:16	N	IV
KQ1903347-58	Carbon, Dissolved Organic (DOC)	QUAD	K1901786-002	Water	1.55 mg/L	10 ml	780 mg/L	500	40	250		2	3/14/19 04:16	N	IV
KQ1903347-59	Carbon, Dissolved Organic (DOC)	DUP	K1901941-001	Water	0.11 mg/L	10 ml	1.1 mg/L J	10	0.7	5.0		48*	3/14/19 06:56	N	II
KQ1903347-60	Carbon, Dissolved Organic (DOC)	TRP	K1901941-001	Water	0.16 mg/L	10 ml	1.6 mg/L J	10	0.7	5.0		24*	3/14/19 06:56	N	II
KQ1903347-61	Carbon, Dissolved Organic (DOC)	QUAD	K1901941-001	Water	0.16 mg/L	10 ml	1.6 mg/L J	10	0.7	5.0		20	3/14/19 06:56	N	II
KQ1903347-62	Carbon, Dissolved Organic (DOC)	DUP	K1901941-002	Water	0.58 mg/L	10 ml	5.8 mg/L	10	0.7	5.0		4	3/14/19 08:00	N	II
KQ1903347-63	Carbon, Dissolved Organic (DOC)	TRP	K1901941-002	Water	0.51 mg/L	10 ml	5.1 mg/L	10	0.7	5.0		6	3/14/19 08:00	N	II
KQ1903347-64	Carbon, Dissolved Organic (DOC)	QUAD	K1901941-002	Water	0.51 mg/L	10 ml	5.1 mg/L	10	0.7	5.0		7	3/14/19 08:00	N	II
KQ1903347-65	Carbon, Dissolved Organic (DOC)	DUP	K1901941-003	Water	0.51 mg/L	10 ml	5.1 mg/L	10	0.7	5.0		13	3/14/19 09:37	N	II
KQ1903347-66	Carbon, Dissolved Organic (DOC)	TRP	K1901941-003	Water	0.54 mg/L	10 ml	5.4 mg/L	10	0.7	5.0		6	3/14/19 09:37	N	II
KQ1903347-67	Carbon, Dissolved Organic (DOC)	QUAD	K1901941-003	Water	0.53 mg/L	10 ml	5.3 mg/L	10	0.7	5.0		5	3/14/19 09:37	N	II
KQ1903347-68	Carbon, Dissolved Organic (DOC)	DUP	K1901941-004	Water	1.09 mg/L	10 ml	1.09 mg/L	1	0.07	0.50		4	3/14/19 12:16	N	II
KQ1903347-69	Carbon, Dissolved Organic (DOC)	TRP	K1901941-004	Water	1.12 mg/L	10 ml	1.12 mg/L	1	0.07	0.50		2	3/14/19 12:16	N	II
KQ1903347-70	Carbon, Dissolved Organic (DOC)	QUAD	K1901941-004	Water	1.07 mg/L	10 ml	1.07 mg/L	1	0.07	0.50		3	3/14/19 12:16	N	II
KQ1903347-71	Carbon, Dissolved Organic (DOC)	DUP	K1901941-005	Water	0.02 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	3/14/19 13:20	N	II
KQ1903347-72	Carbon, Dissolved Organic (DOC)	TRP	K1901941-005	Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	3/14/19 13:20	N	II
KQ1903347-73	Carbon, Dissolved Organic (DOC)	QUAD	K1901941-005	Water	0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	3/14/19 13:20	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

TOC: 628233, 628234
DOC: 628232, 628235

Schedule: 03122019

Version: 8
Instrument: Fusion1
Last Saved by: Fusion1 (Fusion1)
Last Saved on: 2019/03/14 09:36 - Thursday

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps
(Clean)	Clean	Clean		1
(Clean)	Clean	Clean		1
(Clean)	Clean	Clean		1
(Blank)	Blank	Reagent/Acid Blank		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
1	Sample	MB1	Extended Reaction 021711 (Extended Reaction 021711)	1
C	Check Standard	[TOC] LCS ER [25.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Sample	ICS	Extended Reaction 021711 (Extended Reaction 021711)	1
3	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
4	Sample	LOD	Extended Reaction 021711 (Extended Reaction 021711)	4
5	Sample	LOQ	Extended Reaction 021711 (Extended Reaction 021711)	4
6	Sample	K1902025-002.01 doc	Extended Reaction 021711 (Extended Reaction 021711)	2
7	Sample	K1902025-002.01 ms doc	Extended Reaction 021711 (Extended Reaction 021711)	1
8	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
9	Sample	K1902025-004.01 doc	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
10	Sample	K1902074-001.03 doc	Extended Reaction 021711 (Extended Reaction 021711)	2
11	Sample	K1902074-002.03 doc	Extended Reaction 021711 (Extended Reaction 021711)	2
12	Sample	K1901653-001.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
13	Sample	K1901653-002.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
14	Sample	K1901653-003.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
15	Sample	K1901653-004.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
16	Sample	K1901653-006.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
17	Sample	K1901653-005.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
18	Sample	K1901653-005.08 ms 2x	Extended Reaction 021711 (Extended Reaction 021711)	1
19	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
20	Sample	MB2	Extended Reaction 021711 (Extended Reaction 021711)	1
C	Check Standard	[TOC] LCS ER [25.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
21	Sample	K1901719-001.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
22	Sample	K1901719-002.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
23	Sample	K1901719-003.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
24	Sample	K1901719-004.08 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
25	Sample	K1901719-005.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
26	Sample	K1901719-006.08 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
27	Sample	K1901719-007.08 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
28	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
29	Sample	K1901698-001.10 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
30	Sample	K1901698-001.10 ms 10x	Extended Reaction 021711 (Extended Reaction 021711)	1
31	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
32	Sample	K1901698-002.10 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
33	Sample	K1901698-003.10 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
34	Sample	K1901701-001.05 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
35	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
36	Sample	K1901940-001.14	Extended Reaction 021711 (Extended Reaction 021711)	2
37	Sample	K1901955-001.04	Extended Reaction 021711 (Extended Reaction 021711)	2
38	Sample	K1901955-001.04 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1

Blank subtraction 0.15324

03/15/19

Schedule: 03122019

Position	Sample Type	Sample ID	Method (1) Calibration (2)	Reps
0	Check Standard	TOC CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Sample	MBS	Extended Reaction 021711 (Extended Reaction 021711)	[illegible]
2	Check Standard	TOC LCS ER [25.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
41	Sample	K190[illegible]-003.01	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
43	Sample	K190[illegible]64-001.01	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
45	Sample	K190[illegible]44-003.01	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
47	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Check Standard	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	1
0	Check Standard	TOC CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
49	Sample	K1901[illegible]-002.01 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
51	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
53	Sample	K1901226-002.01 100x	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
55	Sample	K1901725-001.10 dcc 4x	Extended Reaction 021711 (Extended Reaction 021711)	4
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	4
57	Sample	K1901725-003.10 dcc 4x	Extended Reaction 021711 (Extended Reaction 021711)	4
[illegible]	Check Standard	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	1
0	Check Standard	TOC CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Sample	MBS	Extended Reaction 021711 (Extended Reaction 021711)	[illegible]
2	Check Standard	TOC LCS ER [25.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	2
60	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	4
62	Sample	K1901742-002.24 dcc 500x	Extended Reaction 021711 (Extended Reaction 021711)	4
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	4
64	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	4
66	Sample	K1901941-002.10 dcc 10x	Extended Reaction 021711 (Extended Reaction 021711)	4
[illegible]	Check Standard	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	1
0	Check Standard	TOC CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	4
68	Sample	K1901941-003.10 ms dcc 10x	Extended Reaction 021711 (Extended Reaction 021711)	4
[illegible]	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
70	Sample	K1901941-004.10 dcc	Extended Reaction 021711 (Extended Reaction 021711)	4
[illegible]	Sample	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	4
72	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
[illegible]	Sample	MBS	Extended Reaction 021711 (Extended Reaction 021711)	2
2	Check Standard	TOC LCS ER [25.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
[illegible]	Check Standard	[illegible]	Extended Reaction 021711 (Extended Reaction 021711)	1
0	Check Standard	TOC CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1

Printed on: March 15, 2019 09:13:09

Fusion Report - 03122019
Tuesday, March 12, 2019 11:18 AM

(View - Reps, Unused Reps, Meta-Data, Signature, History)
Printed on 2019/03/15 09:13 - Friday

Report Summary Information

Company Location:	Gen Chem Lab		
Schedule Name:	03122019	Engine Version:	1.1.5.1
Instrument Name:	Fusion1	Firmware Version:	1.2.0696
Report Version:	1 of 1	Connection:	RS232 COM1
Report Creation by Operators (schedule version):	Fusion1 (Fusion1) (v2) Fusion1 (Fusion1) (v3) Fusion1 (Fusion1) (v4) Fusion1 (Fusion1) (v5) Fusion1 (Fusion1) (v6) Fusion1 (Fusion1) (v7) Fusion1 (Fusion1) (v8)		
Comment:			

Report Results

03/15/19

Sample Type: Clean — From Schedule Version 2

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/03/12 11:18

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	13.77	16.68	2.90	49.56	05:25
2	TC Clean	6.82	9.74	2.91	50.07	04:01
3	TC Clean	2.12	5.09	2.97	50.10	03:46
4	TC Clean	1.33	4.45	3.12	50.06	03:48

Sample Type: Clean — From Schedule Version 3

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/03/12 11:49

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	12.97	15.64	2.67	49.74	05:22

2	TC Clean	3.98	6.84	2.85	50.09	04:04
3	TC Clean	1.46	4.35	2.90	49.99	03:48
4	TC Clean	1.50	4.33	2.83	50.07	03:47

Sample Type: Clean

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/03/12 12:14

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	12.71	15.54	2.84	49.74	05:11
2	TC Clean	4.13	6.91	2.78	50.05	04:04
3	TC Clean	1.52	4.47	2.96	50.08	03:46
4	TC Clean	1.51	4.39	2.89	50.03	03:47

Sample Type: Blank (Creating v1235)

From Schedule Version 5

	Pos	Analysis Type	Sample ID	Start Time
◈	(blank)		Reagent/Acid Blank	2019/03/12 12:36

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	12.63	15.40	2.77	49.75	05:12
2	TC Clean	3.84	6.88	3.04	50.04	04:04
3	TC Clean	1.64	4.62	2.98	50.11	03:50
4	TC Clean	1.35	4.41	3.06	50.06	03:47
5	Reagent Blank	3.56	6.53	2.96	50.11	05:06
6	Acid Blank	0.88	3.61	2.74	49.77	05:31

Sample Type: Sample

From Schedule Version 6

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	D	TOC	RB	0.6073 ppm	0.0000 ppm	0.0000%	2019/03/12 13:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6073	6.0733	14.64	17.43	2.79	50.18	12:31

Dilution **Blank Contribution** **Method** **Calibration**

1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.0023 ppm (PASS)	0.0000 ppm	0%	2019/03/12 13:47

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.0023	250.0233	190.44	193.17	2.74	50.20	12:33

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0072 ppm (PASS)	0.0000 ppm	0%	2019/03/12 14:04

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0072	0.0724	11.22	14.21	2.99	50.23	12:33

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample — From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	1	TOC	MB1	0.0032 ppm	0.0000 ppm	0.0000%	2019/03/12 14:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0032	0.0317	10.31	13.27	2.96	50.22	12:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> LCS ER — From Schedule Version 7

	Pos	BAT	Concentration	Dil	Sample ID	Min / Max	Result	Std. Dev.	RSD	Start Time

			(ppm)			(% dev)				
◆	C	TOC	25.0000	1:1	[TOC] LCS ER [25.0 ppm]	0 / infinity (NA / NA)	26.0129 ppm (PASS)	0.0000 ppm	0%	2019/03/12 14:37

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	26.0129	260.1289	197.68	200.43	2.74	50.24	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	25 ppmC

Sample Type: Sample From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	2	TOC	ICS	0.3560 ppm	0.0000 ppm	0.0000%	2019/03/12 14:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3560	3.5601	12.84	15.77	2.93	50.25	12:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	3	TOC	RB	0.0149 ppm	0.0085 ppm	56.9800%	2019/03/12 15:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0089	0.0889	10.35	13.32	2.97	50.28	12:27
2	TOC	0.0209	0.2088	10.43	13.34	2.91	50.30	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	4	TOC	LOD	0.2108 ppm	0.0188 ppm	8.9000%	2019/03/12 15:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2132	2.1320	11.81	14.68	2.87	50.26	12:30
2	TOC	0.2044	2.0442	11.75	14.60	2.85	50.29	12:27
3	TOC	0.1903	1.9033	11.65	14.61	2.96	50.33	12:27
4	TOC	0.2351	2.3510	11.97	14.81	2.84	50.34	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◈	5	TOC	LOQ	0.5628 ppm	0.0291 ppm	5.1700%	2019/03/12 16:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5804	5.8041	14.45	17.40	2.95	50.33	12:28
2	TOC	0.5214	5.2142	14.02	16.98	2.95	50.30	12:26
3	TOC	0.5856	5.8557	14.48	17.21	2.72	50.24	12:29
4	TOC	0.5638	5.6382	14.33	17.18	2.85	50.22	12:27

Dilution
1:10

Blank Contribution
(TC) 10.2853 (IC) (v1235)

Method
Extended Reaction 021711 (v4)

Calibration
Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	6	TOC	K1902025-002.01 doc	3.3727 ppm	0.0780 ppm	2.3100%	2019/03/12 17:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4279	34.2786	34.86	37.51	2.65	50.19	12:26
2	TOC	3.3175	33.1754	34.07	36.87	2.80	50.19	12:26

Dilution
1:10

Blank Contribution
(TC) 10.2853 (IC) (v1235)

Method
Extended Reaction 021711 (v4)

Calibration
Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	7	TOC	K1902025-002.01 ms doc	30.8157 ppm	0.0000 ppm	0.0000%	2019/03/12 18:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	30.8157	308.1574	231.24	234.27	3.03	50.21	12:31

Dilution
1:10

Blank Contribution
(TC) 10.2853 (IC) (v1235)

Method
Extended Reaction 021711 (v4)

Calibration
Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	8	TOC	RB	0.2175 ppm	0.0000 ppm	0.0000%	2019/03/12 18:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2175	2.1753	11.84	14.55	2.70	50.25	12:32

Dilution
1:10

Blank Contribution
(TC) 10.2853 (IC) (v1235)

Method
Extended Reaction 021711 (v4)

Calibration
Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	9	TOC	K1902025-004.01 doc	2.7506 ppm	0.1556 ppm	5.6600%	2019/03/12 18:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.6406	26.4058	29.22	31.96	2.74	50.25	12:28
2	TOC	2.8607	28.6065	30.80	33.64	2.85	50.30	12:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.3758 ppm (PASS)	0.0000 ppm	0%	2019/03/12 19:27

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.3758	253.7582	193.12	195.99	2.88	50.24	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0965 ppm (PASS)	0.0000 ppm	0%	2019/03/12 19:44

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0965	0.9650	11.86	14.69	2.83	50.27	12:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample — From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	10	TOC	K1902074-001.03 doc	1.7628 ppm	0.2659 ppm	15.0800%	2019/03/12 20:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5748	15.7479	21.58	24.45	2.87	50.26	12:27
2	TOC	1.9508	19.5079	24.27	27.17	2.90	50.26	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◈	11	TOC	K1902074-002.03 doc	1.6615 ppm	0.0107 ppm	0.6400%	2019/03/12 20:33

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6691	16.6907	22.25	25.19	2.93	50.26	12:28
2	TOC	1.6540	16.5401	22.14	25.05	2.91	50.25	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	12	TOC	K1901653-001.08 2x	1.0492 ppm	0.0680 ppm	6.4900%	2019/03/12 21:05

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0973	10.9727	18.15	21.05	2.89	50.27	12:28
2	TOC	1.0010	10.0104	17.46	20.31	2.85	50.24	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	13	TOC	K1901653-002.08 2x	0.7410 ppm	0.1522 ppm	20.5300%	2019/03/12 21:37

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6334	6.3341	14.83	17.75	2.92	50.24	12:30
2	TOC	0.8486	8.4860	16.37	19.26	2.89	50.25	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	14	TOC	K1901653-003.08 2x	0.9012 ppm	0.0625 ppm	6.9400%	2019/03/12 22:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9454	9.4539	17.06	19.88	2.81	50.17	12:26
2	TOC	0.8570	8.5697	16.43	19.22	2.79	50.15	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	15	TOC	K1901653-004.08 2x	1.0064 ppm	0.0052 ppm	0.5200%	2019/03/12 22:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0027	10.0271	17.48	20.33	2.86	50.11	12:26
2	TOC	1.0101	10.1010	17.53	20.22	2.70	50.11	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	16	TOC	K1901653-006.08 2x	0.6871 ppm	0.0919 ppm	13.3800%	2019/03/12 23:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7521	7.5209	15.68	18.47	2.80	50.04	12:30
2	TOC	0.6221	6.2211	14.75	17.59	2.84	50.06	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	17	TOC	K1901653-005.08 2x	0.5681 ppm	0.0627 ppm	11.0400%	2019/03/12 23:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6125	6.1249	14.68	17.60	2.92	50.07	12:26
2	TOC	0.5238	5.2379	14.04	16.99	2.94	50.07	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	18	TOC	K1901653-005.08 ms 2x	20.3764 ppm	0.0000 ppm	0.0000%	2019/03/13 00:17

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	20.3764	203.7641	156.39	159.30	2.91	50.07	12:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	19	TOC	RB	0.1439 ppm	0.1221 ppm	84.8500%	2019/03/13 00:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2302	2.3022	11.94	14.85	2.91	50.05	12:28
2	TOC	0.0576	0.5756	10.70	13.48	2.79	50.05	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.0316 ppm (PASS)	0.0000 ppm	0%	2019/03/13 01:06

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.0316	250.3162	190.65	193.50	2.86	50.00	12:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	1.5818 ppm (PASS)	0.0000 ppm	0%	2019/03/13 01:22

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	1.5818	15.8179	22.51	25.41	2.90	49.97	12:28

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample — From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	20	TOC	MB2	0.3071 ppm	0.0000 ppm	0.0000%	2019/03/13 01:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3071	3.0706	12.49	15.33	2.85	50.01	12:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> LCS ER — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	C	TOC	25.0000	1:1	[TOC] LCS ER [25.0 ppm]	0 / infinity (NA / NA)	26.7013 ppm (PASS)	0.0000 ppm	0%	2019/03/13 01:56

Pos	Base Analysis	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

	Type									
C	TOC	25.0 ppm	1	26.7013	267.0128	202.62	205.45	2.83	49.99	12:34

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	25 ppmC

Sample Type: Sample — From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	21	TOC	K1901719-001.08 2x	0.7029 ppm	0.1074 ppm	15.2800%	2019/03/13 02:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7789	7.7887	15.87	18.82	2.95	49.97	12:29
2	TOC	0.6270	6.2699	14.78	17.74	2.96	49.97	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	22	TOC	K1901719-002.08 2x	1.0319 ppm	0.0336 ppm	3.2600%	2019/03/13 02:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0557	10.5571	17.86	20.72	2.87	49.99	12:31
2	TOC	1.0081	10.0815	17.51	20.36	2.84	49.99	12:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	23	TOC	K1901719-003.08 2x	18.8966 ppm	0.0982 ppm	0.5200%	2019/03/13 03:17

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	18.8271	188.2710	145.28	148.28	3.00	49.99	12:28
2	TOC	18.9660	189.6600	146.28	149.06	2.78	49.98	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	24	TOC	K1901719-004.08 4x	1.2885 ppm	0.0590 ppm	4.5800%	2019/03/13 03:49

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.3302	13.3017	19.82	22.63	2.80	49.97	12:29
2	TOC	1.2468	12.4677	19.22	22.11	2.88	49.97	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	25	TOC	K1901719-005.08 2x	2.0573 ppm	0.1055 ppm	5.1300%	2019/03/13 04:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.1320	21.3195	25.57	28.37	2.79	49.98	12:25
2	TOC	1.9827	19.8273	24.50	27.32	2.82	49.97	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	26	TOC	K1901719-006.08 2x	0.9032 ppm	0.0597 ppm	6.6100%	2019/03/13 04:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9454	9.4539	17.06	19.90	2.84	49.94	12:26
2	TOC	0.8610	8.6101	16.46	19.27	2.81	49.94	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	27	TOC	K1901719-007.08 4x	6.5144 ppm	0.0958 ppm	1.4700%	2019/03/13 05:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.5821	65.8212	57.48	60.26	2.78	49.93	12:29
2	TOC	6.4467	64.4670	56.51	59.26	2.75	49.95	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	28	TOC	RB	0.1038 ppm	0.0677 ppm	65.2700%	2019/03/13 05:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1517	1.5170	11.37	14.10	2.72	49.96	12:28
2	TOC	0.0559	0.5589	10.69	13.47	2.79	49.98	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.9213 ppm (PASS)	0.0000 ppm	0%	2019/03/13 06:29

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.9213	249.2130	189.86	192.85	3.00	49.95	12:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/13 06:46

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	10.27	13.13	2.86	49.93	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	29	TOC	K1901698-001.10 10x	0.6847 ppm	0.0235 ppm	3.4300%	2019/03/13 07:03

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6681	6.6813	15.08	17.98	2.90	49.94	12:25
2	TOC	0.7013	7.0133	15.31	18.04	2.72	49.91	12:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	30	TOC	K1901698-001.10 ms 10x	27.9616 ppm	0.0000 ppm	0.0000%	2019/03/13 07:35

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.9616	279.6160	210.78	213.50	2.72	49.89	12:34

Dilution	Blank Contribution	Method	Calibration

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	31	TOC	RB	0.0186 ppm	0.0263 ppm	141.4200%	2019/03/13 07:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0372	0.3720	10.55	13.36	2.81	49.87	12:26
2	TOC	0.0000	0.0000	9.65	12.43	2.78	49.87	12:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	32	TOC	K1901698-002.10 10x	2.3102 ppm	0.0416 ppm	1.8000%	2019/03/13 08:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.3396	23.3962	27.06	29.62	2.56	49.84	12:29
2	TOC	2.2808	22.8076	26.64	29.43	2.79	49.83	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	33	TOC	K1901698-003.10 10x	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/13 08:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	10.22	13.01	2.79	49.79	12:27
2	TOC	0.0000	0.0000	9.50	12.34	2.84	49.82	12:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	34	TOC	K1901701-001.05 10x	7.5363 ppm	0.0025 ppm	0.0300%	2019/03/13 09:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.5380	75.3801	64.34	67.11	2.78	49.83	12:33
2	TOC	7.5345	75.3453	64.31	66.97	2.66	49.82	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	35	TOC	RB	0.0090 ppm	0.0128 ppm	141.4200%	2019/03/13 10:00

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0181	0.1809	10.42	13.25	2.84	49.79	12:29
2	TOC	0.0000	0.0000	9.92	12.56	2.64	49.86	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	36	TOC	K1901940-001.14	0.5054 ppm	0.0677 ppm	13.3900%	2019/03/13 10:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4575	4.5754	13.57	16.34	2.77	49.95	12:24
2	TOC	0.5532	5.5322	14.25	17.03	2.77	50.00	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	37	TOC	K1901955-001.04	3.2123 ppm	0.0090 ppm	0.2800%	2019/03/13 11:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.2060	32.0597	33.27	36.15	2.88	50.04	12:29
2	TOC	3.2187	32.1866	33.36	36.05	2.69	50.02	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	38	TOC	K1901955-001.04 ms	29.8771 ppm	0.0000 ppm	0.0000%	2019/03/13 11:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	29.8771	298.7714	224.51	227.19	2.68	50.02	12:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.6039 ppm (PASS)	0.0000 ppm	0%	2019/03/13 11:53

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

B	TOC	25 ppm	1	24.6039	246.0388	187.58	190.34	2.76	50.03	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/13 12:09

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	9.36	12.06	2.71	50.03	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	39	TOC	MB3	0.5022 ppm	0.0000 ppm	0.0000%	2019/03/13 12:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5022	5.0217	13.89	16.89	3.00	50.05	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> LCS ER From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	C	TOC	25.0000	1:1	[TOC] LCS ER [25.0 ppm]	0 / infinity (NA / NA)	25.9545 ppm (PASS)	0.0000 ppm	0%	2019/03/13 12:43

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	25.9545	259.5445	197.26	199.89	2.62	50.14	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	25 ppmC

Sample Type: Sample From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	40	TOC	K1901895-001.02	5.1831 ppm	0.1352 ppm	2.6100%	2019/03/13 12:59

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.2787	52.7869	48.14	50.91	2.77	50.09	12:30
2	TOC	5.0875	50.8748	46.76	49.60	2.84	50.09	12:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	41	TOC	K1901956-001.01	30.7278 ppm	0.6021 ppm	1.9600%	2019/03/13 13:31

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	30.3021	303.0209	227.56	230.45	2.89	50.11	12:30
2	TOC	31.1535	311.5352	233.66	236.68	3.01	50.11	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	42	TOC	K1901956-002.01	31.7343 ppm	0.3230 ppm	1.0200%	2019/03/13 14:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.5059	315.0595	236.19	238.98	2.79	50.09	12:26
2	TOC	31.9627	319.6269	239.47	242.42	2.95	50.10	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	43	TOC	K1902084-001.01	4.1932 ppm	0.5599 ppm	13.3500%	2019/03/13 14:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.5892	45.8918	43.19	46.06	2.87	50.12	12:28
2	TOC	3.7973	37.9730	37.51	40.30	2.79	50.08	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	44	TOC	K1902084-002.01	3.2410 ppm	0.2059 ppm	6.3500%	2019/03/13 15:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time

1	TOC	3.3866	33.8658	34.57	37.52	2.95	50.07	12:27
2	TOC	3.0954	30.9537	32.48	35.34	2.86	50.07	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	45	TOC	K1902084-003.01	3.4533 ppm	0.0571 ppm	1.6500%	2019/03/13 15:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4937	34.9368	35.34	38.13	2.79	50.08	12:28
2	TOC	3.4129	34.1293	34.76	37.69	2.93	50.09	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	46	TOC	K1901830-001.01	0.3771 ppm	0.0594 ppm	15.7400%	2019/03/13 16:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4191	4.1905	13.29	16.24	2.95	50.10	12:28
2	TOC	0.3351	3.3509	12.69	15.65	2.96	50.08	12:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	47	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/13 16:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	9.78	12.81	3.02	50.06	12:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.7687 ppm (PASS)	0.0000 ppm	0%	2019/03/13 17:00

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.7687	247.6873	188.76	191.85	3.09	50.04	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/13 17:17

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	10.34	13.11	2.77	50.04	12:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	48	TOC	K1901875-001.01 100x	5.7317 ppm	0.0220 ppm	0.3800%	2019/03/13 17:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.7473	57.4729	51.50	54.23	2.73	50.05	12:31
2	TOC	5.7162	57.1619	51.27	54.15	2.88	50.06	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	49	TOC	K1901875-002.01 100x	0.7626 ppm	0.0459 ppm	6.0100%	2019/03/13 18:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7950	7.9505	15.99	18.93	2.94	50.07	12:31
2	TOC	0.7302	7.3020	15.52	18.55	3.03	50.08	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	50	TOC	K1901875-003.01 100x	1.4672 ppm	0.0729 ppm	4.9700%	2019/03/13 18:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5187	15.1873	21.18	23.86	2.69	50.11	12:25

2	TOC	1.4157	14.1566	20.44	23.41	2.98	50.16	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	51	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/13 19:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	9.32	12.01	2.69	50.18	12:29
2	TOC	0.0000	0.0000	9.46	12.18	2.72	50.23	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	52	TOC	K1901926-001.03 100x	0.7080 ppm	0.0997 ppm	14.0800%	2019/03/13 19:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7785	7.7845	15.87	18.57	2.70	50.25	12:28
2	TOC	0.6375	6.3745	14.86	17.72	2.87	50.27	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	53	TOC	K1901926-002.03 100x	1.7196 ppm	2.0677 ppm	120.2400%	2019/03/13 20:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2576	2.5755	12.13	14.94	2.81	50.34	12:29
2	TOC	3.1817	31.8170	33.10	35.99	2.89	50.37	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	54	TOC	K1901926-003.03	2.3354 ppm	0.3256 ppm	13.9400%	2019/03/13 20:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.5657	25.6569	28.68	31.57	2.89	50.34	12:28
2	TOC	2.1052	21.0518	25.38	28.28	2.90	50.34	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◈	55	TOC	K1901725-001.10 doc 4x	2.5546 ppm	0.2135 ppm	8.3600%	2019/03/13 21:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.8639	28.6386	30.82	33.59	2.77	50.32	12:28
2	TOC	2.5300	25.2998	28.43	31.27	2.84	50.31	12:32
3	TOC	2.4103	24.1032	27.57	30.39	2.82	50.30	12:27
4	TOC	2.4142	24.1423	27.60	30.31	2.71	50.31	12:28

Dilution: 1:10
Blank Contribution: (TC) 10.2853 (IC) (v1235)
Method: Extended Reaction 021711 (v4)
Calibration: Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	56	TOC	K1901725-002.10 doc 4x	1.6993 ppm	0.0709 ppm	4.1700%	2019/03/13 22:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.7744	17.7437	23.01	25.83	2.82	50.28	12:28
2	TOC	1.7124	17.1244	22.56	25.35	2.79	50.27	12:26
3	TOC	1.6034	16.0338	21.78	24.57	2.79	50.27	12:27
4	TOC	1.7070	17.0701	22.52	25.49	2.96	50.26	12:28

Dilution: 1:10
Blank Contribution: (TC) 10.2853 (IC) (v1235)
Method: Extended Reaction 021711 (v4)
Calibration: Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	57	TOC	K1901725-003.10 doc 4x	2.5634 ppm	0.0352 ppm	1.3700%	2019/03/13 23:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.5424	25.4240	28.52	31.42	2.90	50.27	12:30
2	TOC	2.5266	25.2664	28.40	31.27	2.87	50.27	12:30
3	TOC	2.6035	26.0348	28.95	31.75	2.80	50.25	12:30
4	TOC	2.5812	25.8117	28.79	31.61	2.81	50.25	12:29

Dilution: 1:10
Blank Contribution: (TC) 10.2853 (IC) (v1235)
Method: Extended Reaction 021711 (v4)
Calibration: Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.4881 ppm (PASS)	0.0000 ppm	0%	2019/03/14 00:30

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

B	TOC	25 ppm	1	24.4881	244.8812	186.75	189.60	2.85	50.24	12:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/14 00:47

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	9.68	12.36	2.68	50.23	12:34

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample — From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	58	TOC	MB4	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/14 01:03

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	9.20	12.05	2.85	50.24	12:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> LCS ER — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	C	TOC	25.0000	1:1	[TOC] LCS ER [25.0 ppm]	0 / infinity (NA / NA)	25.6773 ppm (PASS)	0.0000 ppm	0%	2019/03/14 01:20

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	25.6773	256.7734	195.28	198.09	2.81	50.27	12:27

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	25 ppmC

Sample Type: Sample

From Schedule Version 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	59	TOC	K1901725-003.10 ms doc 4x	29.0821 ppm	0.1112 ppm	0.3800%	2019/03/14 01:37

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	28.9358	289.3576	217.76	220.70	2.93	50.24	12:31
2	TOC	29.1710	291.7103	219.45	222.32	2.87	50.25	12:29
3	TOC	29.0556	290.5556	218.62	221.49	2.87	50.24	12:26
4	TOC	29.1660	291.6601	219.41	222.29	2.88	50.27	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	60	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/14 02:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	10.17	13.05	2.89	50.24	12:29
2	TOC	0.0000	0.0000	10.19	13.10	2.91	50.23	12:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	61	TOC	K1901786-001.23 doc	0.4524 ppm	0.0253 ppm	5.6000%	2019/03/14 03:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4656	4.6563	13.62	16.61	2.98	50.24	12:26
2	TOC	0.4658	4.6577	13.62	16.40	2.77	50.24	12:27
3	TOC	0.4638	4.6382	13.61	16.41	2.80	50.28	12:29
4	TOC	0.4144	4.1445	13.26	16.18	2.92	50.25	12:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	62	TOC	K1901786-002.24 doc 500x	1.7221 ppm	0.0263 ppm	1.5300%	2019/03/14 04:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6829	16.8288	22.35	25.27	2.92	50.25	12:29
2	TOC	1.7392	17.3922	22.76	25.58	2.82	50.25	12:29
3	TOC	1.7328	17.3281	22.71	25.63	2.92	50.26	12:30
4	TOC	1.7336	17.3364	22.72	25.57	2.85	50.25	12:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	63	TOC	K1901786-002.24 ms doc 500x	27.8649 ppm	0.1281 ppm	0.4600%	2019/03/14 05:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.7375	277.3748	209.17	211.97	2.80	50.25	12:28
2	TOC	27.9627	279.6271	210.79	213.60	2.81	50.25	12:29
3	TOC	27.7726	277.7262	209.42	212.37	2.94	50.25	12:25
4	TOC	27.9870	279.8698	210.96	213.70	2.74	50.27	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	64	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/14 06:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	10.13	13.00	2.87	50.25	12:26
2	TOC	0.0000	0.0000	9.43	12.31	2.88	50.26	12:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	65	TOC	K1901941-001.10 doc 10x	0.3380 ppm	0.0302 ppm	8.9400%	2019/03/14 06:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3666	3.6661	12.91	15.84	2.92	50.26	12:25
2	TOC	0.2953	2.9535	12.40	15.35	2.94	50.27	12:29
3	TOC	0.3468	3.4681	12.77	15.51	2.73	50.27	12:28
4	TOC	0.3430	3.4304	12.74	15.61	2.86	50.26	12:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	66	TOC	K1901941-002.10 doc 10x	0.7222 ppm	0.0354 ppm	4.9000%	2019/03/14 08:00

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7419	7.4191	15.60	18.51	2.91	50.25	12:28
2	TOC	0.7620	7.6199	15.75	18.59	2.84	50.24	12:27

3	TOC	0.6960	6.9603	15.28	18.22	2.94	50.23	12:27
4	TOC	0.6891	6.8905	15.23	18.27	3.05	50.21	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

Sample Type: Check Standard --> CCV 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.5647 ppm (PASS)	0.0000 ppm	0%	2019/03/14 09:03

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.5647	245.6469	187.30	190.13	2.83	50.16	12:34

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 — From Schedule Version 7

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/14 09:20

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	9.69	12.55	2.86	50.18	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Sample Type: Sample — From Schedule Version 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	67	TOC	K1901941-003.10 doc 10x	0.7214 ppm	0.0289 ppm	4.0000%	2019/03/14 09:37

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7602	7.6018	15.74	18.49	2.75	50.17	12:29
2	TOC	0.6907	6.9073	15.24	18.03	2.79	50.13	12:25
3	TOC	0.7207	7.2071	15.45	18.21	2.76	50.10	12:29
4	TOC	0.7142	7.1416	15.41	18.13	2.72	50.11	12:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	68	TOC	K1901941-003.10 ms doc 10x	13.9637 ppm	15.5930 ppm	111.6700%	2019/03/14 10:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.7028	277.0275	208.92	211.70	2.77	50.08	12:28
2	TOC	27.2261	272.2606	205.50	208.36	2.85	50.08	12:27
3	TOC	0.8041	8.0411	16.05	18.90	2.85	50.08	12:25
4	TOC	0.1217	1.2171	11.16	13.86	2.71	50.07	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	69	TOC	RB	0.0592 ppm	0.0203 ppm	34.3000%	2019/03/14 11:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0449	0.4487	10.61	13.31	2.70	50.05	12:30
2	TOC	0.0736	0.7360	10.81	13.51	2.70	50.04	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	70	TOC	K1901941-004.10 doc	1.2890 ppm	0.0289 ppm	2.2400%	2019/03/14 12:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.3179	13.1790	19.74	22.41	2.68	50.01	12:27
2	TOC	1.2758	12.7578	19.43	22.35	2.92	50.02	12:27
3	TOC	1.3073	13.0730	19.66	22.66	3.00	50.06	12:25
4	TOC	1.2550	12.5500	19.28	22.16	2.87	50.04	12:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 10.2853 (IC) (v1235)	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	71	TOC	K1901941-005.10 doc	0.1789 ppm	0.0256 ppm	14.3200%	2019/03/14 13:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1419	1.4194	11.30	14.05	2.74	50.06	12:27
2	TOC	0.1991	1.9912	11.71	14.56	2.85	50.09	12:29
3	TOC	0.1822	1.8224	11.59	14.40	2.80	50.07	12:31
4	TOC	0.1924	1.9242	11.66	14.41	2.74	50.07	12:30

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	72	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/14 14:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	9.84	12.54	2.70	50.08	12:27
2	TOC	0.0000	0.0000	9.71	12.52	2.81	50.09	12:27

Dilution: 1:10
Blank Contribution: (TC) 10.2853 (IC) (v1235)
Method: Extended Reaction 021711 (v4)
Calibration: Extended Reaction 021711 (v27)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	58	TOC	MB4	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/14 14:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	9.33	12.22	2.89	50.08	12:28
2	TOC	0.0000	0.0000	9.38	12.14	2.76	50.07	12:24
3	TOC	0.0000	0.0000	9.67	12.33	2.66	50.08	12:29

Dilution: 1:10
Blank Contribution: (TC) 10.2853 (IC) (v1235)
Method: Extended Reaction 021711 (v4)
Calibration: Extended Reaction 021711 (v27)

Sample Type: Check Standard --> LCS ER
From Schedule Version 8

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS ER [25.0 ppm]	0 / infinity (NA / NA)	25.7114 ppm (PASS)	0.2529 ppm	0.98%	2019/03/14 15:44

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	25.4476	254.4764	193.63	196.48	2.85	50.08	12:25
C	TOC	25.0 ppm	2	25.7347	257.3466	195.69	198.43	2.74	50.09	12:28
C	TOC	25.0 ppm	3	25.9518	259.5180	197.25	200.16	2.91	50.08	12:26

Completion State: Success - Criteria met.
Success Action: Do Nothing
Method: Extended Reaction 021711 (v4)
Calibration: Extended Reaction 021711 (v27)
STD Conc - Pos C: 25 ppmC

Sample Type: Check Standard --> CCV 021711
From Schedule Version 8

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.4100 ppm	0.0000 ppm	0%	2019/03/14 16:32

							(PASS)				

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.4100	244.1002	186.19	188.81	2.62	50.09	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	50 ppmC

Sample Type: Check Standard --> CCB 021711 From Schedule Version 8

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/14 16:48

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	10.48	13.41	2.93	50.08	12:29

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v4)	Extended Reaction 021711 (v27)	0 ppmC

Meta Data Used in this Report

Blanks

Version	Reagent (Abs)	Acid (Abs)	DI IC (Abs)	DI TC (Abs)	DI TOC (Abs)	Save Time	Operator
v1234	1.5067	0.6760	0.0000	0.0000	0.0000	2019/03/11 18:53	Fusion1 (Fusion1)
v1235	1.1880	0.8760	0.0000	0.0000	0.0000	2019/03/12 13:10	Fusion1 (Fusion1)

Calibrations

Name: Extended Reaction 021711 (TOC)

Version:	v27	Calibration curve formula:	TOC: y = 7.170x + 11.164
Ver Creation:	2019/03/11 21:51	r^2 value:	TOC: r^2 = 0.99991
Comment:			
Operator:	Fusion1 (Fusion1)		
Basic Analysis Type	TOC		

Basic Analysis Type: TOC

Sample ID	Y Raw Value	X Expected	Message	End Time
0.0 ppm	10.4100	0.0000		2019/03/11 20:12
0.50 ppm	14.7740	0.5000		2019/03/11 20:28
1.00 ppm	18.0020	1.0000		2019/03/11 20:44
5.00 ppm	47.2310	5.0000		2019/03/11 21:01
10.0 ppm	85.1320	10.0000		2019/03/11 21:17
25.0 ppm	188.5200	25.0000		2019/03/11 21:33
50.0 ppm	370.1610	50.0000		2019/03/11 21:49

Methods

Name: Extended Reaction 021711 (TOC)

Version: v4 Operator: Fusion1 (Fusion1)
Ver Creation: 2019/01/31 11:21
Comment:

Parameter	Value
SampleVolume	10.0 mL
Dilution	1:10
AcidVolume	0.5 ml
ReagentVolume	2.0 ml
UVReactorPrerinse	Off
UVReactorPrerinseVolume	5.0
NumberOfUVReactorPrerinses	1
ICSpargeTime	1.00 mins
DetectorSweepFlow	500 ml/min
PreSpargeTime	4.00 mins
SystemFlow	500 ml/min

Advanced Parameter	Value
NeedleRinseVolume	5.0 ml
VialPrimeVolume	2.0 ml
ICSamplePrimeVolume	2.0 ml
ICSpargeRinseVolume	12.0 ml
BaselineStabilizeTime	0.70 min
DetectorPressureFlow	150 ml/min
SyringeSpeedWaste	10
SyringeSpeedAcid	7
SyringeSpeedReagent	7
SyringeSpeedDIWater	7
NDIRPressurization	60 psig
SyringeSpeedSampleDispense	5
SyringeSpeedSampleAspirate	4
SyringeSpeedUVDispense	5
SyringeSpeedUVAspirate	5
SyringeSpeedICDispense	5
SyringeSpeedICAspirate	5
NDIRPressureStabilize	1.75 min
SampleMixing	Off
SampleMixingCycles	1
SampleMixingVolume	10.0
LowLevelFilterNDIR	Off

Acceptance / Approval

Electronic Signatures

Report Version	User Name	Acceptance	Reason	Date

Report History

Report History

Report Version	User Name	System Reason	User Reason	Date
1	Fusion1 (Fusion1)	Schedule completed	Schedule completed	2019/03/14 17:09

StarLIMS Run: 628233, 628234, 628232, 628235

Analysis: TOC/DOC

Method: 9060, 415.1, SM 5310 C, 9060A

CCV: 11-GEN-05-76B 50 ppm LCS: 11-GEN-05-74L 25.0 ppm

ICAL Date: 3/6/19

ICAL ID: 11-GEN-05-76H

ICS ID: 11-GEN-05-74A

ICS TV: 25.0 ppm ICS % R = 2

Spike ID: 11-GEN-05-70O 0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-76F

21 % H3PO4: 11-GEN-05-76G

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, 129001F, N11314F, Marge

FILTER ID: NA

Analyzed By: BCD	Date Analyzed: 3/12/19
Reviewed By:	Date Reviewed: 03/15/19

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1905651; 1906112; 1906330; 1906332; 1906334

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2223 (233911)

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: Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 642099) was less than 1/2 the CRDL. The recovery for the LCS (642100) was within acceptable parameters.

MS/MSD Analysis: MS/MSD was performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 4.µg/L. The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.

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 5.1.1. The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level of 4.0µg/L. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported. Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

Thomas Bosch March 06, 2019
Analyst Date

ANALYTICAL REPORT

Report Date: March 07, 2019

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1906334**
Project ID: HS19030014
Purchase Order: HS19030014
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18-24-SP650_022819_BIX	1906334001	02/28/19	03/02/19	

ANALYTICAL REPORT

Workorder: 34-1906334
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18-24-SP650_022819_BIX** | Sampling Site: NA | Collected: 02/28/2019
Lab ID: 1906334001 | Media: 125 mL Nalgene | Received: 03/02/2019
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/2223 (HBN: 233911) | **Percent Solid:** NA
Analyzed: 03/05/2019 13:02 | **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: 233911)

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 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 03/06/2019 09:17	/S/ Stephen Brose 03/07/2019 11:04

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: 34-1906334
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	PJLA (DoD ELAP)	L17-506	http://www.pjlabs.com
	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com
	Utah (TNI)	UT00953	http://lams.nelac-institute.org/search
	Nevada (TNI)	UT00953201-1	https://ndep.nv.gov/water/lab-certification
	Iowa (TNI)	IA# 376	http://www.shl.uiowa.edu/labcert/idnr/
	Kansas	E-10416	http://www.kdheks.gov/envlab/disclaimer.html
	Oklahoma (TNI)	IJ# 9980	http://www.deq.state.ok.us/CSDnew/labcert.htm
	Texas (TNI)	T104704456-18-9	https://www.tceq.texas.gov/assets/public/compliance/compliance_support/qa/txnelap_lab_list.pdf
Industrial Hygiene	AIHA (ISO 17025 & AIHA IHLAP)	101574	http://www.aihaaccreditedlabs.org
	DOECAP-AP	L18-606	http://www.pjlabs.com
	Washington	C596	https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Laboratory-Accreditation
Dietary Supplements	PJLA (ISO 17025)	L17-507-R1	http://www.pjlabs.com

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.
< Means 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: 1906334

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 642099
Analyzed: 03/05/2019 09:26
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 642100
Analyzed: 03/05/2019 09:00
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.11	4.00	103	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample:	1906112001	**MS:**	1906112002	**MSD:**	1906112003
Analyzed:	03/05/2019 09:54	**Analyzed:**	03/05/2019 10:07	**Analyzed:**	03/05/2019 10:20
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	4	▲ 65.7	78.8	123.8	53.7	▲ 61.2	0.337	0.0	20.0

Continuing Calibration Verification

CCV:	642096	**CCV:**	642101	**CCV:**	642102
Analyzed:	03/05/2019 08:44	**Analyzed:**	03/05/2019 12:18	**Analyzed:**	03/05/2019 14:07
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	25.0	25.0	100	25.0	25.0	100	24.5	25.0	97.8

Interference Check Sample

ICSA: 642098
Analyzed: 03/05/2019 09:13
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	3.93	4.00	98.2

Comments

Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly.

Quality Control Sample
Batch Report

Analysis Information

Workorder: **1906334**

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2223 (HBN: 233911)
		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
03/06/2019 13:45	03/07/2019 11:04

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

00934869

18698/#2

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

W 1906334

Subcontract Chain of Custody

COC ID: 10856

1906334

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:	HS19030014
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19030014-02**	**LH18/24-SP650_022819_BIX**	**Water**	**28 Feb 2019 14:00**
	SUB_Perch-6850			15 Mar 2019

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:	3/1/19 1800.
Received By:		Date/Time:	3/2/19 903
Cooler ID(s):	9703	Temperature(s):	3

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS19030014	Split:	Workorder ID: 1906334	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	02/28/2019 14:00	LH18-24-SP650_022819_BIX	1906334001		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	03/02/2019 09:03	ALS Sample Receiving	Sample Login
Julie Warath 3/4/19 1400		13B	storage
R.33.1	03.04.19/16:10	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

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00934871

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ARS Thornton — Project/Task/Site: 1906334

Date/Time of Receipt: 3/2/17 903 — 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	C19 9203	3 °C	4	C19	°C	7	C19	°C
2	C19	°C	5	C19	°C	8	C19	°C
3	C19	°C	6	C19	°C	9	C19	°C

Taken By: [signature] (Signature) — Meredith Edwards (Printed Name) — 3/2/17 (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 ☐

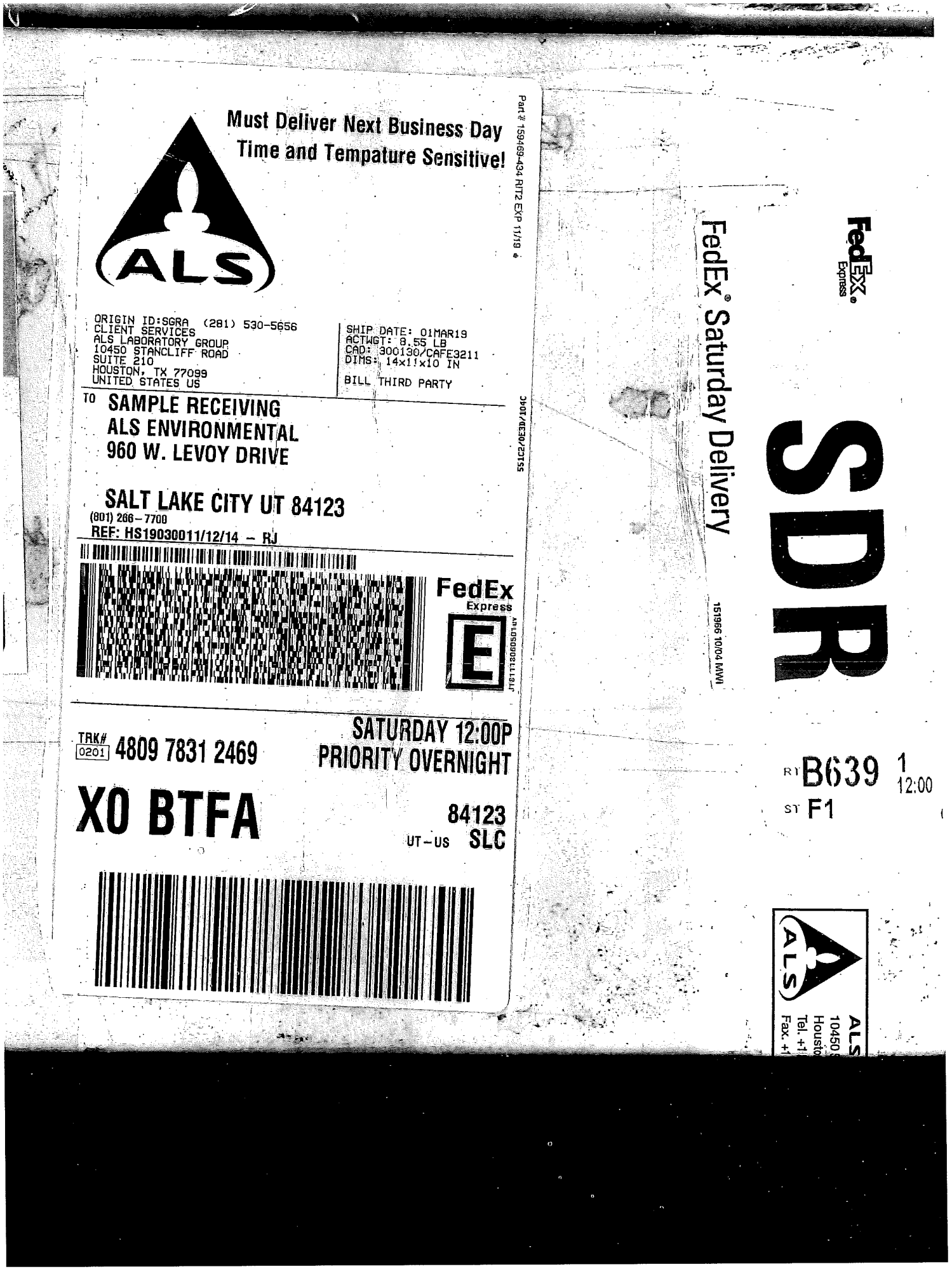
Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

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

00934872



Must Deliver Next Business Day
Time and Tempature Sensitive!

Part # 159469-434 RIT2 EXP 11/19

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

SHIP DATE: 01MAR19
ACTWGT: 8.55 LB
CAD: 300130/CAFE3211
DIMS: 14x11x10 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS19030011/12/14 - RJ

JD01/4E30/23155

FedEx Express

TRK# 0201 4809 7831 2469

SATURDAY 12:00P
PRIORITY OVERNIGHT

XO BTFA

84123
UT-US SLC

FedEx Express

FedEx® Saturday Delivery

SDR

151966 10/04 MWI

RT B639 1
ST F1 12:00

ALS
10450
Houston
Tel. +1
Fax. +1

Batch Worklist

Batch: ELMS/ 2223 **Created:** 3/5/2019 08:21 **Instrument:** **HBN:** 233911

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

Workorder: 1905651 [ENV_LVL4]
Workorder: 1906112 [ENV_LVL4]
Workorder: 1906330 [ENV_LVL4]
Workorder: 1906332 [ENV_LVL4]
Workorder: 1906334 [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	642096	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
2	642097	RLVS for HBN 233911 [ELMS/2223				RLVS	3		E685041C3Q	5311		3/7/2019	
3	642098	ICS for HBN 233911 [ELMS/2223]				ICS	3		E6850..D3Q	5311		3/7/2019	
4	642099	LMB for HBN 233911 [ELMS/2223]				LMB	3		E6850Q413Q	5311		3/7/2019	
5	642100	LCS for HBN 233911 [ELMS/2223]				LCS	3		E6850Q413Q	5311		3/7/2019	
6	1905651001	HS19021158-02/LH18/24-SP650_02				SAMPLE	3	1905651001-A	E6850Q41.3	5480	3/21/2019	3/7/2019	
7	1906112001	EW01_022619				SAMPLE	3	1906112001-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
8	1906112002	EW01_022619MS				MS	3	1906112002-A	E6850Q413Q	5480		3/7/2019	
9	1906112003	EW01_022619MSD				MSD	3	1906112003-A	E6850Q413Q	5480		3/7/2019	
10	1906112004	EW05_022619				SAMPLE	3	1906112004-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
11	1906112005	EW05_022619_FD				FLDDUP	3	1906112005-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
12	1906112006	EW02_022619				SAMPLE	3	1906112006-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
13	1906112007	EW06_022619				SAMPLE	3	1906112007-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
14	1906112008	EW03_022619				SAMPLE	3	1906112008-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
15	1906112009	EW07_022619				SAMPLE	3	1906112009-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
16	642101	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	
17	1906112010	EW04_022619				SAMPLE	3	1906112010-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
18	1906112011	EW08_022619				SAMPLE	3	1906112011-A	E6850Q41.3	5480	3/26/2019	3/13/2019	
19	1906330001	LH18/24-SP140_022819				SAMPLE	3	1906330001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
20	1906332001	LH18/24-SP650_022819_BIX				SAMPLE	3	1906332001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
21	1906334001	LH18-24-SP650_022819_BIX				SAMPLE	3	1906334001-A	E6850Q41.3	5480	3/28/2019	3/14/2019	
22	642102	CCV for HBN 233911 [ELMS/2223]				CCV	3		E685041C3Q	5311		3/7/2019	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1905651 (001); 1906112 (001-11); 1906330 (001); 1906332 (001); 1906334 (001) ELMS Batch/HBN ID: 2223 (233911)
Prep Date: 03/04/2019 Analysis Date: 03/05/2019 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2019\MAR\05MAR19D.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 AH015-4)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot AH015-4)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 43730. Dilutions of Working Standard Solution ID 43702 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 02/15/2019, sequence 15FEB19D.s Offline Quantitation Method: CLO4-DP1.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-AQN.M Fragmentor: 160 Output Gain: 3 Injection Volume: 30µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.65
5.8	0.65
5.9	0.25
10.3	0.25
10.5	0.65
12.0	0.65

QC DATA: 4.0µL of QC Solution Horizon ID 41830 was used for LCS 642100; Target = 4.0µg/L. ASTM type II water was used for LMB 642099.

MS/MSD: The Matrix Spike and duplicate (MS/MSD) were performed on samples 1906112002/03 (Client ID's: EW01_022619). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. Spike target = 4.0µg/L.

COMMENTS:

1) Results reported in µg/L. Field samples 1906112004/05 were re-analyzed and reported from 1:10 dilutions. Field sample 1906330001 was analyzed and reported from a 1:100 dilution. The reporting limits have been adjusted accordingly. Sample 1906112007 failed the 50-150% method requirement for ISTD recovery. This sample was re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike and duplicate (MS/MSD) failed QC acceptance criteria for percent recoveries. The MS/MSD is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2019\MAR\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2019\23911-DoD-ALS-Hstn LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#
5) The Reporting Limit Verification Standard (RLVS – 642097) is reported from the analysis of the Laboratory Control Sample (LCS – 642100) at a level 4.0µg/L.
6) Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 15FEBI04) along with datafiles 05MARD07-10.

5.5 Chromatography (GC, HPLC and LC/MS) Technical Review

Note: It is the peer reviewer's responsibility to ensure that appropriate criteria are used as defined in the HORIZON PROFILE. The evaluation criteria are prioritized as per Section 2.2 of this SOP. These items must be checked for all projects. The following checklist will be completed by both the analyst and the peer reviewer and scanned into the HBN folder with the raw data.

Chromatography (GC, HPLC, LC/MS) Technical Review Criteria Batch(es)/SDG: ELMS: 2223 HBN: 233911 Sample Set IDs if Applicable: 1905651/1906912/1906330 1906332/1906334	Analyst Initials	Reviewer Initials
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
For method 8081A, Endrin/DDT Breakdown is checked for compliance	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR#	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — Description - 6850 WKG Std 100.ug/L

Standard: 43702
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 WRK

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
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020
MFG Lot: 218065075		Usable: No
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: 43701
MFG: ALS/SLC
MFG Lot: TNB: 09/18/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/18/2018 02:09PM

Amount: 10 mL
Expires: 09/18/2019
Usable: Yes
Lab Lot: CLO4 INT

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
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020

STANDARD REPORT

Working Standard - CLO4 QC WRK

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

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

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
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

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

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

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: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

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: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

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: 43730	**Created By:** Thomas Bosch	**Amount:** 25 mL
MFG: ALS/SLC	**Create Date:** 09/20/2018 09:09AM	**Expires:** 09/20/2019
MFG Lot: TNB: 05/09/2018	**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
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date:	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

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

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

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

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

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

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

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CERTIFICATE OF ANALYSIS

S 43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 218065075
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Date Certified: Jun 25, 2018
Expiration: Jul 25, 2020
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO 17034 Scope of Accreditation: Yes

Signal Word: None

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

The gravimetric uncertainty for this product is ±0.24%.
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.

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 (1804, 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 Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
*	642096 CCV@25	Vial 71	1	Control	1	2.57589e6	8.017	25.04585
*	642100 QC@4.0	Vial 72	1	Control	2	4.23307e5	8.139	4.10749
*	642098 ICS@4.0	Vial 73	1	Control	3	3.17619e5	7.883	3.92708
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	7.71127e6	7.438	51.25151
*	1906112002 MS	Vial 77	1	Sample	7	8.02696e6	7.464	53.87972
*	1906112003 MSD	Vial 78	1	Sample	8	7.94242e6	7.442	53.69940
*	1906112004	Vial 79	1	Sample	9	2.33017e7	7.227	172.36522
*	1906112005	Vial 80	1	Sample	10	2.30991e7	7.229	180.38568
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	2.33611e6	8.114	25.01987
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	2.53126e6	7.736	226.48155
*	1906112005 10X	Vial 91	1	Sample	22	2.68237e6	7.739	241.03710
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	3.77363e6	8.090	3708.65666
*	642102 CCV@25	Vial 71	1	Control	25	2.15787e6	8.144	24.45533

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	642096 CCV@25	Vial 71	1	Control	1	6.79028e5	8.036	25.15984
*	642100 QC@4.0	Vial 72	1	Control	2	1.27412e5	8.156	4.45187
*	642098 ICS@4.0	Vial 73	1	Control	3	9.68721e4	7.906	4.29888
*	642099 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1905651001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1906112001	Vial 76	1	Sample	6	2.02786e6	7.452	51.10329
*	1906112002 MS	Vial 77	1	Sample	7	2.14637e6	7.478	54.46797
*	1906112003 MSD	Vial 78	1	Sample	8	2.10991e6	7.456	53.98100
*	1906112004	Vial 79	1	Sample	9	6.79668e6	7.243	180.45962
*	1906112005	Vial 80	1	Sample	10	6.82834e6	7.246	190.34382
*	1906112006	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1906112007	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1906112008	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1906112009	Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1906112010	Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	1906112011	Vial 86	1	Sample	16	0.00000	0.000	0.00000
*	642101 CCV@25	Vial 71	1	Control	17	6.28961e5	8.128	25.63410
*	1906332001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1906334001	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1906112004 10X	Vial 90	1	Sample	21	6.46870e5	7.754	220.91905
*	1906112005 10X	Vial 91	1	Sample	22	6.95643e5	7.756	238.44674
*	1906112007 RE	Vial 82	1	Sample	23	0.00000	0.000	0.00000
*	1906330001 100	Vial 92	1	Sample	24	1.01021e6	8.102	3771.67475
*	642102 CCV@25	Vial 71	1	Control	25	5.83711e5	8.160	25.16652

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
*	642096 CCV@25	Vial 71	1	Control	1	3.12207e5	8.043	5.00000
*	642100 QC@4.0	Vial 72	1	Control	2	3.41038e5	8.157	5.00000
*	642098 ICS@4.0	Vial 73	1	Control	3	2.68237e5	7.902	5.00000
*	642099 LMB	Vial 74	1	Control	4	3.53313e5	8.102	5.00000
*	1905651001	Vial 75	1	Sample	5	3.26356e5	7.780	5.00000
*	1906112001	Vial 76	1	Sample	6	4.26473e5	7.464	5.00000
*	1906112002 MS	Vial 77	1	Sample	7	4.19549e5	7.491	5.00000
*	1906112003 MSD	Vial 78	1	Sample	8	4.16709e5	7.467	5.00000
*	1906112004	Vial 79	1	Sample	9	2.95705e5	7.253	5.00000
*	1906112005	Vial 80	1	Sample	10	2.75946e5	7.263	5.00000
*	1906112006	Vial 81	1	Sample	11	3.73575e5	7.480	5.00000
*	1906112007	Vial 82	1	Sample	12	5.00533e5	7.256	5.00000
*	1906112008	Vial 83	1	Sample	13	4.65121e5	7.237	5.00000
*	1906112009	Vial 84	1	Sample	14	2.43675e5	7.672	5.00000
*	1906112010	Vial 85	1	Sample	15	2.51865e5	7.710	5.00000
*	1906112011	Vial 86	1	Sample	16	2.80792e5	7.876	5.00000
*	642101 CCV@25	Vial 71	1	Control	17	2.83460e5	8.140	5.00000
*	1906332001	Vial 88	1	Sample	19	2.64674e5	7.827	5.00000
*	1906334001	Vial 89	1	Sample	20	2.65662e5	7.808	5.00000
*	1906112004 10X	Vial 90	1	Sample	21	3.41608e5	7.756	50.00000
*	1906112005 10X	Vial 91	1	Sample	22	3.38724e5	7.764	50.00000
*	1906112007 RE	Vial 82	1	Sample	23	4.31135e5	7.332	5.00000
*	1906330001 100	Vial 92	1	Sample	24	2.98985e5	8.111	500.00000
*	642102 CCV@25	Vial 71	1	Control	25	2.68305e5	8.165	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

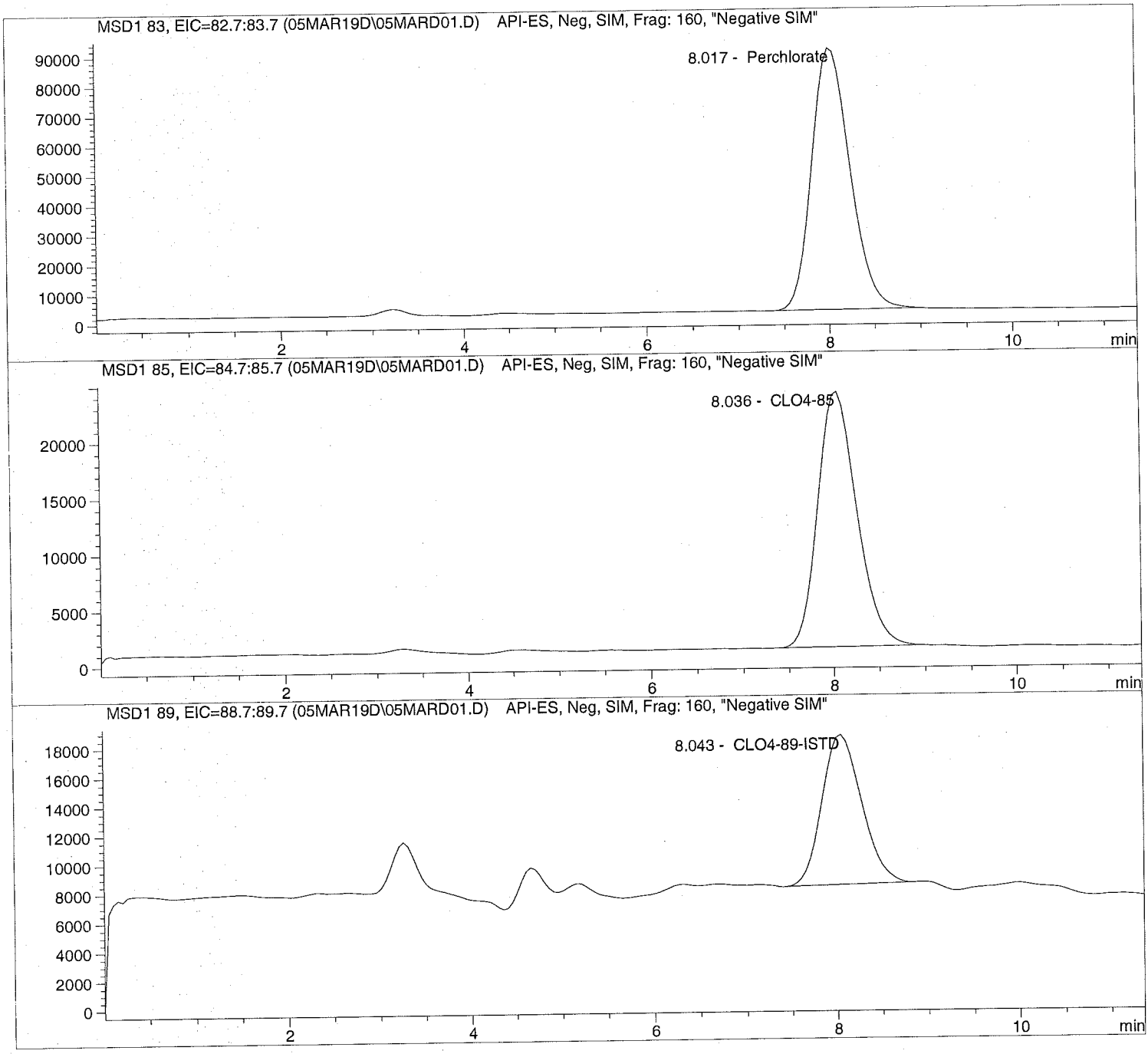
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	642096	CCV@25	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	642100	QC@4.0	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	642098	ICS@4.0	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	642099	LMB	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	1905651001		CLO4-AQN	1	Sample		
6	Vial 76	1906112001		CLO4-AQN	1	Sample		
7	Vial 77	1906112002	MS	CLO4-AQN	1	Sample		
8	Vial 78	1906112003	MSD	CLO4-AQN	1	Sample		
9	Vial 79	1906112004		CLO4-AQN	1	Sample		
10	Vial 80	1906112005		CLO4-AQN	1	Sample		
11	Vial 81	1906112006		CLO4-AQN	1	Sample		
12	Vial 82	1906112007		CLO4-AQN	1	Sample		
13	Vial 83	1906112008		CLO4-AQN	1	Sample		
14	Vial 84	1906112009		CLO4-AQN	1	Sample		
15	Vial 85	1906112010		CLO4-AQN	1	Sample		
16	Vial 86	1906112011		CLO4-AQN	1	Sample		
17	Vial 71	642101	CCV@25	CLO4-AQN	1	Ctrl Samp		
18	Vial 87	1906330001	1K	CLO4-AQN	1	Sample		
19	Vial 88	1906332001		CLO4-AQN	1	Sample		
20	Vial 89	1906334001		CLO4-AQN	1	Sample		
21	Vial 90	1906112004	10X	CLO4-AQN	1	Sample		
22	Vial 91	1906112005	10X	CLO4-AQN	1	Sample		
23	Vial 82	1906112007	RE	CLO4-AQN	1	Sample		
24	Vial 92	1906330001	100	CLO4-AQN	1	Sample		
25	Vial 71	642102	CCV@25	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD01.D Sample Name: 642096 CCV@25

Injection Date:	3/05/2019 08:44:45	Seq Line:	1
Sample Name:	642096 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.017	PBA	2575886.3	25.0459	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.036	PBA	679028.4	25.1598	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.043	PBA	312206.9	5.0000	CLO4-89-ISTD

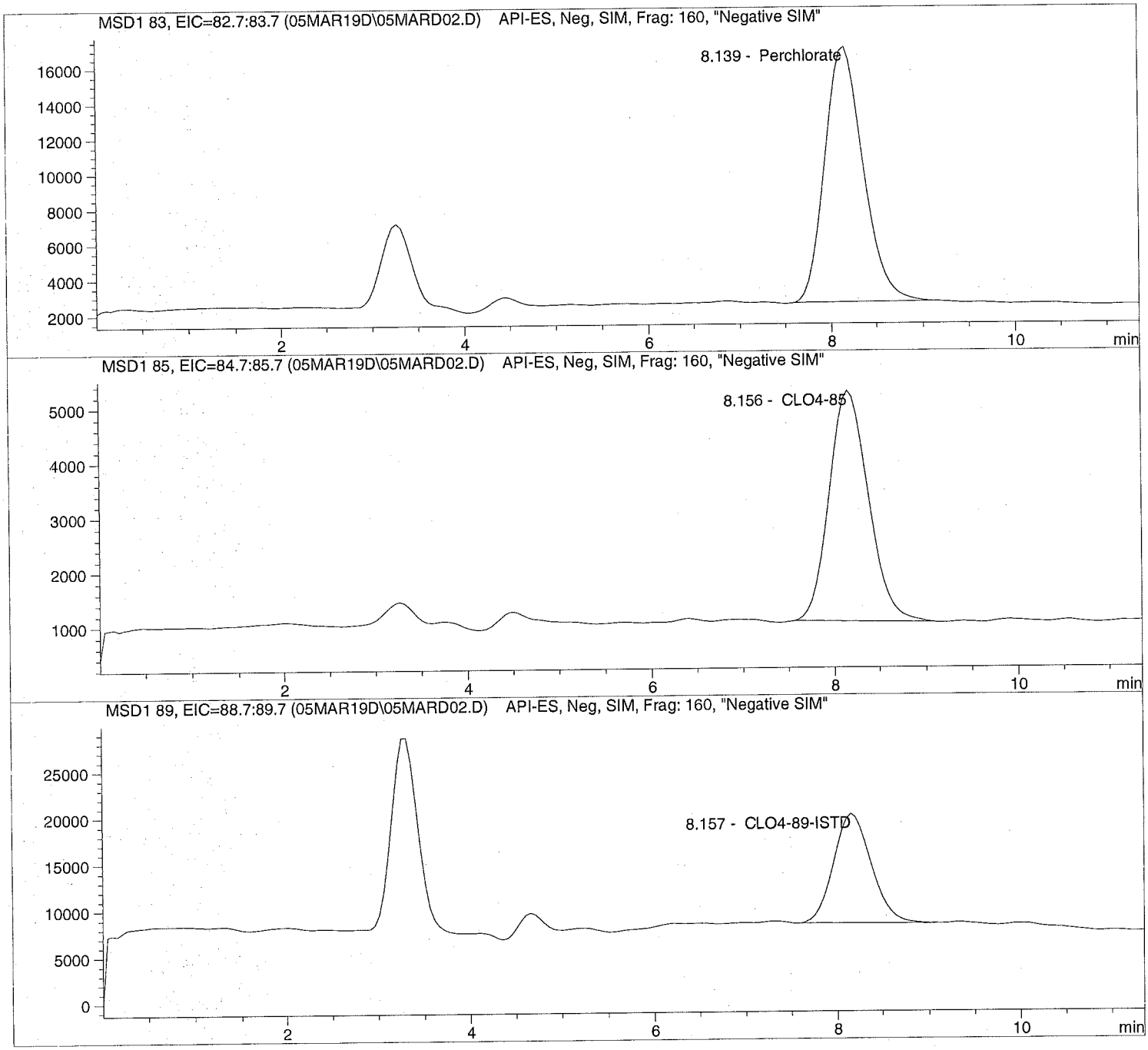
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD02.D Sample Name: 642100 QC@4.0

Injection Date:	3/05/2019 09:00:30	Seq Line:	2
Sample Name:	642100 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD02.D Sample Name: 642100 QC@4.0

Injection Date:	3/05/2019 09:00:30	Seq Line:	2
Sample Name:	642100 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.139	PBA	423307.1	4.1075	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.156	PBA	127412.0	4.4519	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.157	PBA	341038.3	5.0000	CLO4-89-ISTD

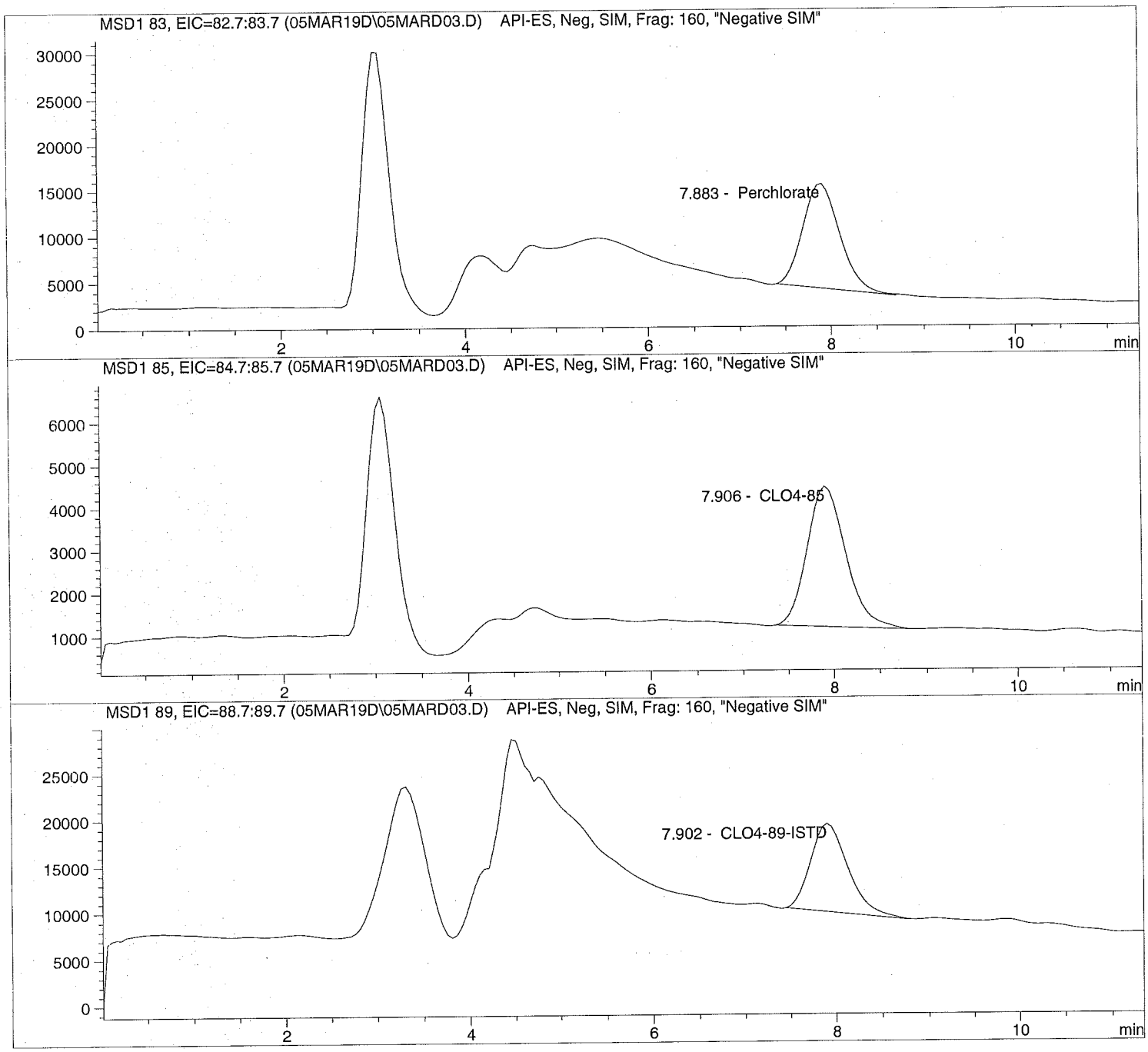
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD03.D Sample Name: 642098 ICS@4.0

Injection Date:	3/05/2019 09:13:34	Seq Line:	3
Sample Name:	642098 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	4.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.883	PBA	317618.9	3.9271	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.906	PBA	96872.1	4.2989	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.902	PBA	268236.7	5.0000	CLO4-89-ISTD

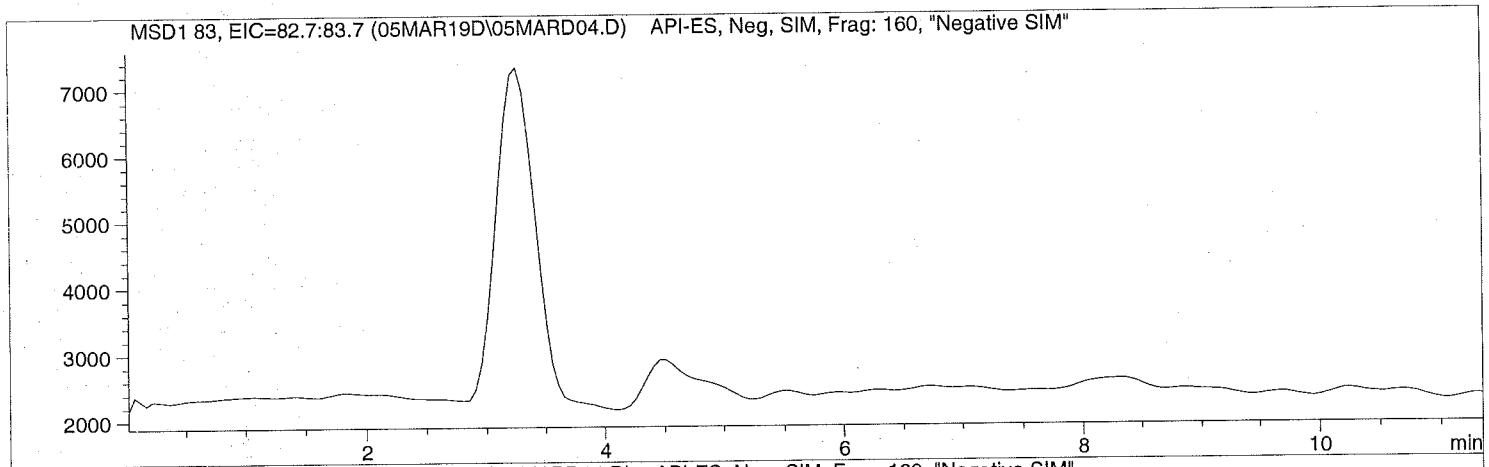
*** End of Report ***

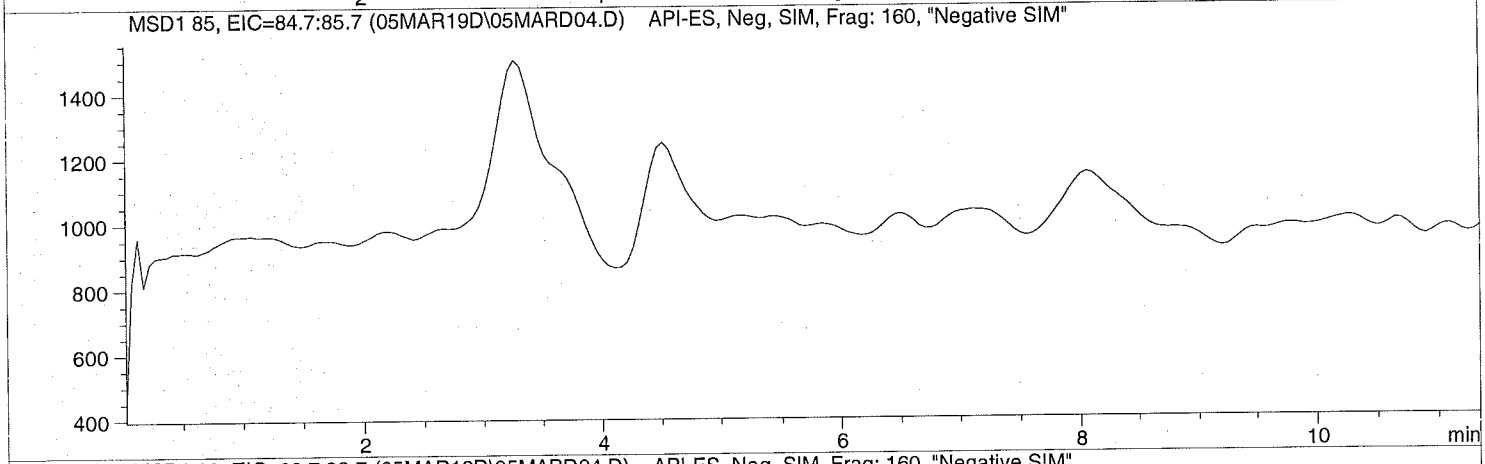
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

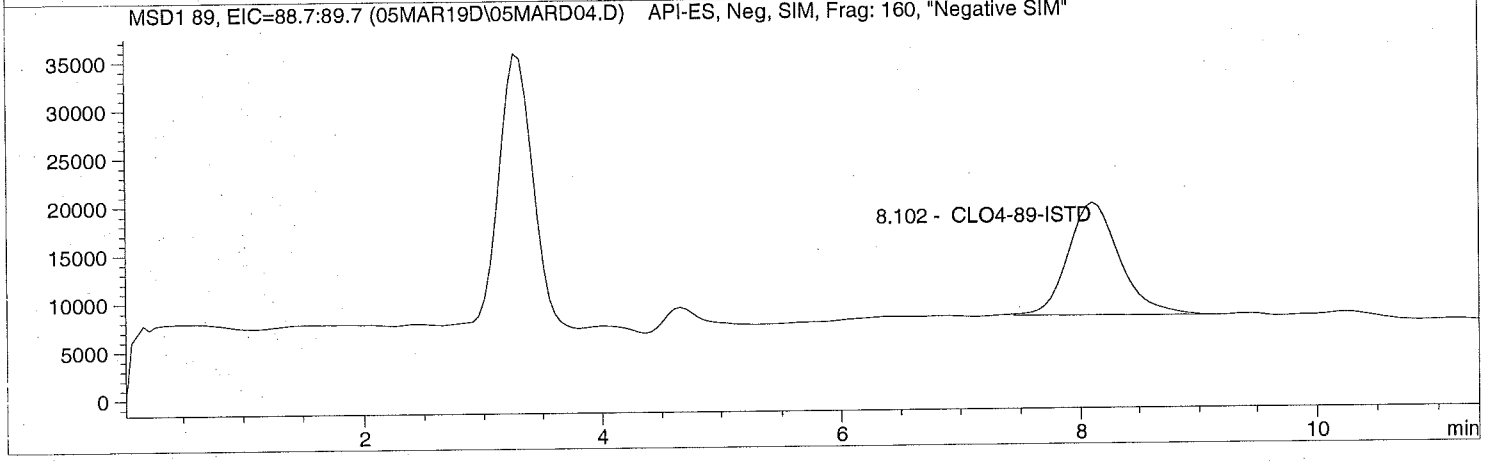
Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD04.D Sample Name: 642099 LMB

Injection Date:	3/05/2019 09:26:40	Seq Line:	4
Sample Name:	642099 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.102	BBA	353313.1	5.0000	CLO4-89-ISTD

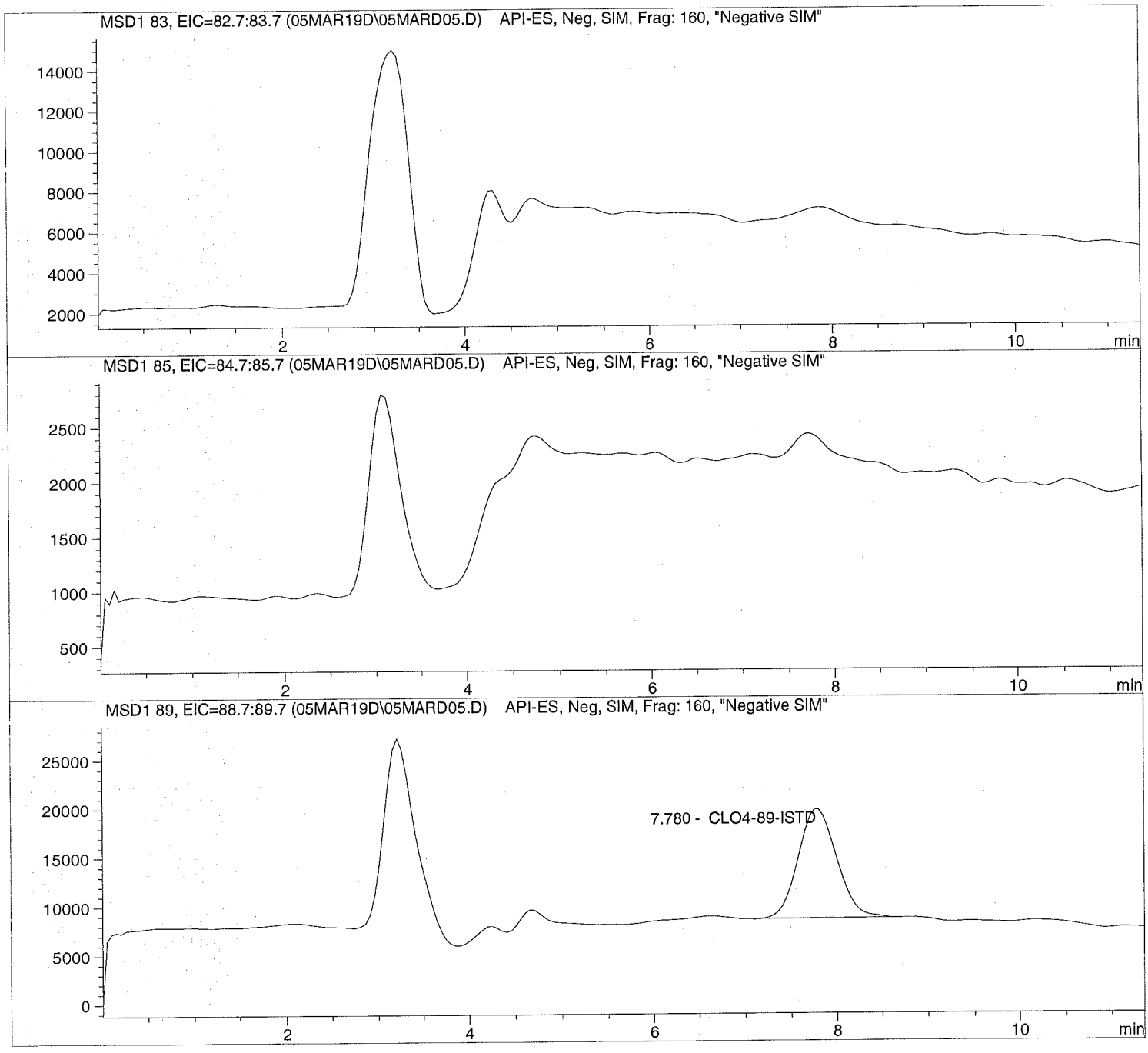
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD05.D Sample Name: 1905651001

Injection Date:	3/05/2019 09:40:58	Seq Line:	5
Sample Name:	1905651001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.780	PBA	326356.2	5.0000	CLO4-89-ISTD

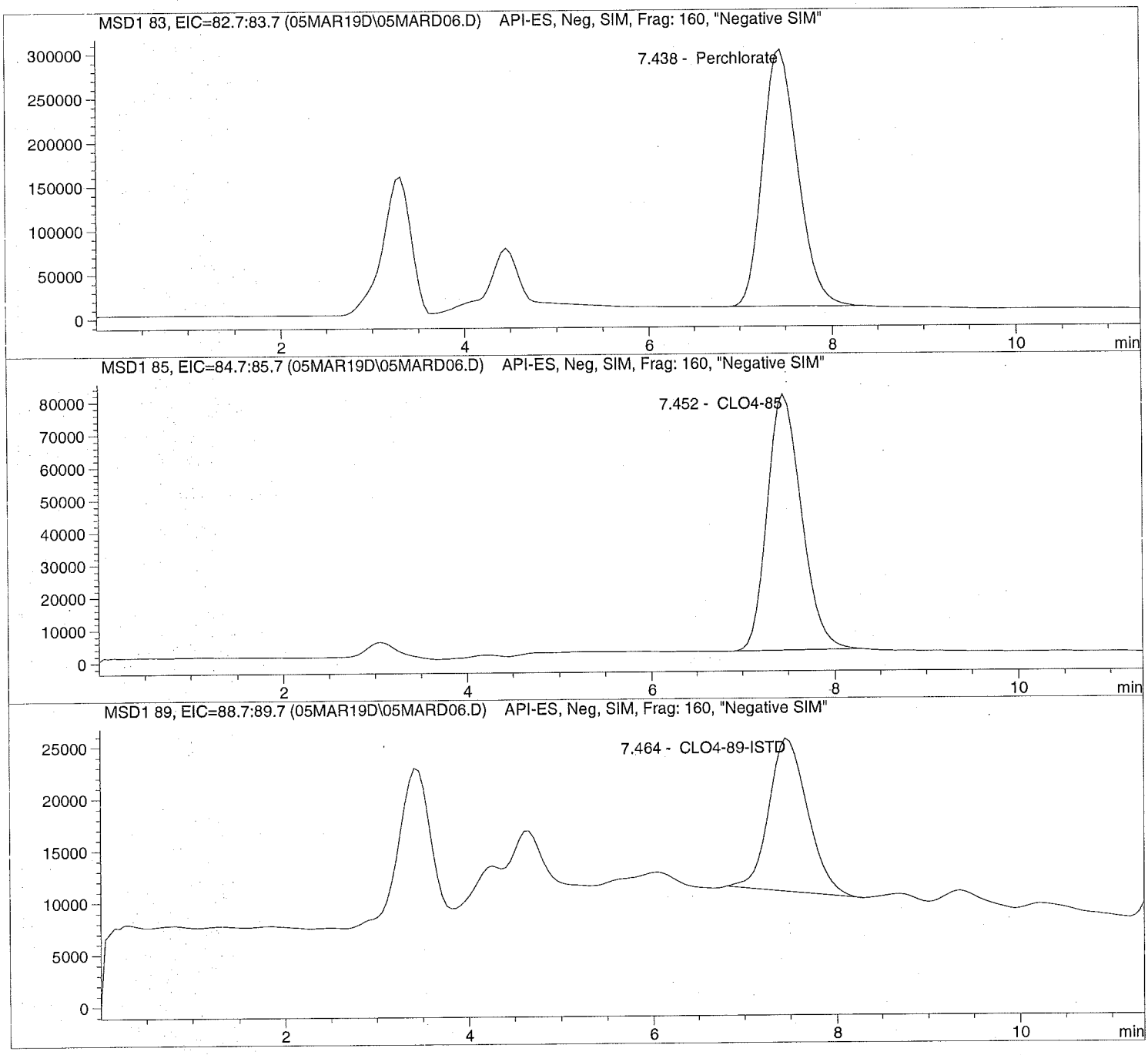
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD06.D Sample Name: 1906112001

Injection Date:	3/05/2019 09:54:04	Seq Line:	6
Sample Name:	1906112001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.438	PBA	7711270.5	51.2515	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.452	PBA	2027855.1	51.1033	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.464	PB	426473.5	5.0000	CLO4-89-ISTD

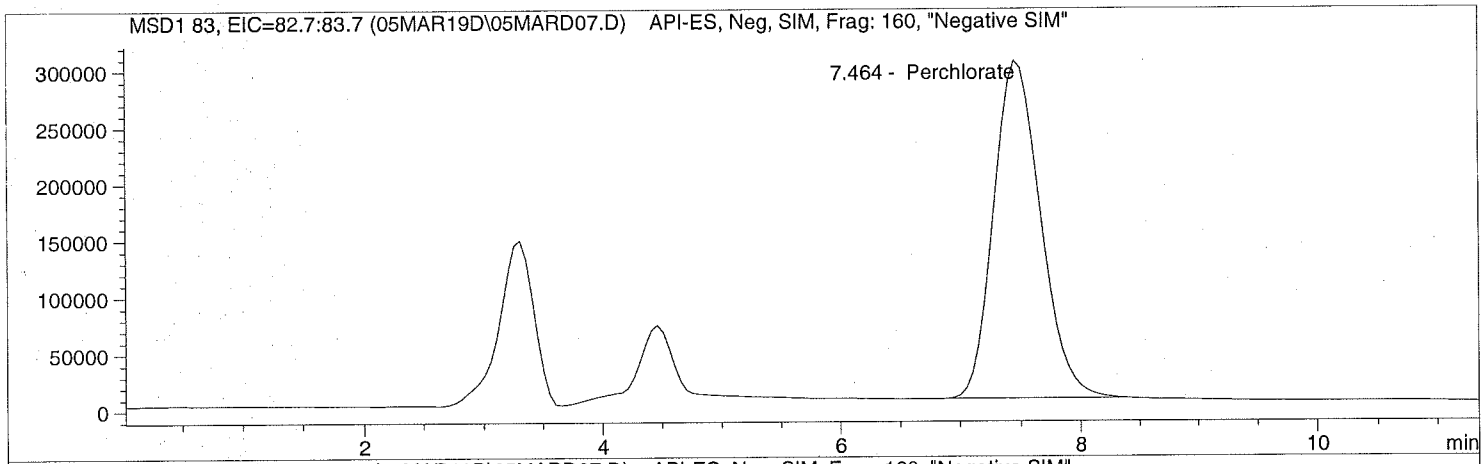
*** End of Report ***

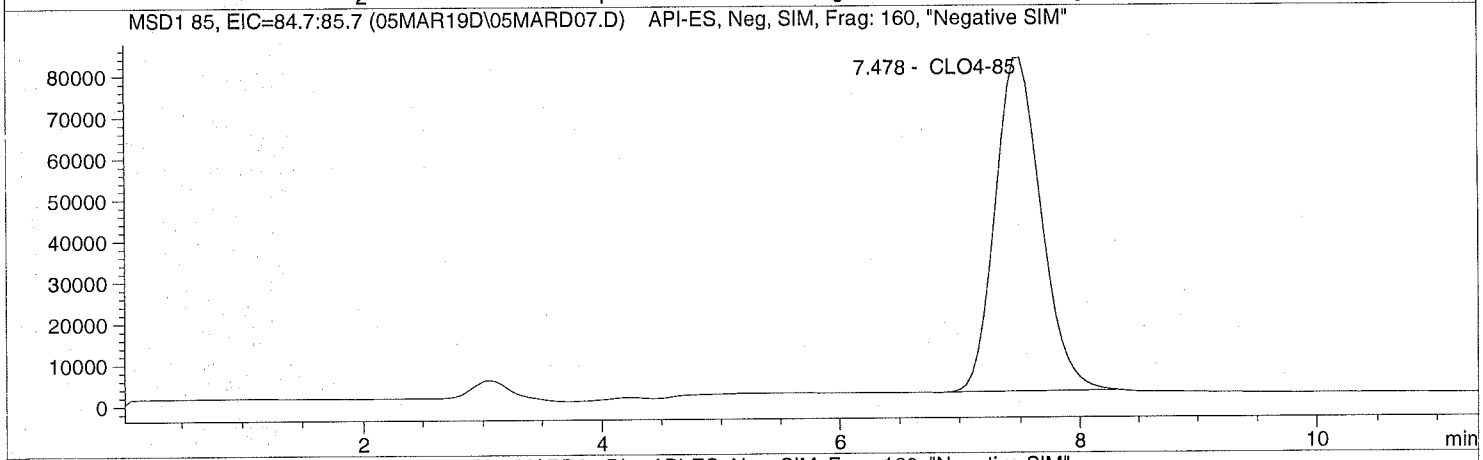
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

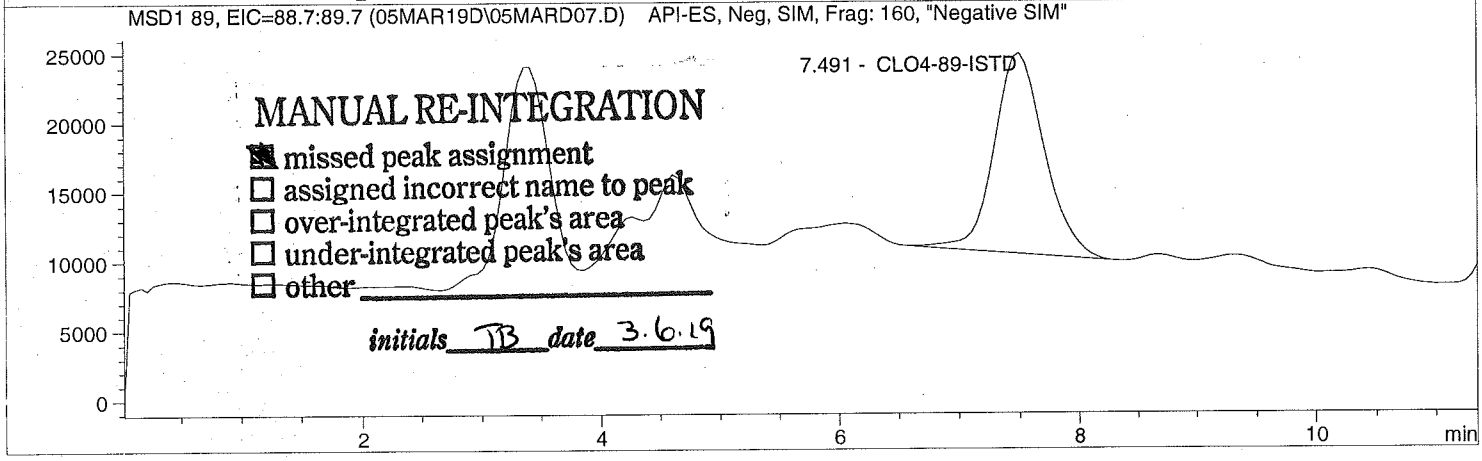
Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	53.8797	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	54.4680	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.491	MM	419549.0	5.0000	CLO4-89-ISTD

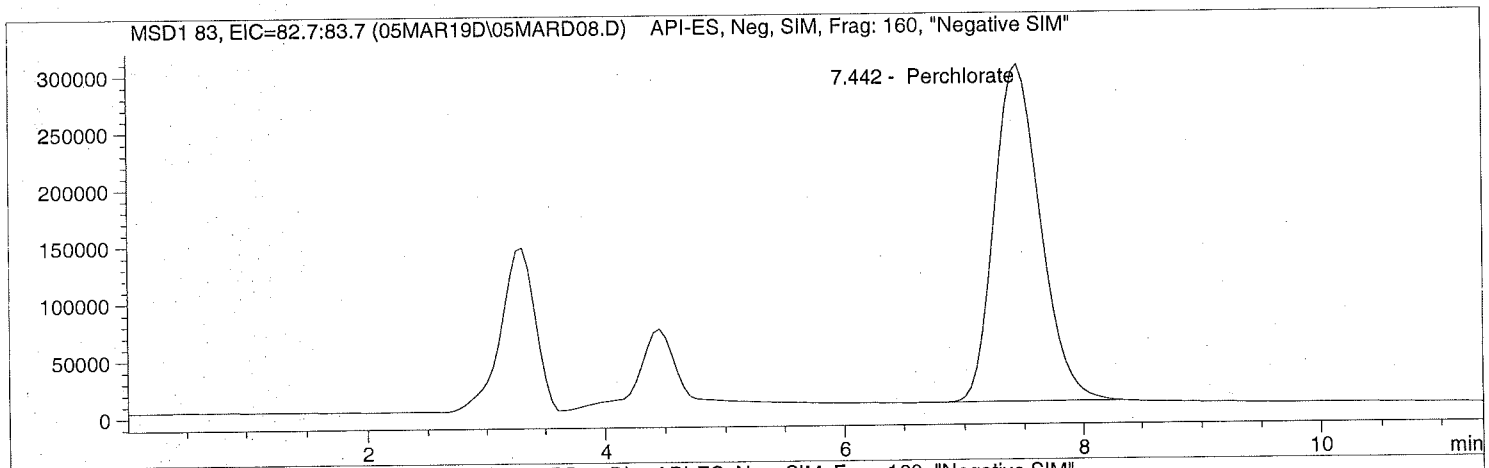
*** End of Report ***

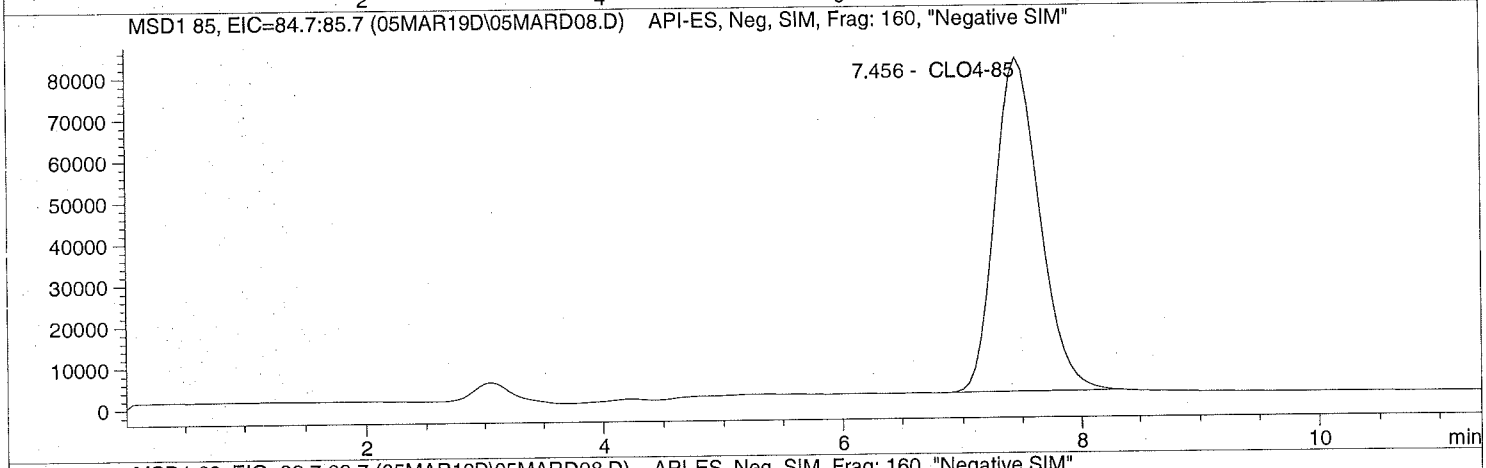
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

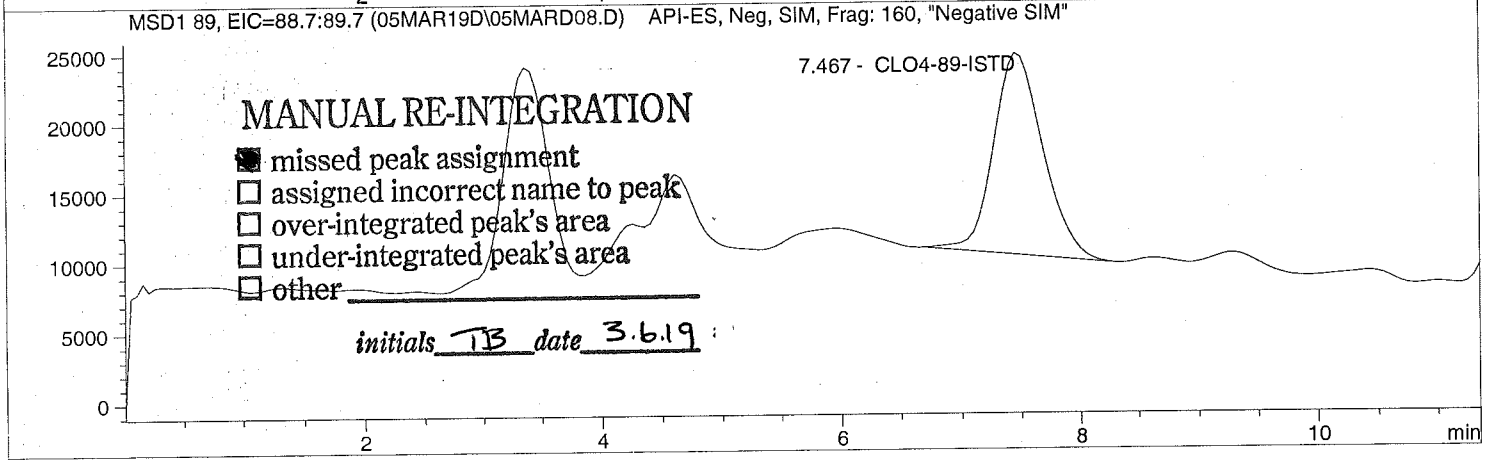
Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







MANUAL RE-INTEGRATION

- ■ missed peak assignment
- ☐ assigned incorrect name to peak
- ☐ over-integrated peak's area
- ☐ under-integrated peak's area
- ☐ other _____

initials TB *date* 3.6.19

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	53.6994	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	53.9810	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.467	MM	416709.1	5.0000	CLO4-89-ISTD

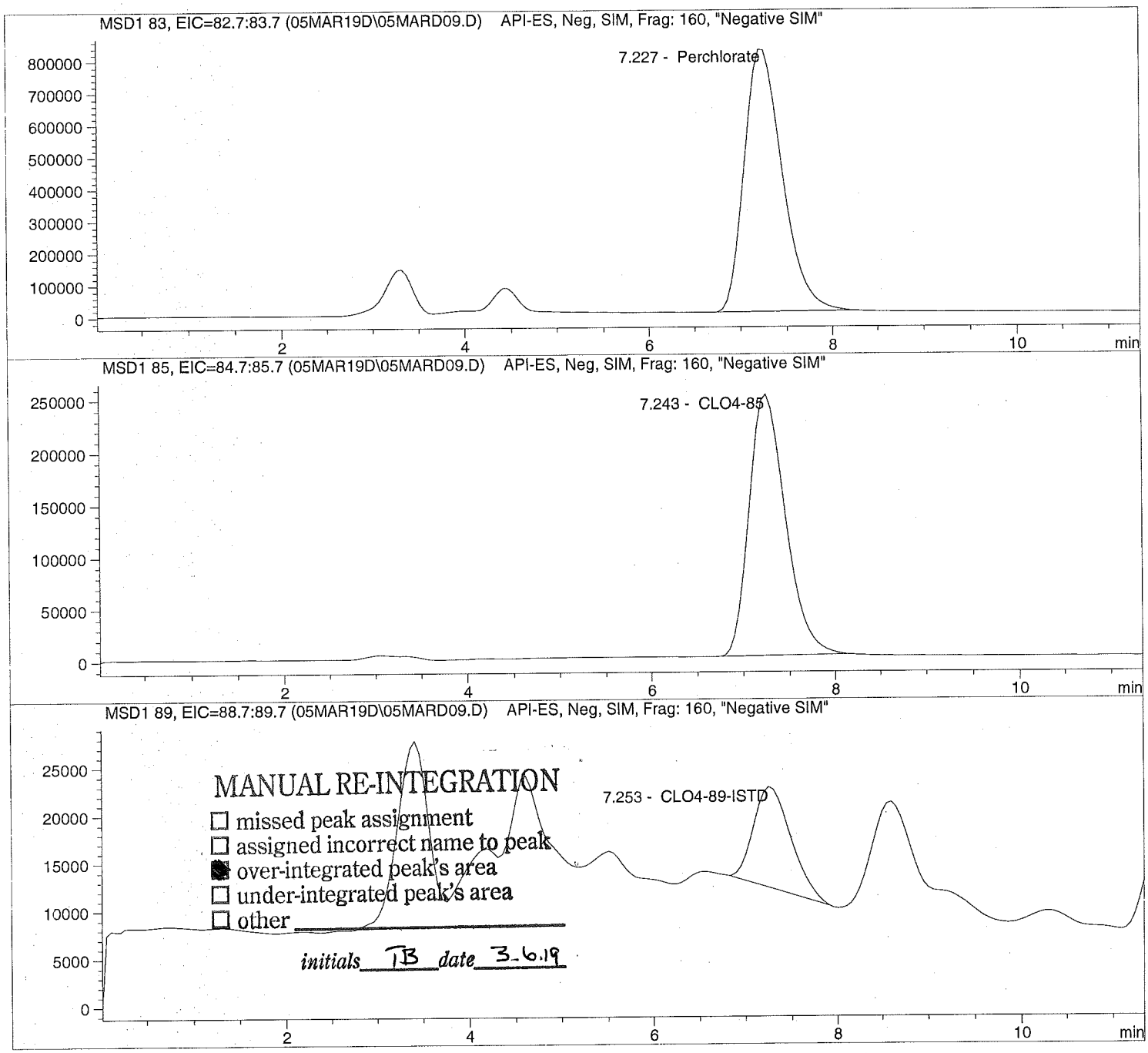
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	172.3652	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	180.4596	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.253	MM	295705.2	5.0000	CLO4-89-ISTD

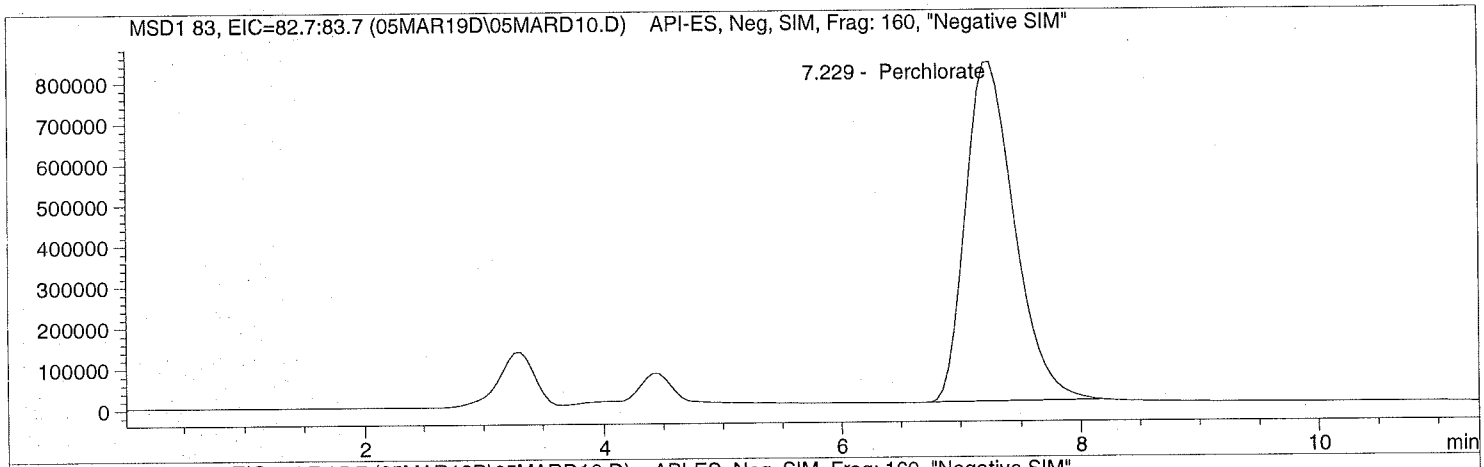
*** End of Report ***

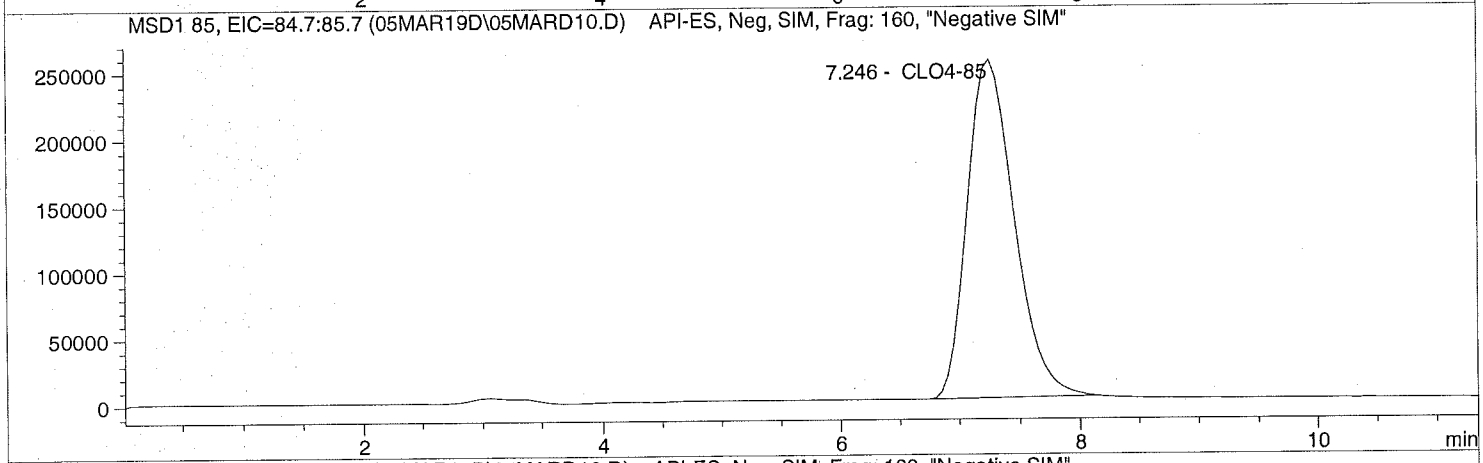
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

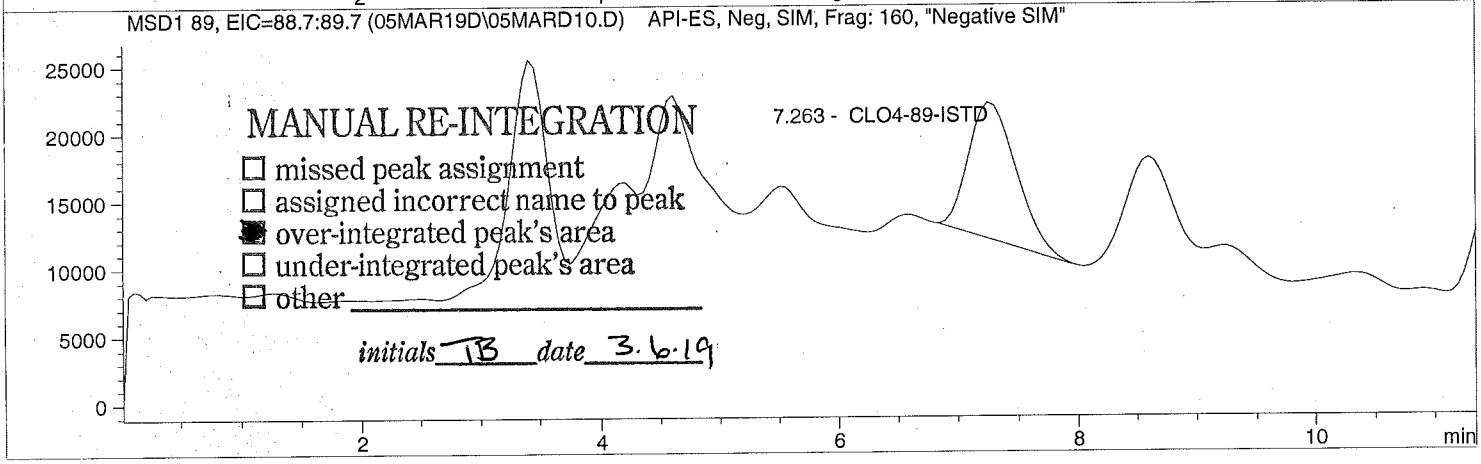
Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







MANUAL RE-INTEGRATION

- ☐ missed peak assignment
- ☐ assigned incorrect name to peak
- ■ over-integrated peak's area
- ☐ under-integrated peak's area
- ☐ other _____

initials TB *date* 3.6.19

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	180.3857	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	190.3438	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	MM	275946.4	5.0000	CLO4-89-ISTD

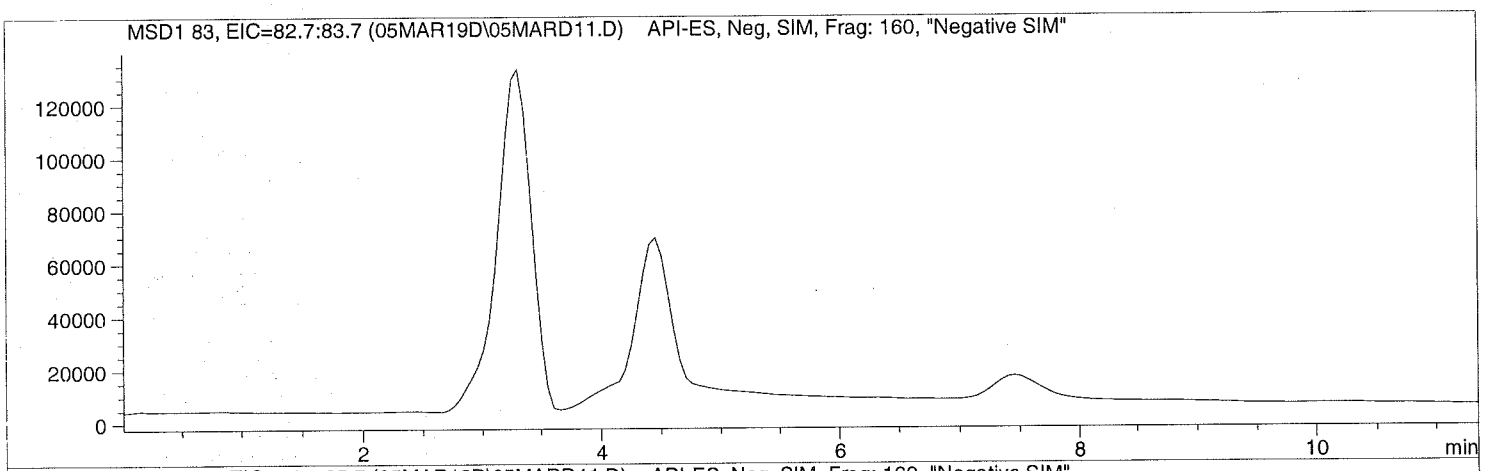
*** End of Report ***

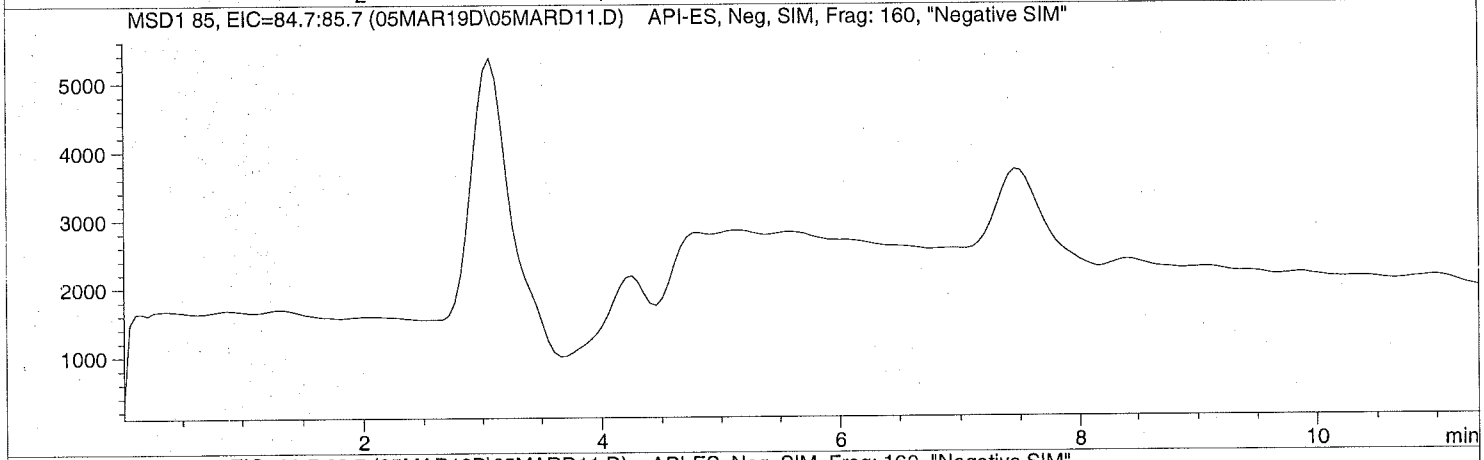
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

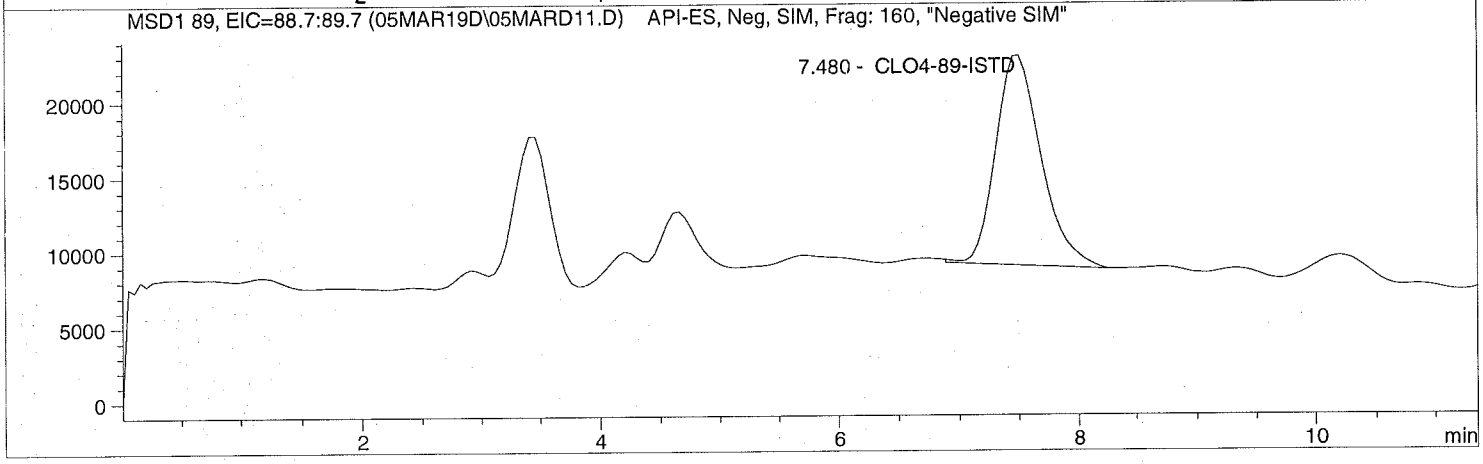
Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD11.D Sample Name: 1906112006

Injection Date:	3/05/2019 10:59:36	Seq Line:	11
Sample Name:	1906112006	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.480	BBA	373575.4	5.0000	CLO4-89-ISTD

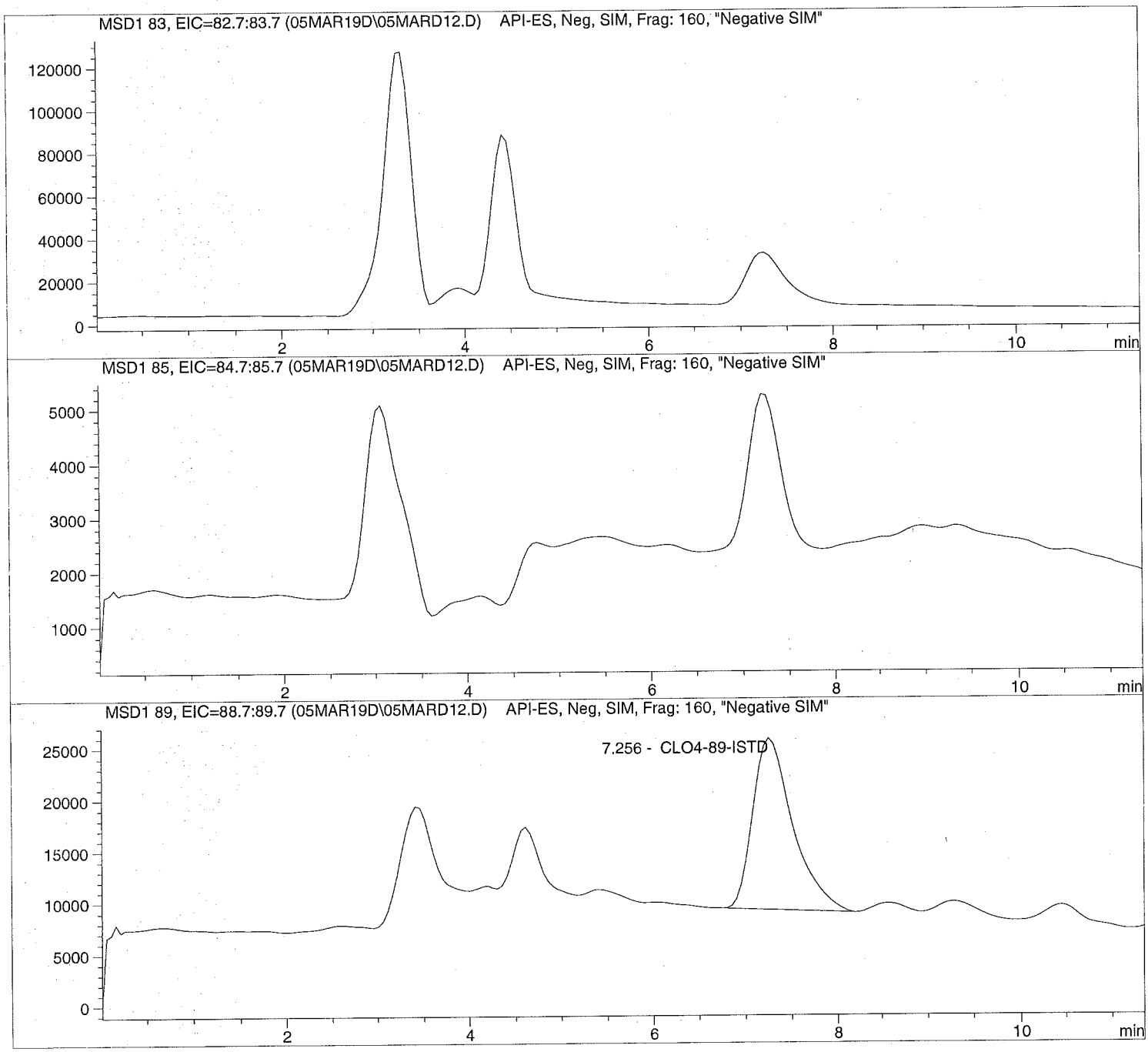
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD12.D Sample Name: 1906112007

Injection Date:	3/05/2019 11:12:28	Seq Line:	12
Sample Name:	1906112007	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.256	PB	500532.9	5.0000	CLO4-89-ISTD

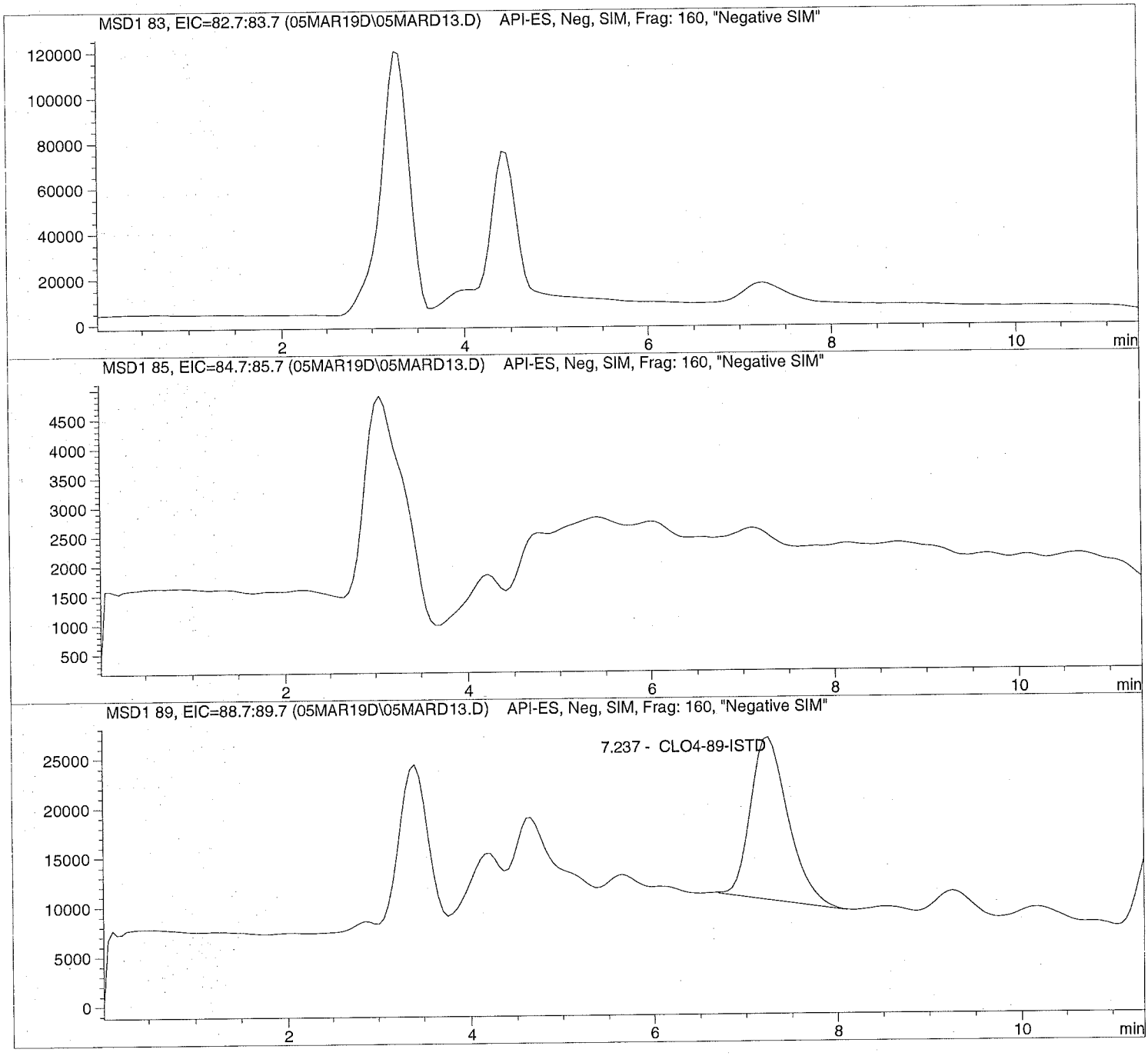
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD13.D Sample Name: 1906112008

Injection Date:	3/05/2019 11:26:23	Seq Line:	13
Sample Name:	1906112008	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.237	BBA	465121.2	5.0000	CLO4-89-ISTD

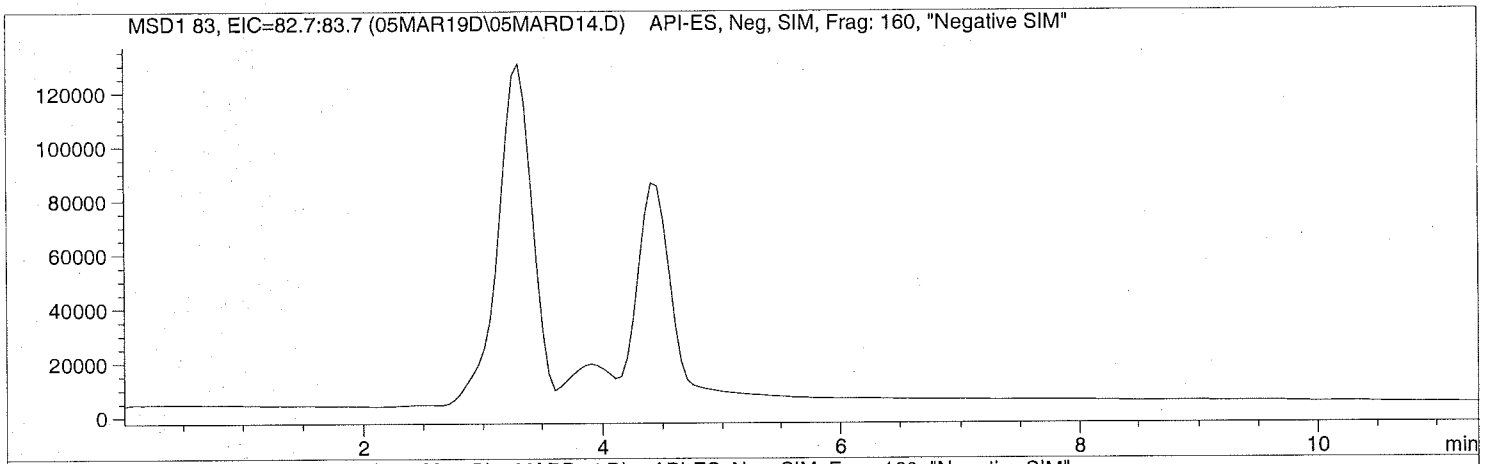
*** End of Report ***

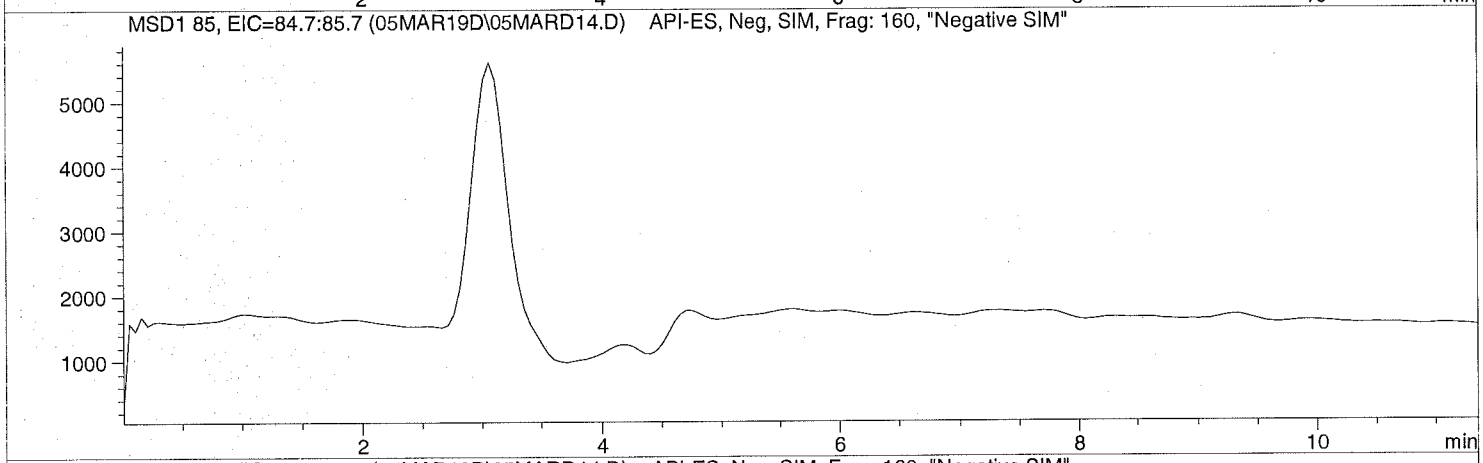
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

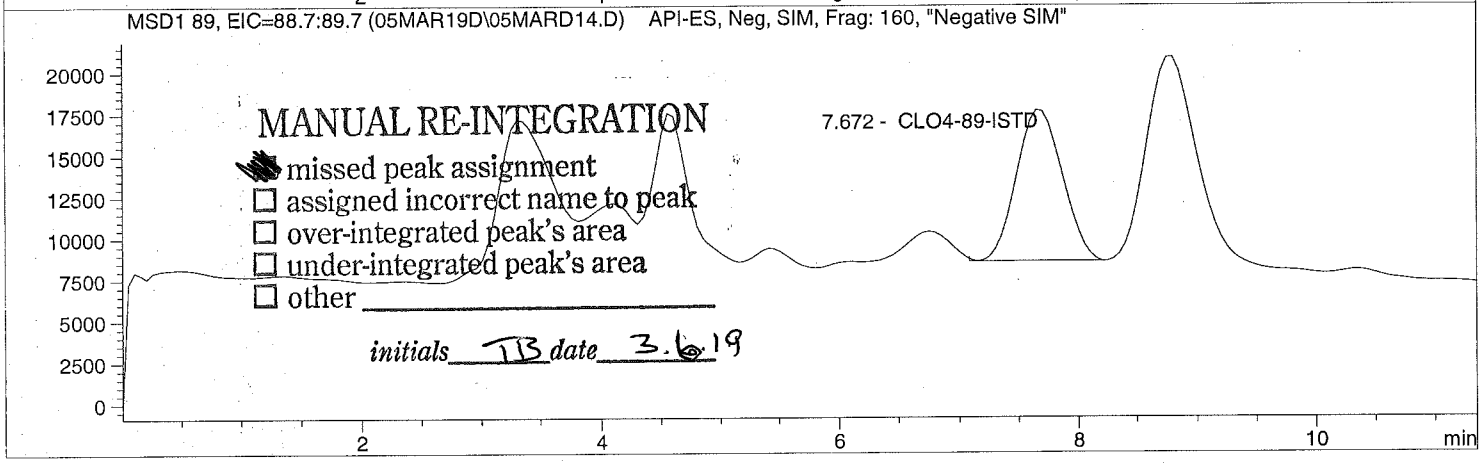
Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	5.0000	CLO4-89-ISTD

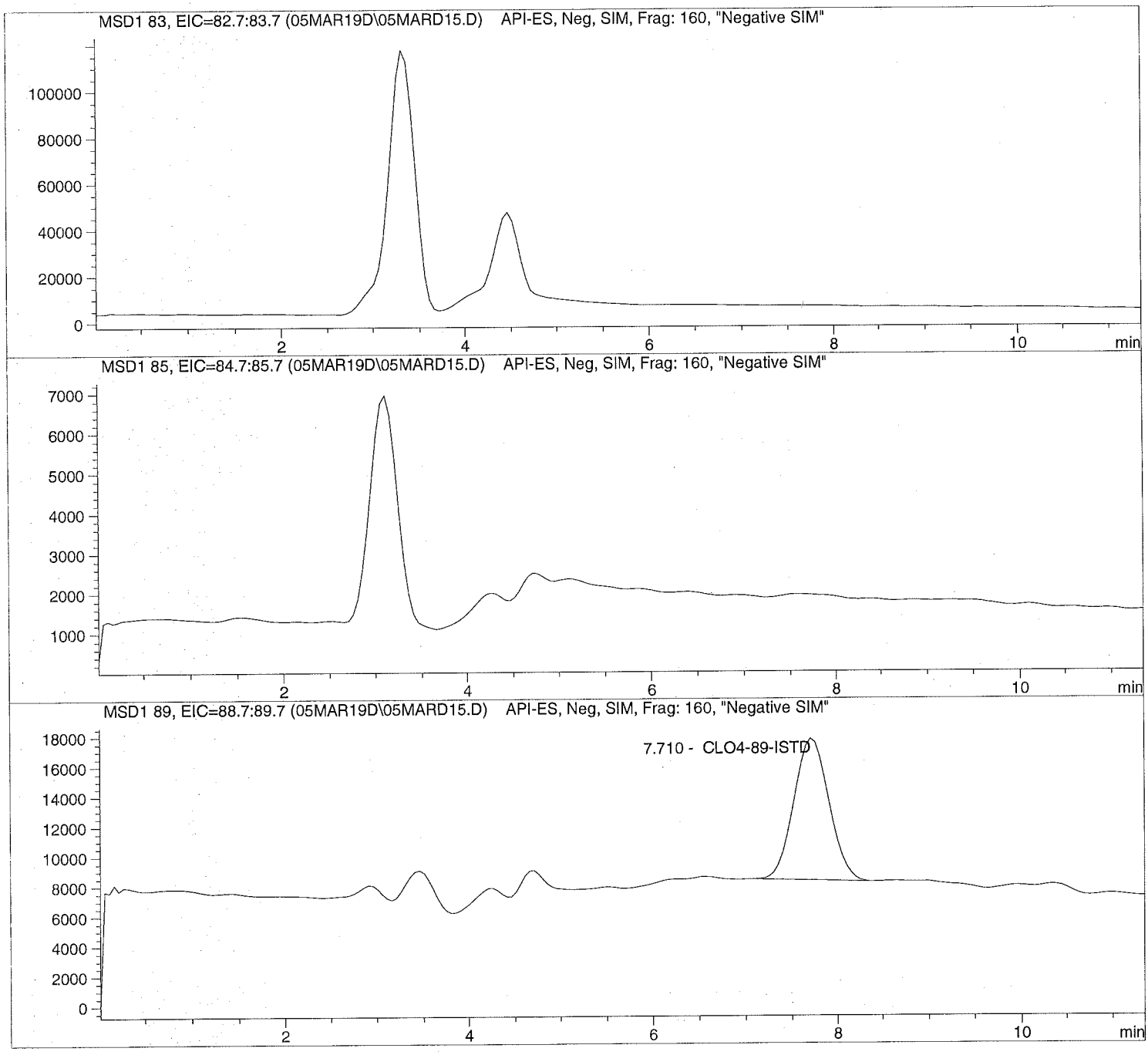
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD15.D Sample Name: 1906112010

Injection Date:	3/05/2019 11:52:27	Seq Line:	15
Sample Name:	1906112010	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.710	BBA	251865.4	5.0000	CLO4-89-ISTD

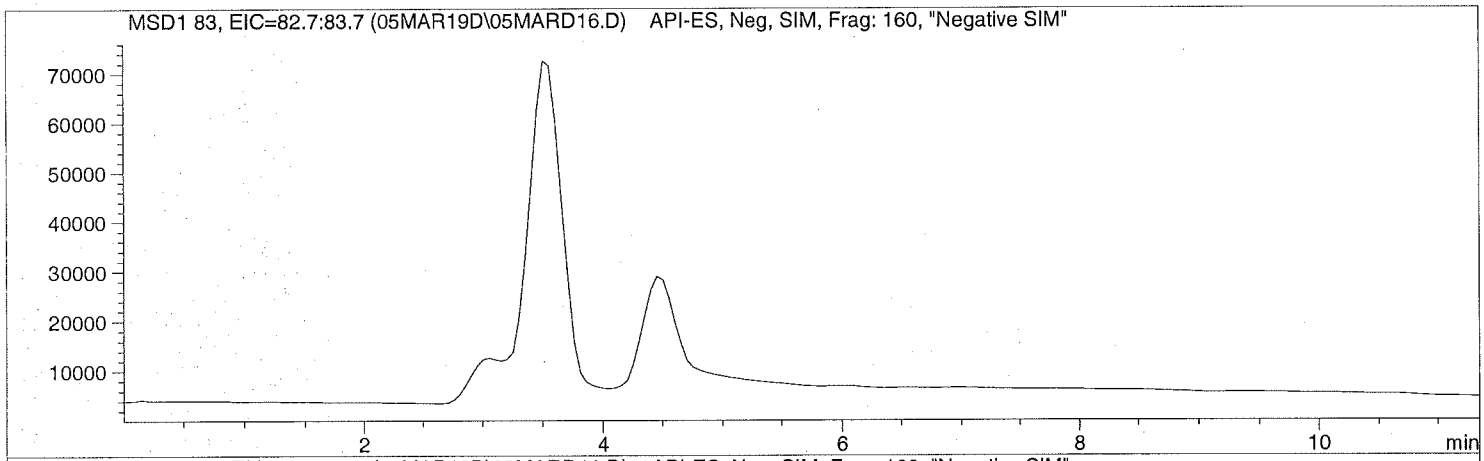
*** End of Report ***

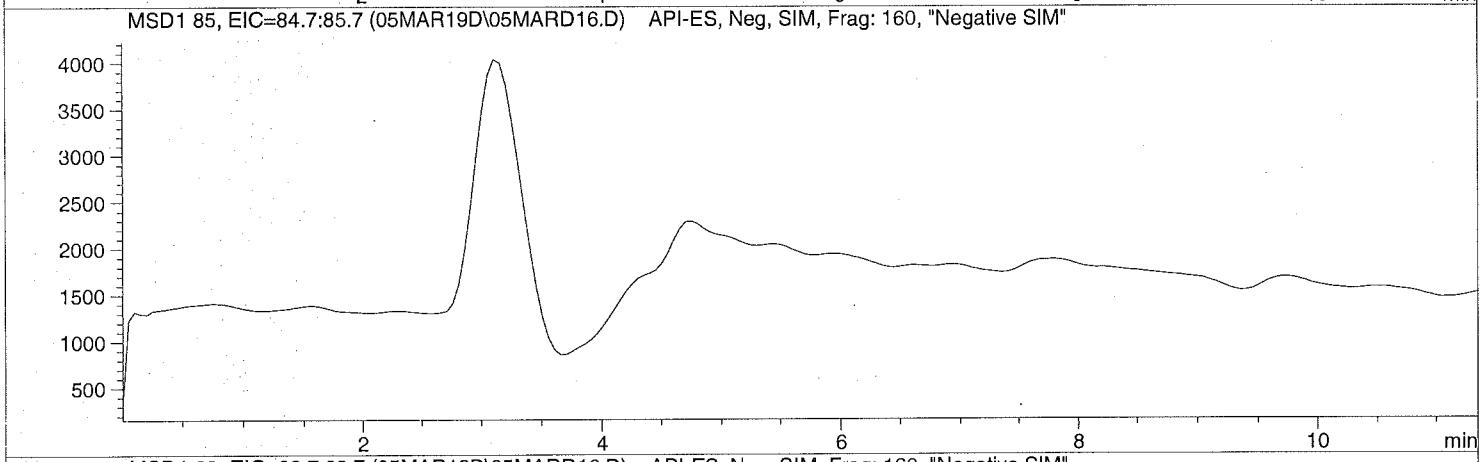
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

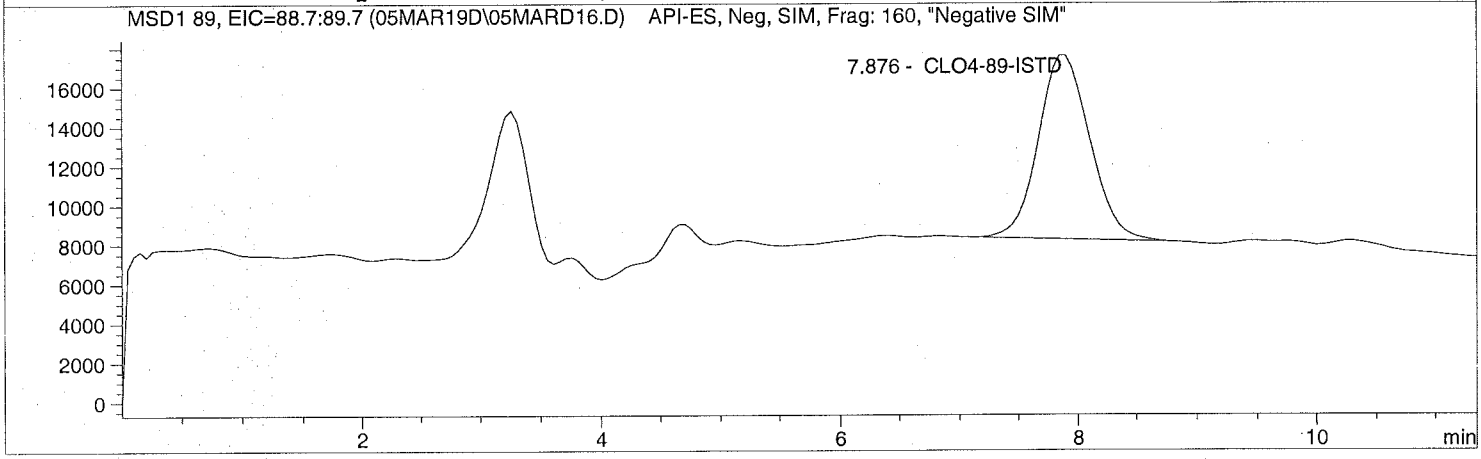
Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD16.D Sample Name: 1906112011

Injection Date:	3/05/2019 12:05:39	Seq Line:	16
Sample Name:	1906112011	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Tue, 19. Feb. 2019,09:07:33 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
7.876	BBA	280792.2	5.0000	CLO4-89-ISTD

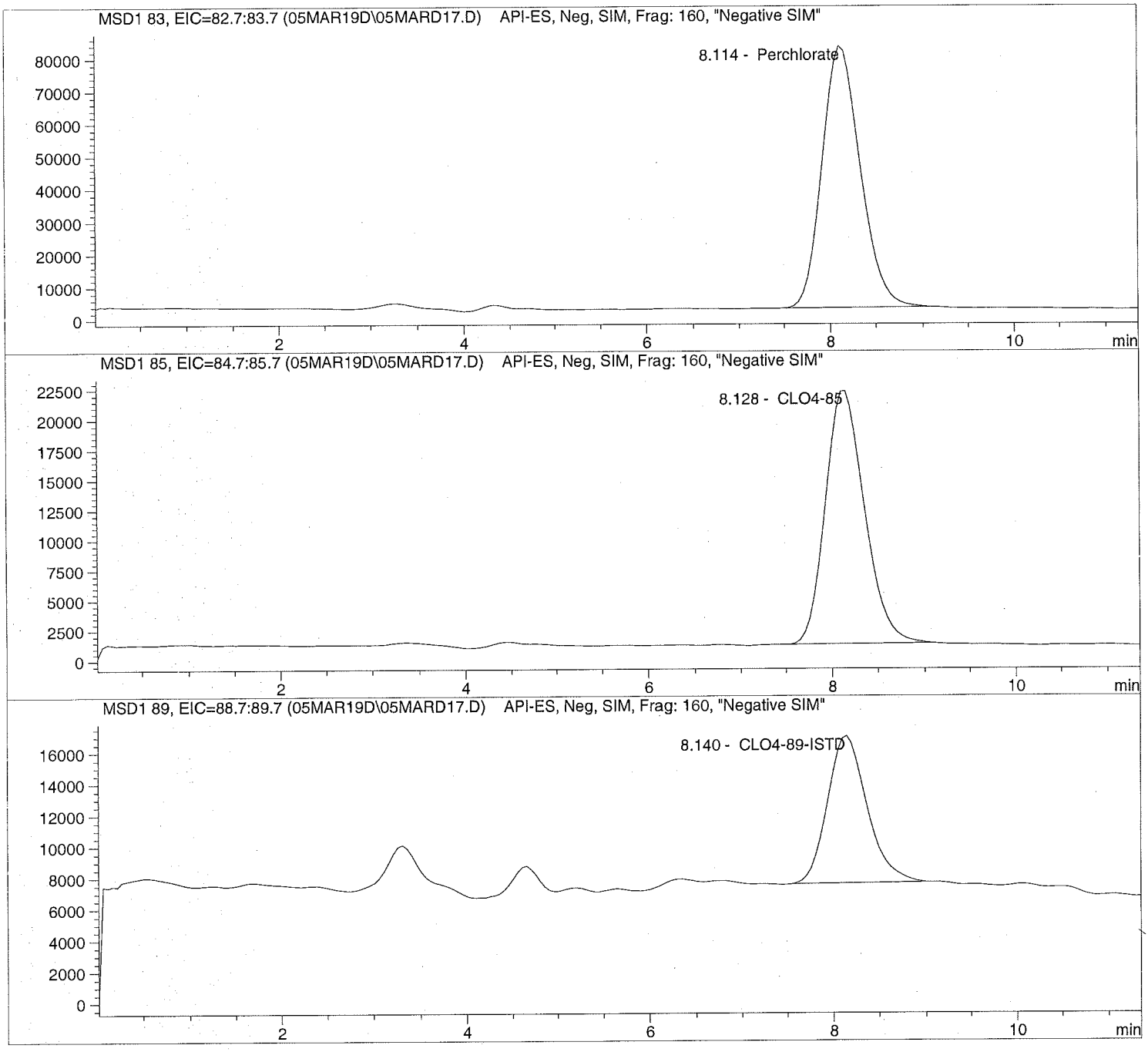
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD17.D Sample Name: 642101 CCV@25

Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD17.D Sample Name: 642101 CCV@25

Injection Date:	3/05/2019 12:18:41	Seq Line:	17
Sample Name:	642101 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	2336112.7	25.0199	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.128	PBA	628961.2	25.6341	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.140	PBA	283460.4	5.0000	CLO4-89-ISTD

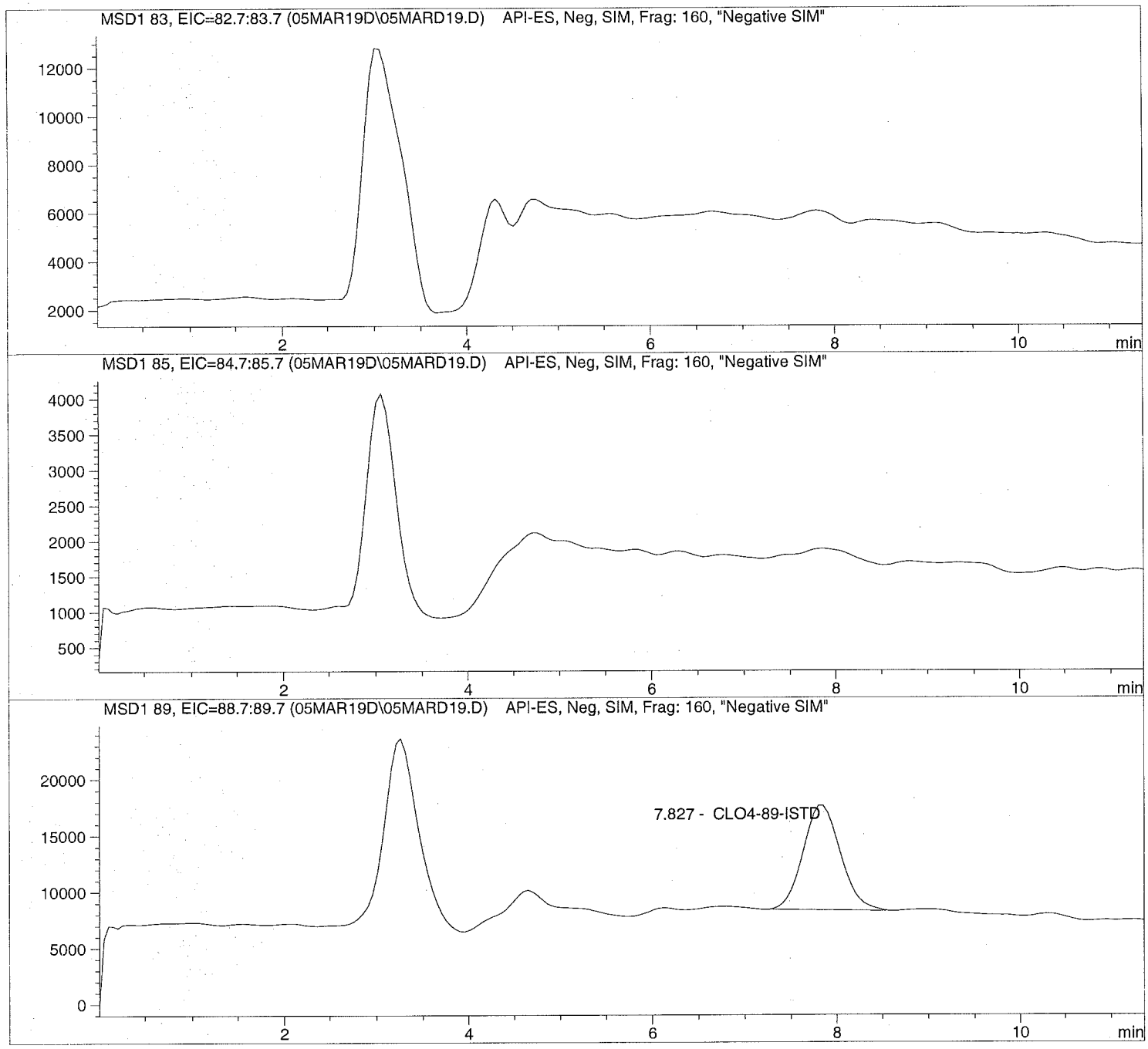
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD19.D Sample Name: 1906332001

Injection Date:	3/05/2019 12:49:07	Seq Line:	19
Sample Name:	1906332001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.827	PBA	264674.3	5.0000	CLO4-89-ISTD

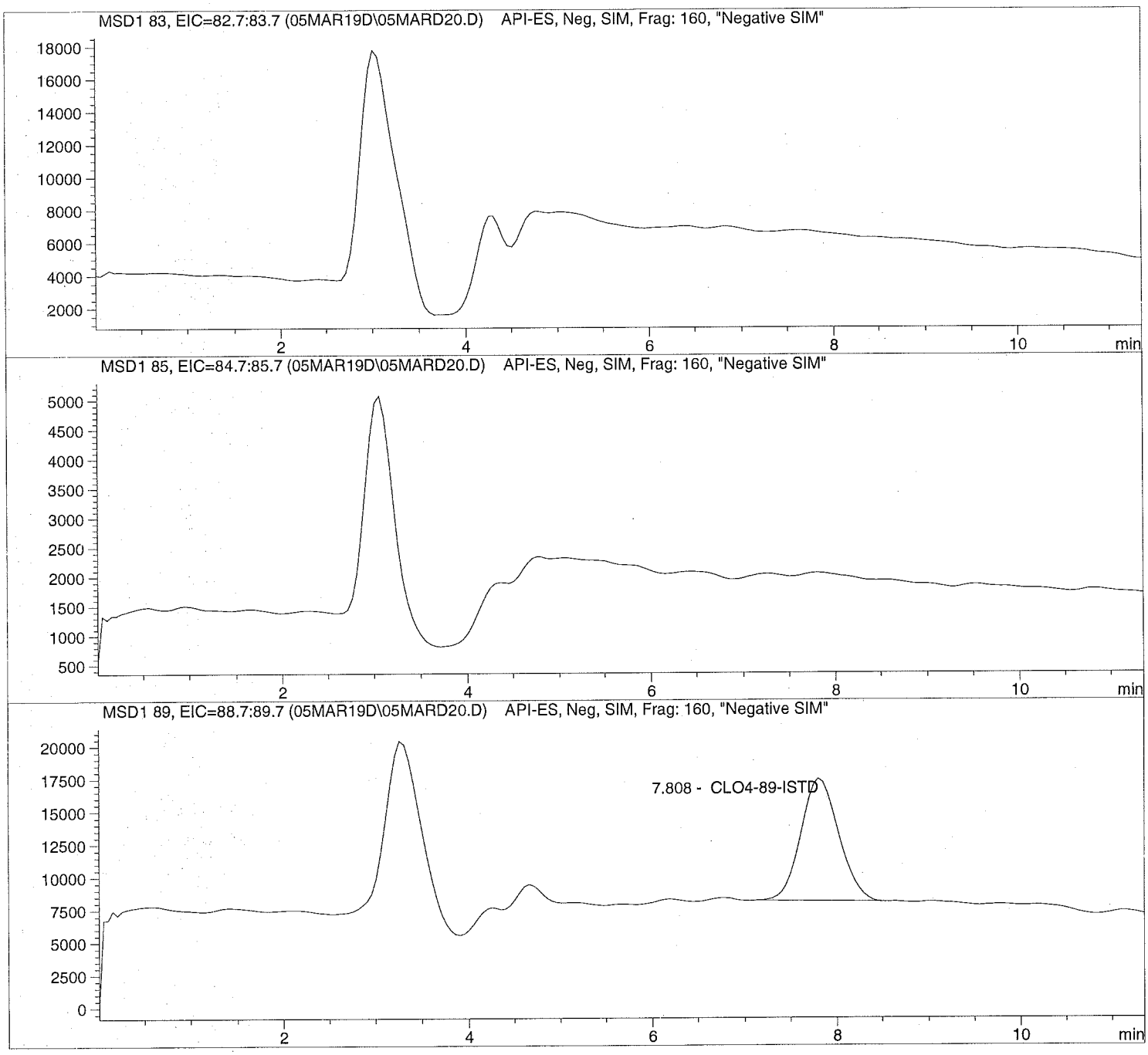
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD20.D Sample Name: 1906334001

Injection Date:	3/05/2019 13:02:15	Seq Line:	20
Sample Name:	1906334001	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.808	PBA	265662.0	5.0000	CLO4-89-ISTD

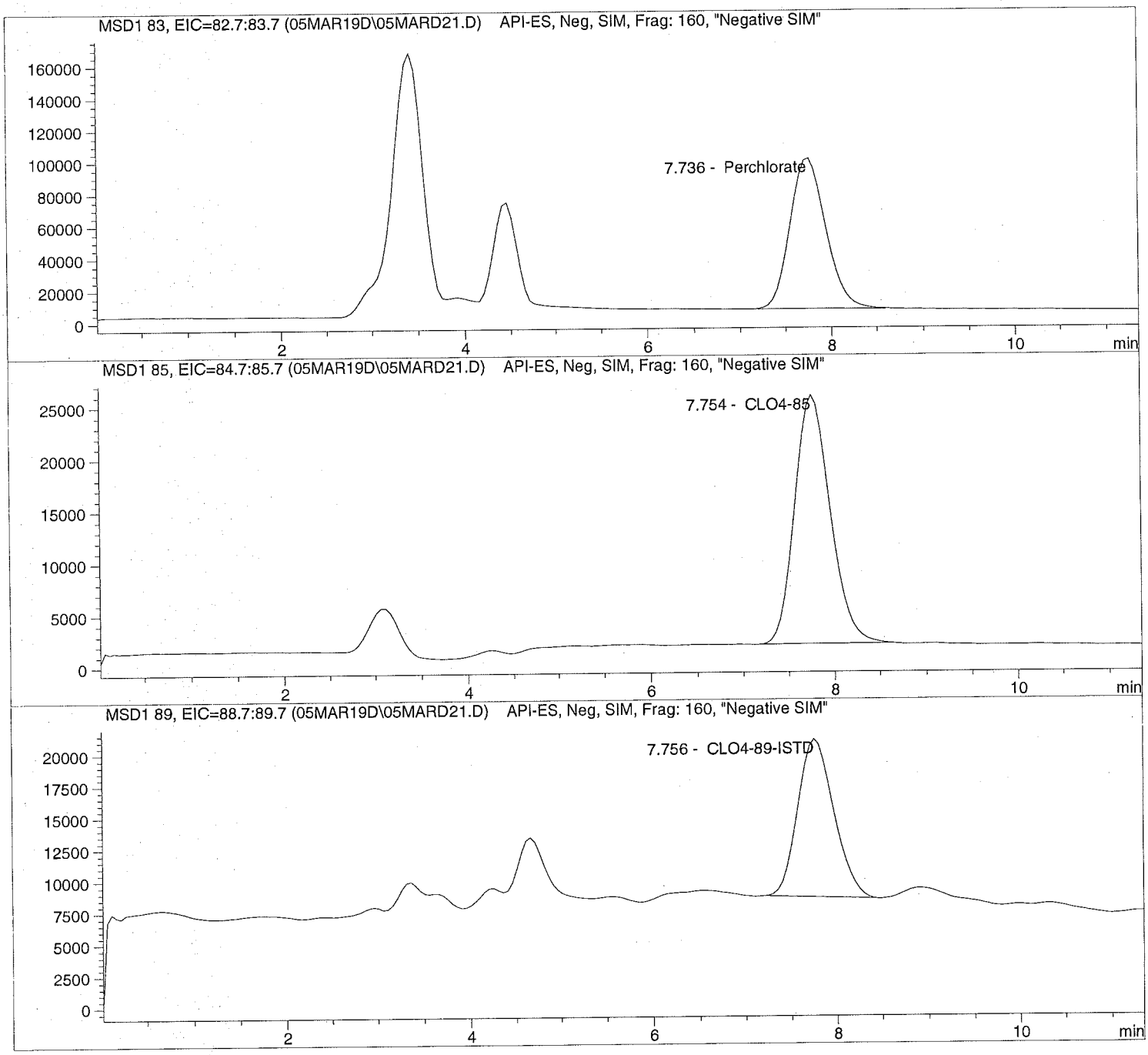
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD21.D Sample Name: 1906112004 10X

Injection Date:	3/05/2019 13:15:18	Seq Line:	21
Sample Name:	1906112004 10X	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.736	PBA	2531259.3	226.4815	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.754	PBA	646870.4	220.9191	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	PB	341607.9	50.0000	CLO4-89-ISTD

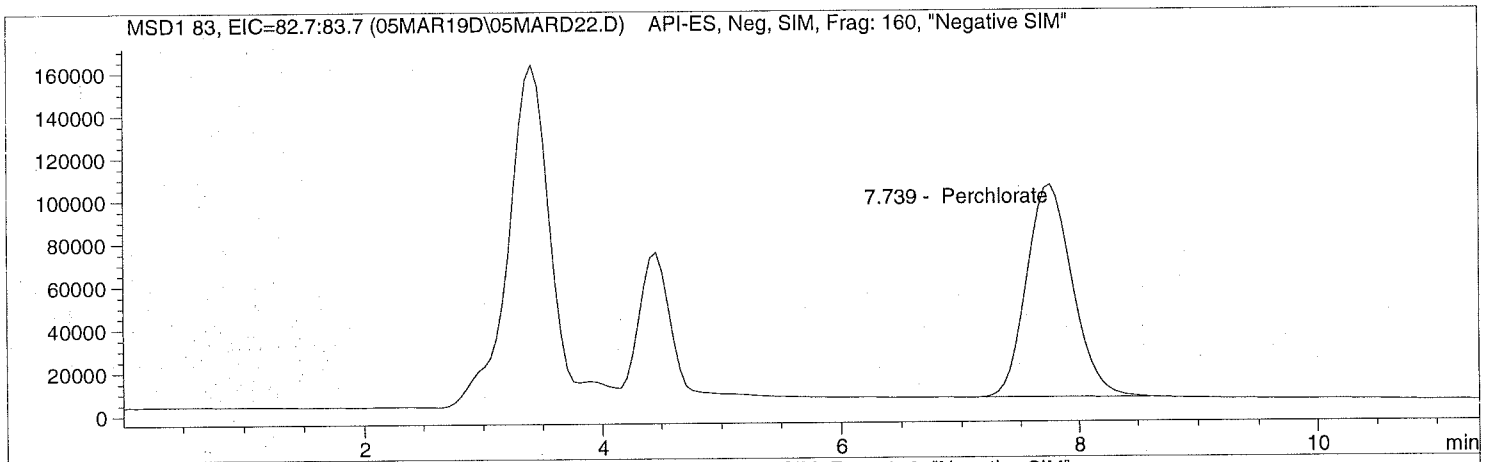
*** End of Report ***

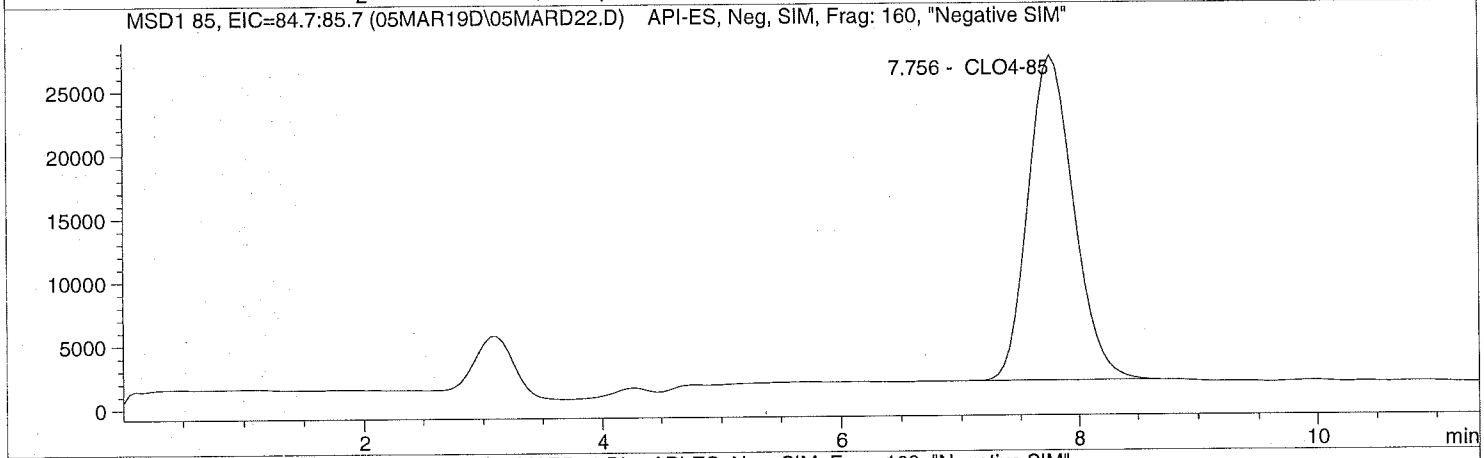
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X

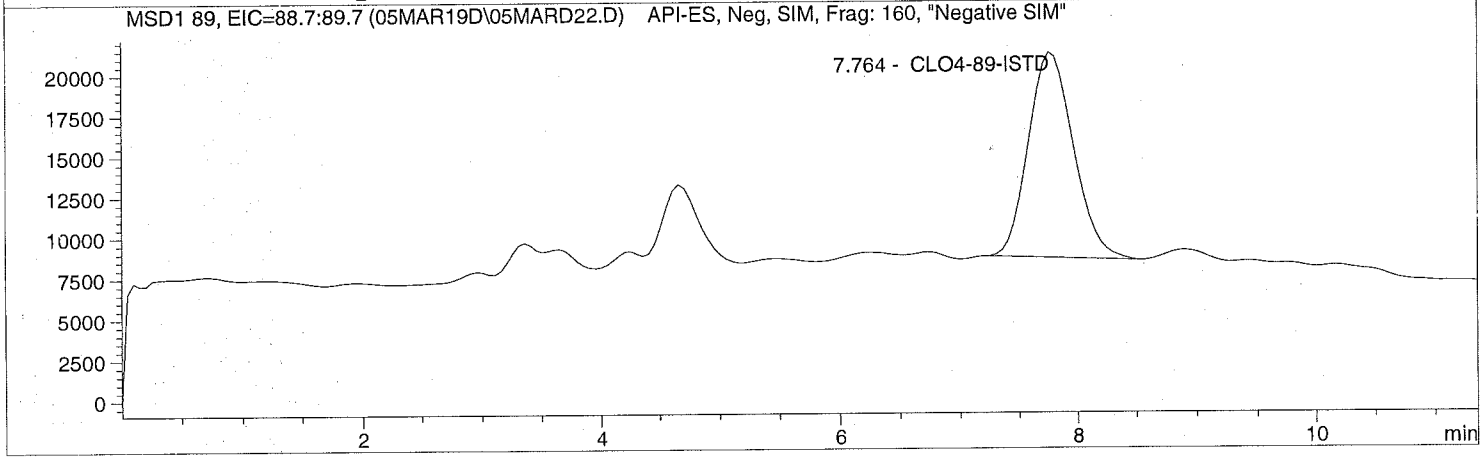
Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD22.D Sample Name: 1906112005 10X

Injection Date:	3/05/2019 13:28:32	Seq Line:	22
Sample Name:	1906112005 10X	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.739	PBA	2682370.5	241.0371	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.756	BBA	695643.1	238.4467	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.764	PB	338724.1	50.0000	CLO4-89-ISTD

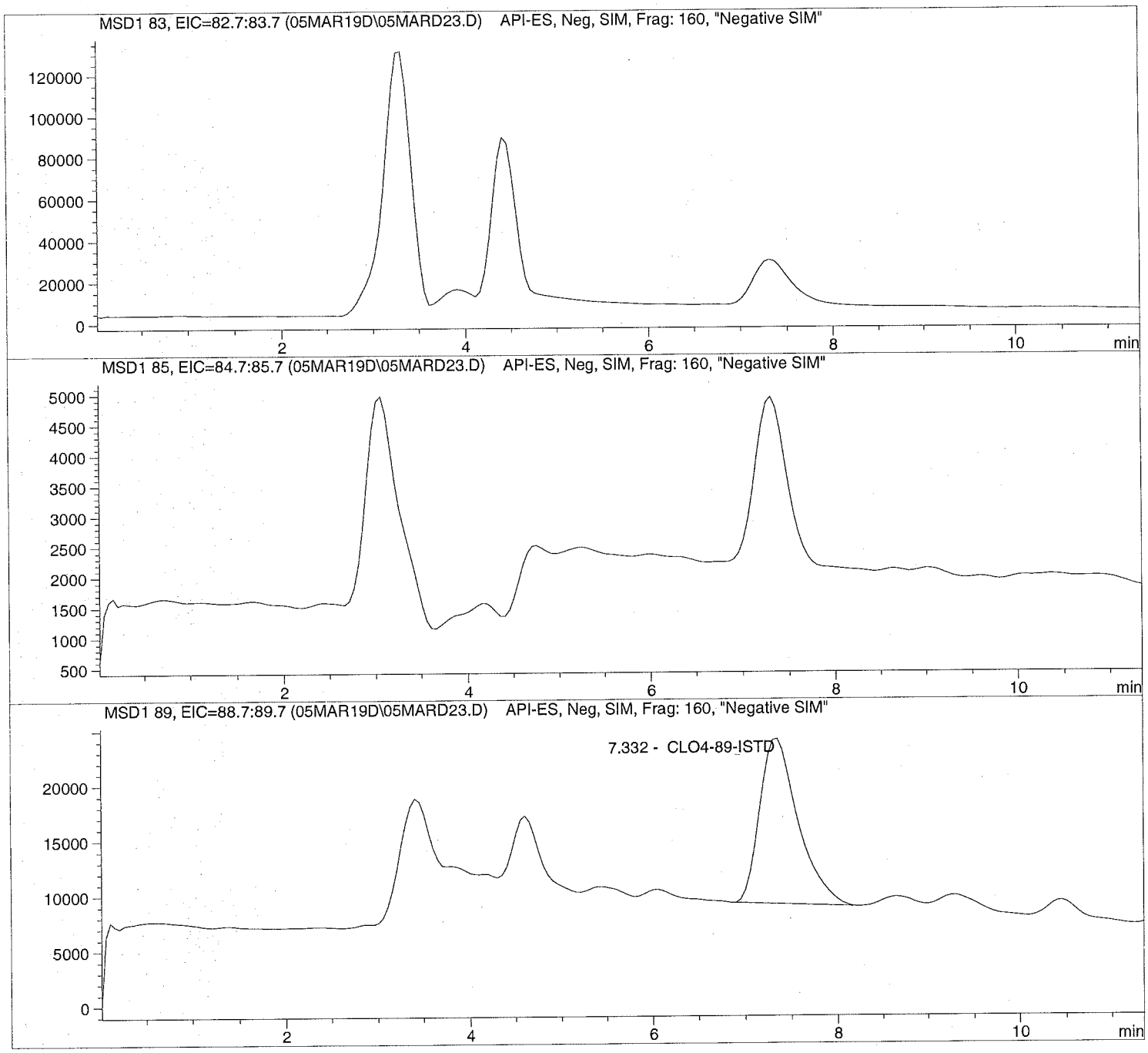
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD23.D Sample Name: 1906112007 RE

Injection Date:	3/05/2019 13:41:34	Seq Line:	23
Sample Name:	1906112007 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.332	PB	431134.6	5.0000	CLO4-89-ISTD

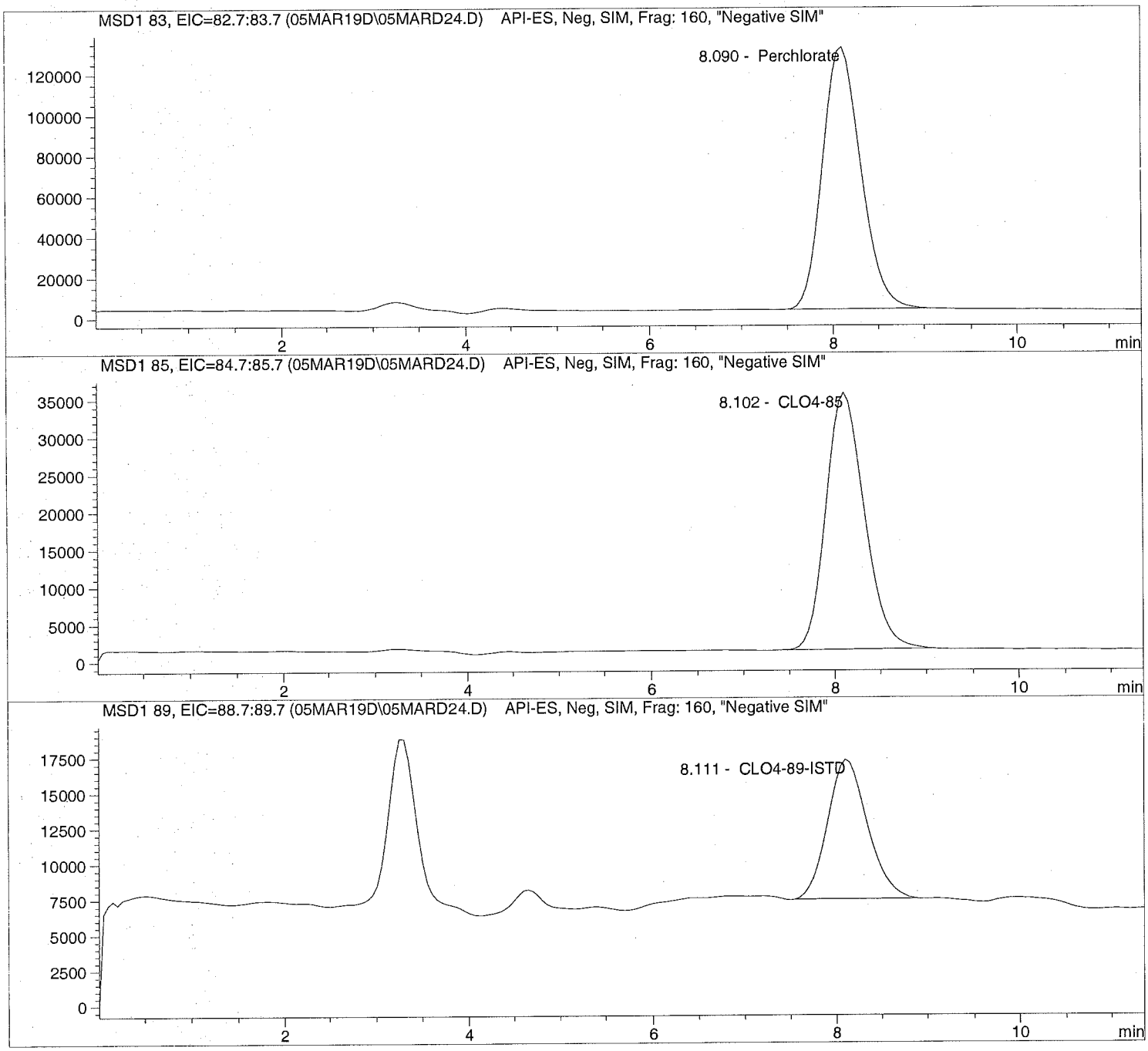
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD24.D Sample Name: 1906330001 100

Injection Date:	3/05/2019 13:54:34	Seq Line:	24
Sample Name:	1906330001 100	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 am
Multiplier:	1.000000
Dilution:	100.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.090	PBA	3773628.7	3708.6567	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.102	PBA	1010205.2	3771.6748	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.111	PBA	298984.6	500.0000	CLO4-89-ISTD

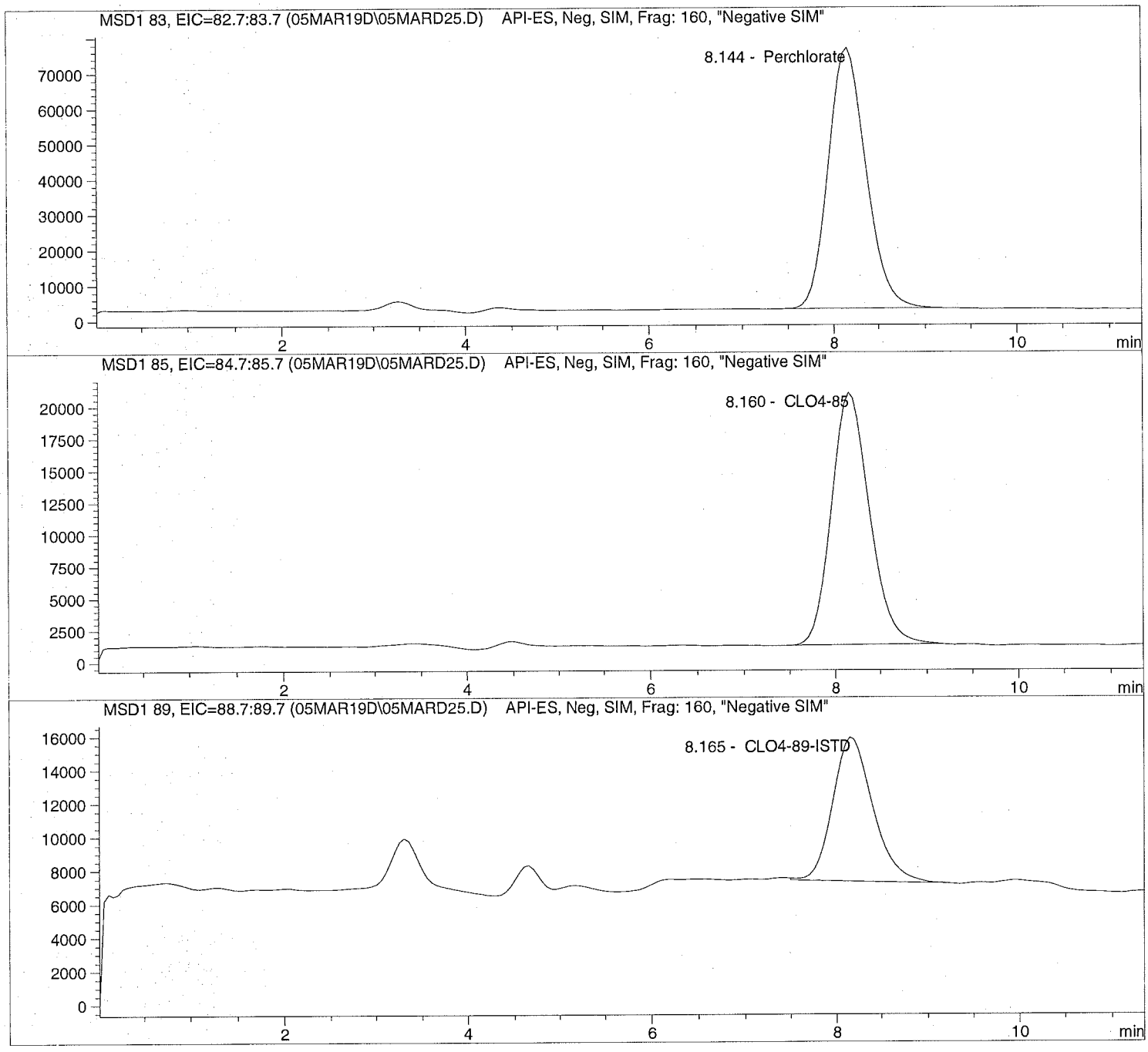
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD25.D Sample Name: 642102 CCV@25

Injection Date:	3/05/2019 14:07:36	Seq Line:	25
Sample Name:	642102 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.144	PBA	2157871.5	24.4553	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.160	PBA	583711.5	25.1665	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.165	BBA	268305.4	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Batch Report: C:\HPCHEM\1\DATA\15FEB19I\15FEB19D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP1.M

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

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	8.94006e4	7.889	9.89924e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	1.97443e5	8.114	2.26028
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	4.79370e5	7.828	4.65688
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	9.30136e5	7.904	9.14998
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	2.81067e6	7.793	25.52636
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	5.66830e6	7.976	51.07439
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	8.69624e6	7.886	74.30603
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	1.01141e6	7.988	9.46019

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.26121e4	7.914	9.98836e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	5.53134e4	8.127	2.11360
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	1.39247e5	7.842	4.91261
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	2.54396e5	7.923	9.39034
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	7.35969e5	7.811	25.48268
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	1.47152e6	7.993	50.35774
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	2.32809e6	7.900	74.72233
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	2.81230e5	8.007	9.87858

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	3.41443e5	7.900	5.00000
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	2.99651e5	8.132	5.00000
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	3.38646e5	7.853	5.00000
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	3.25154e5	7.925	5.00000
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	3.33799e5	7.819	5.00000
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	3.14712e5	7.999	5.00000
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	3.13909e5	7.908	5.00000
#*	ICAL Verf@10ug/L	Vial 80	1	Control	10	3.41503e5	8.005	5.00000

*** End of Report ***

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2019\FEB\15FEB19I.S

Sequence Table:

Method and Injection Info Part:

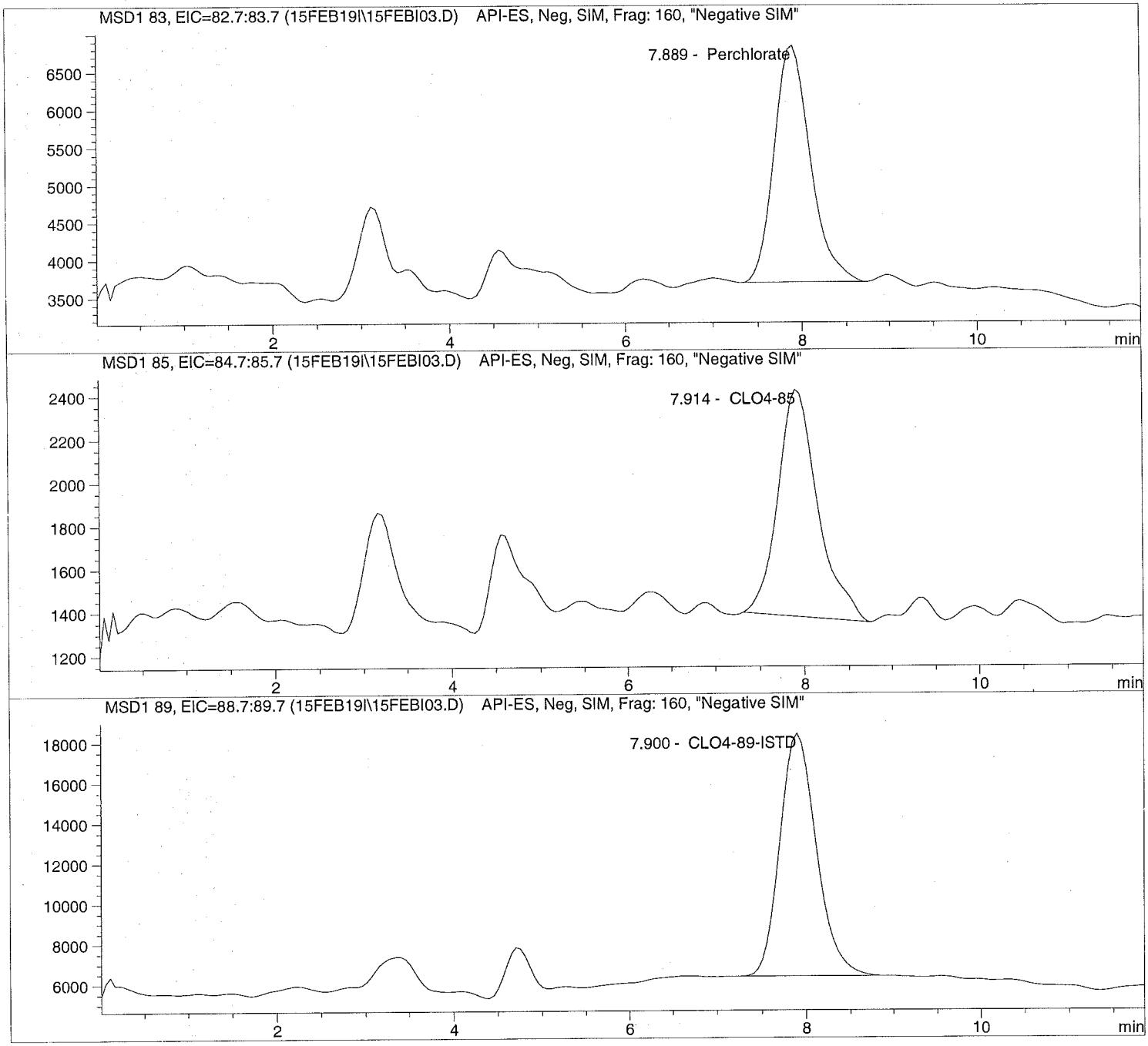
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	CLO4@ .20ug/L	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	CLO4@ 0.5ug/L	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	CLO4@ 1.0ug/L	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	CLO4@ 2.0ug/L	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	CLO4@ 5.0ug/L	CLO4-AQN	1	Ctrl Samp		
6	Vial 76	CLO4@ 10.ug/L	CLO4-AQN	1	Ctrl Samp		
7	Vial 77	CLO4@ 25.ug/L	CLO4-AQN	1	Ctrl Samp		
8	Vial 78	CLO4@ 50.ug/L	CLO4-AQN	1	Ctrl Samp		
9	Vial 79	CLO4@ 75.ug/L	CLO4-AQN	1	Ctrl Samp		
10	Vial 80	ICAL Verf@10ug/L	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	2/15/2019 09:51:42	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.889	PBA	89400.6	0.9899	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.914	BBA	32612.1	0.9988	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	BBA	341443.2	5.0000	CLO4-89-ISTD

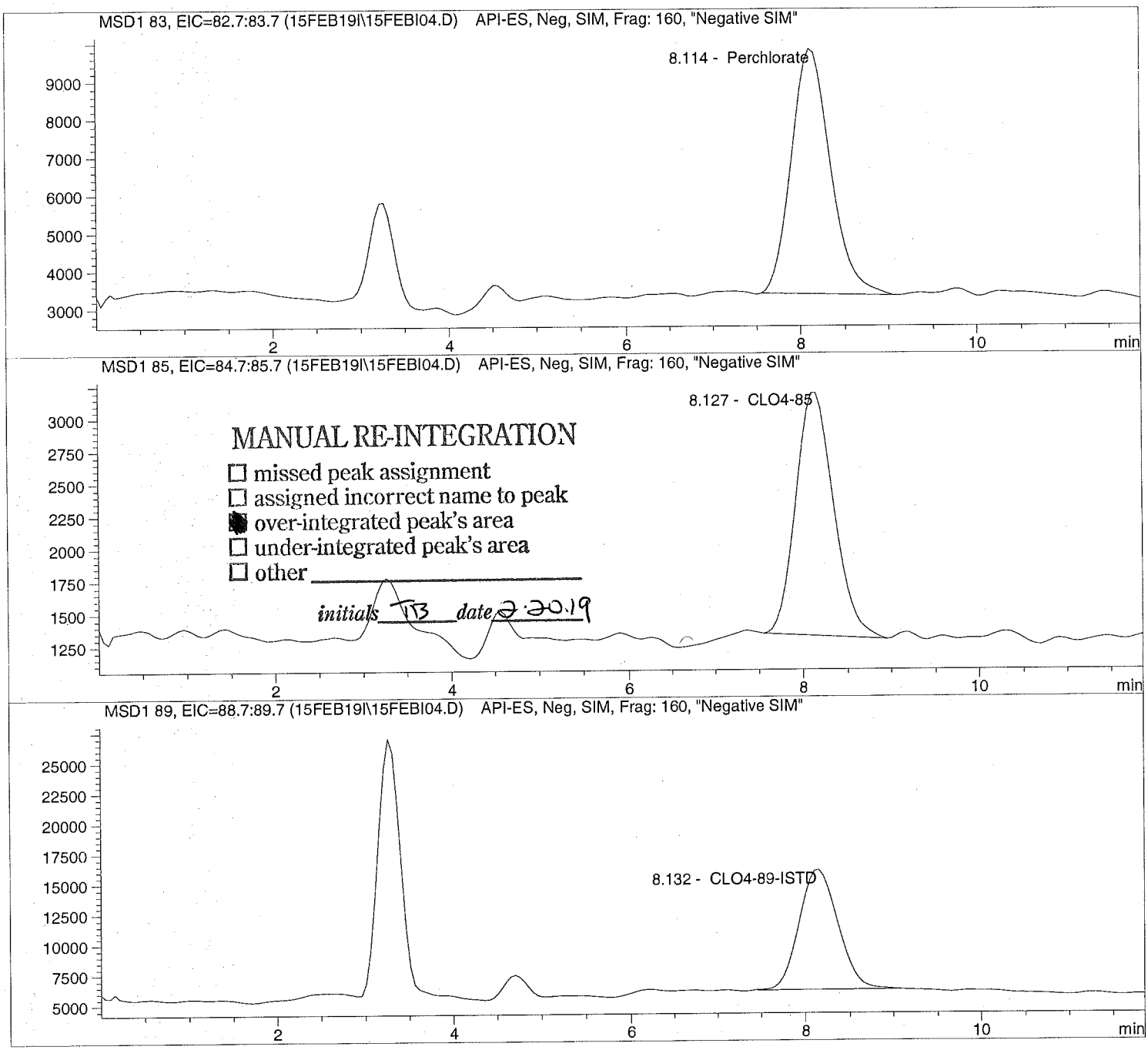
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	MM	55313.4	2.1136	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

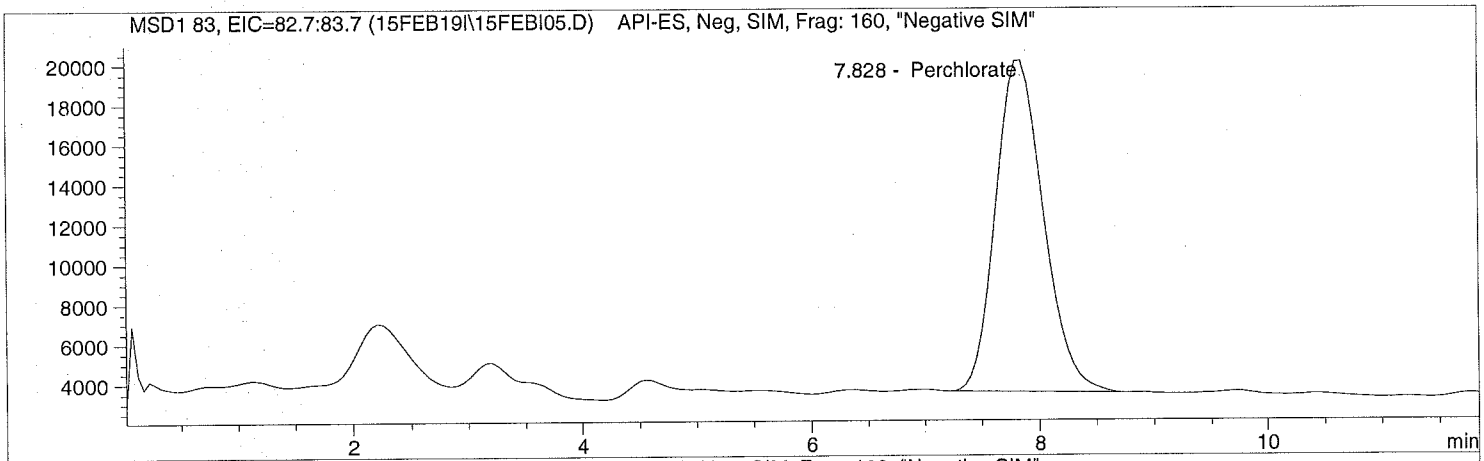
*** End of Report ***

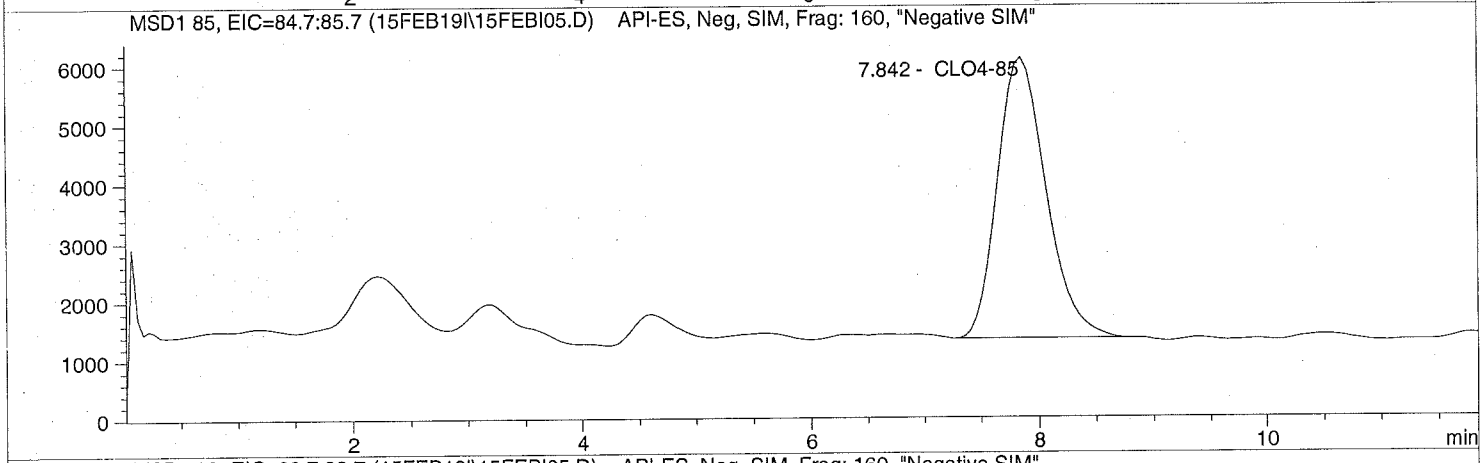
Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

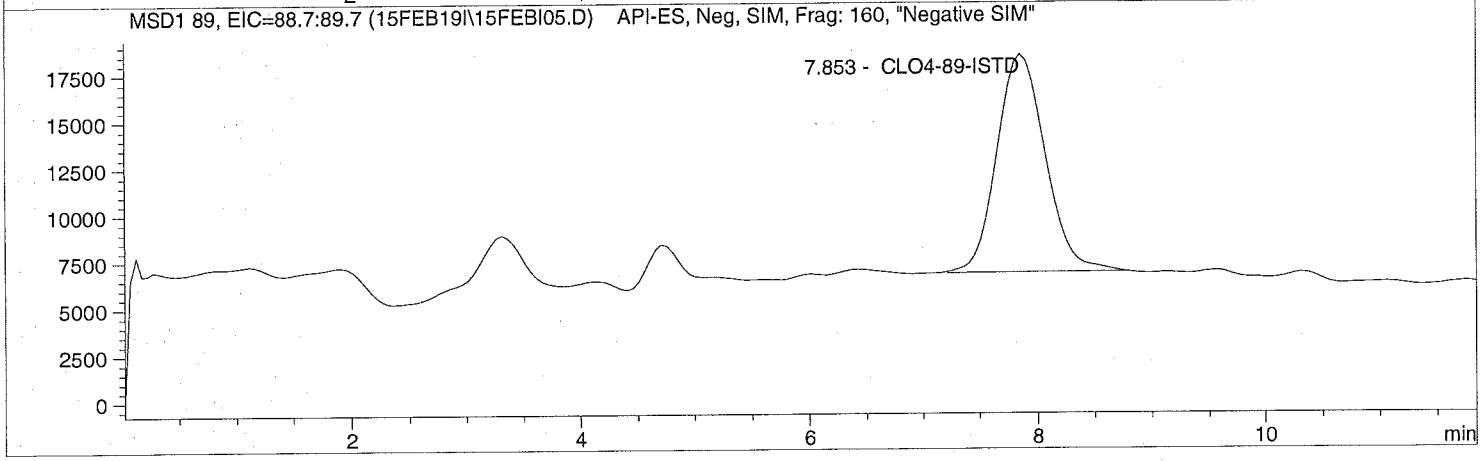
Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	2/15/2019 11:42:56	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.828	PBA	479370.4	4.6569	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.842	PBA	139246.9	4.9126	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.853	PBA	338646.3	5.0000	CLO4-89-ISTD

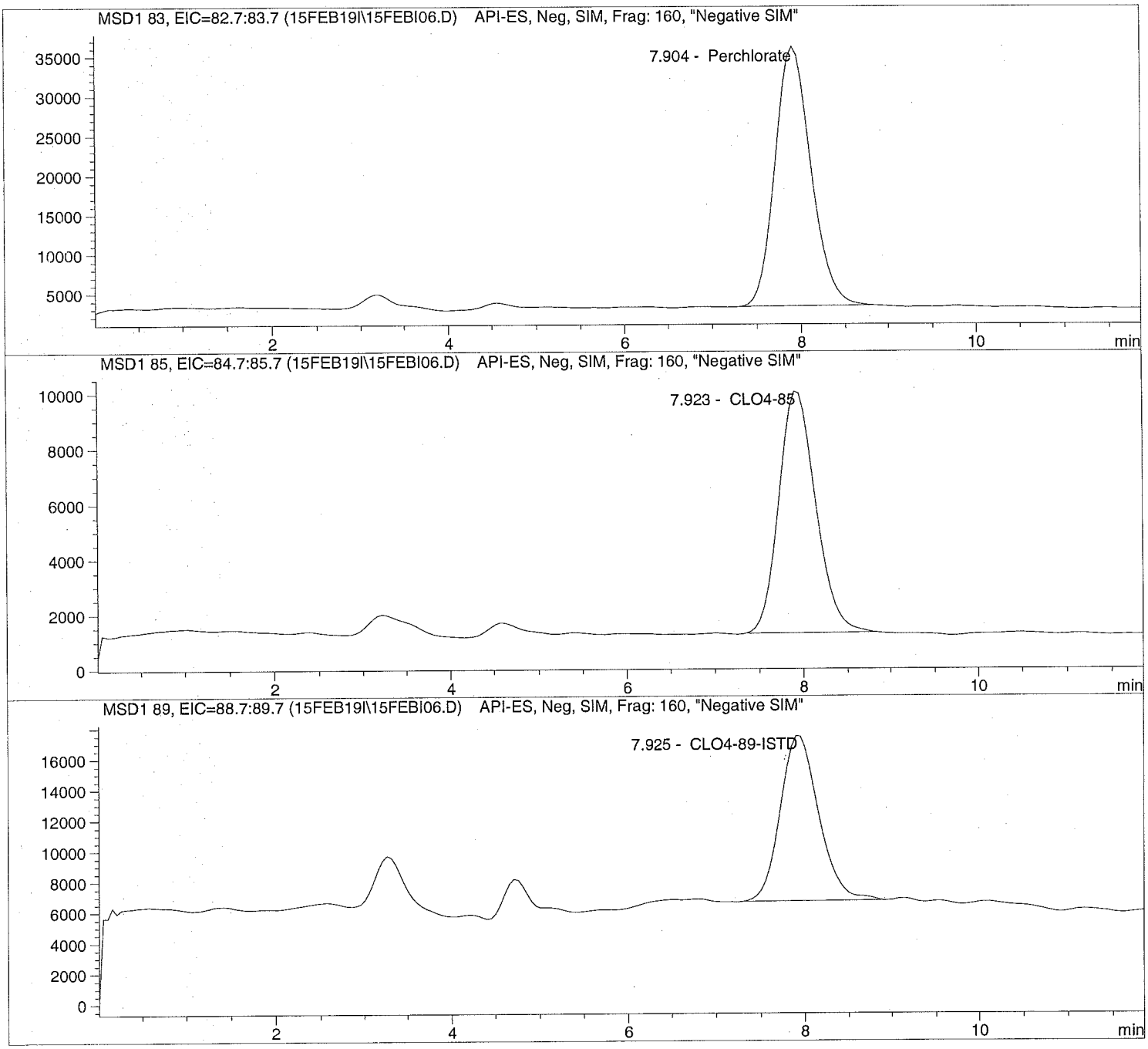
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	2/15/2019 11:56:38	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.904	PBA	930135.8	9.1500	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.923	BBA	254395.6	9.3903	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.925	PBA	325154.4	5.0000	CLO4-89-ISTD

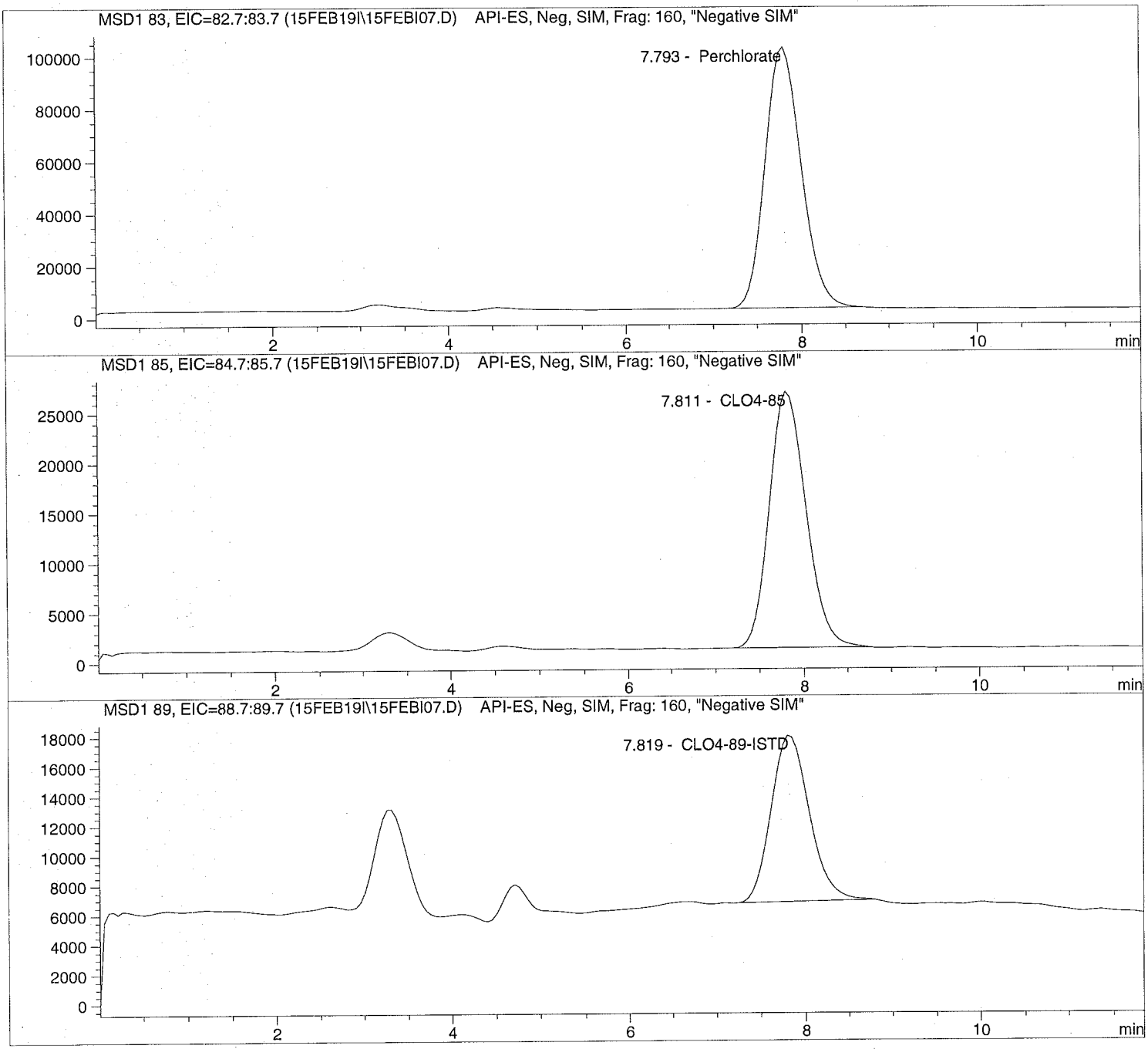
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	2/15/2019 12:10:22	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.793	PBA	2810669.2	25.5264	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.811	BBA	735968.9	25.4827	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.819	PBA	333799.0	5.0000	CLO4-89-ISTD

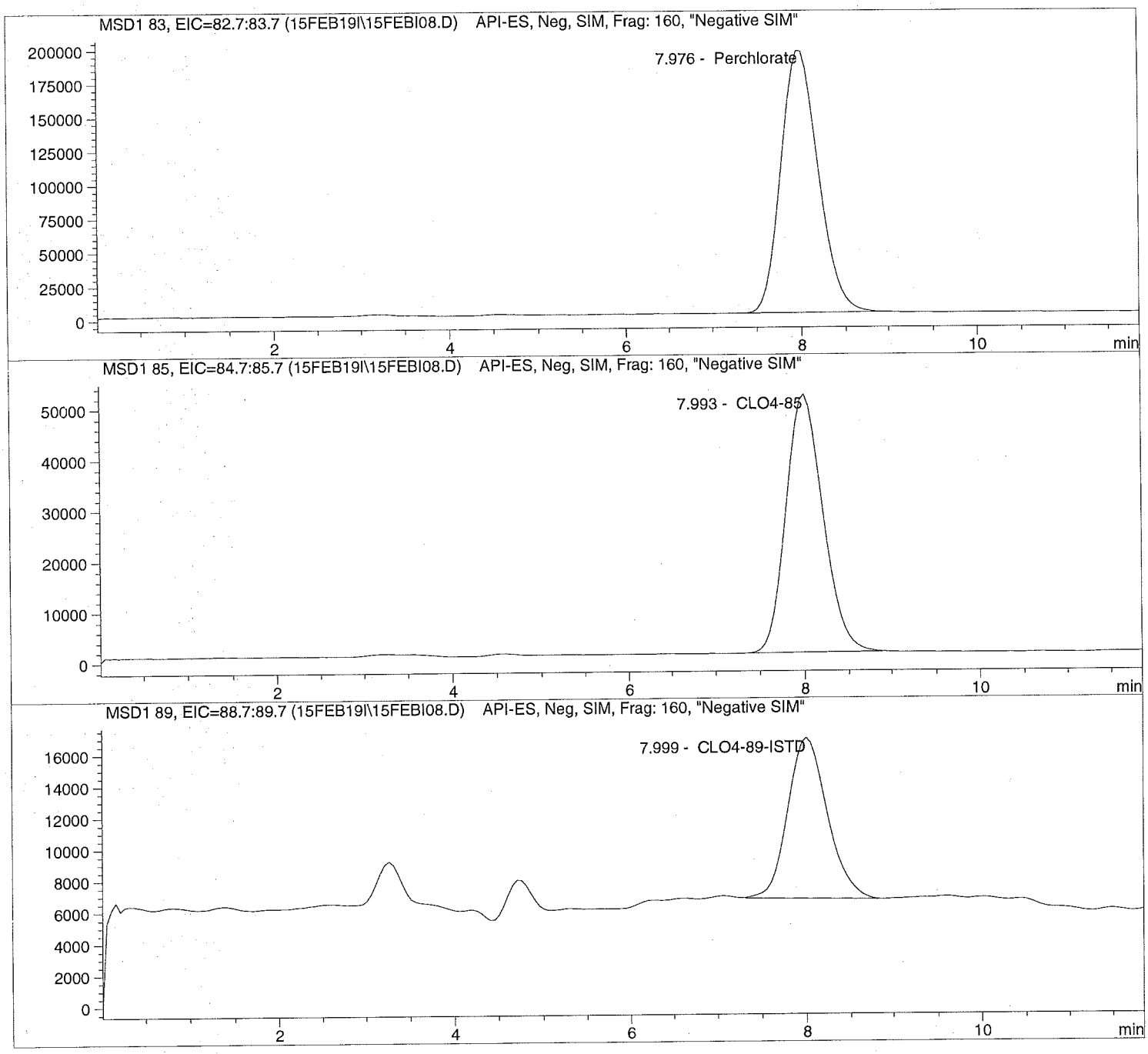
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	2/15/2019 12:24:06	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.976	PBA	5668301.5	51.0744	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.993	PBA	1471522.9	50.3577	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.999	BBA	314711.8	5.0000	CLO4-89-ISTD

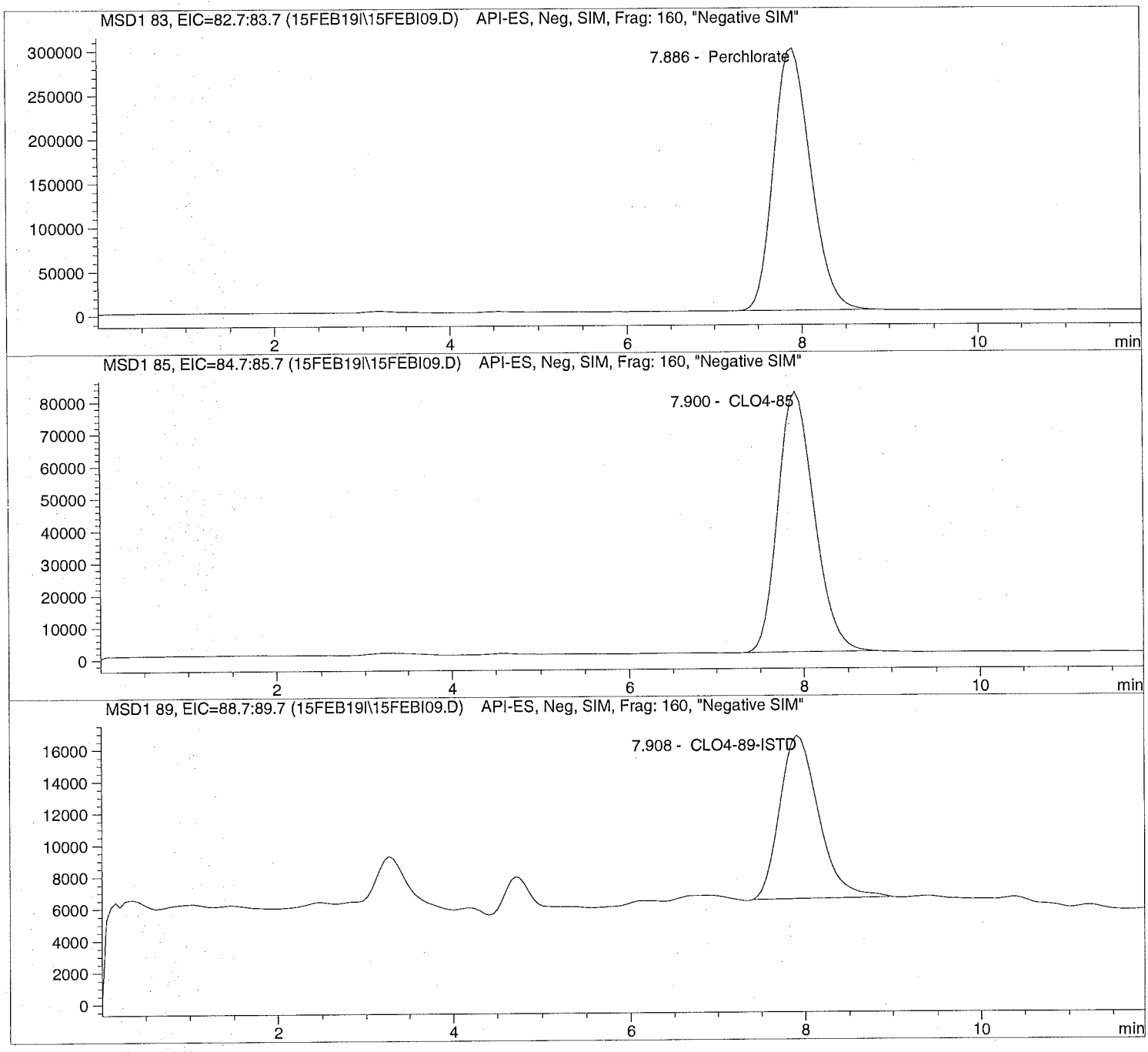
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	2/15/2019 12:37:48	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.886	PBA	8696239.0	74.3060	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.900	PBA	2328089.5	74.7223	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.908	PBA	313908.9	5.0000	CLO4-89-ISTD

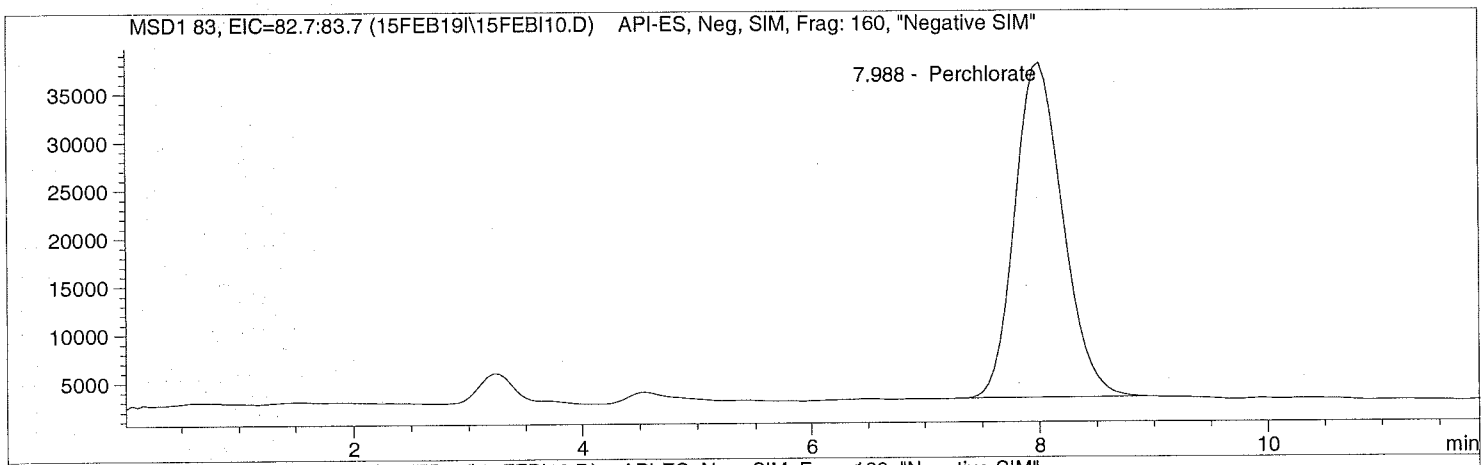
*** End of Report ***

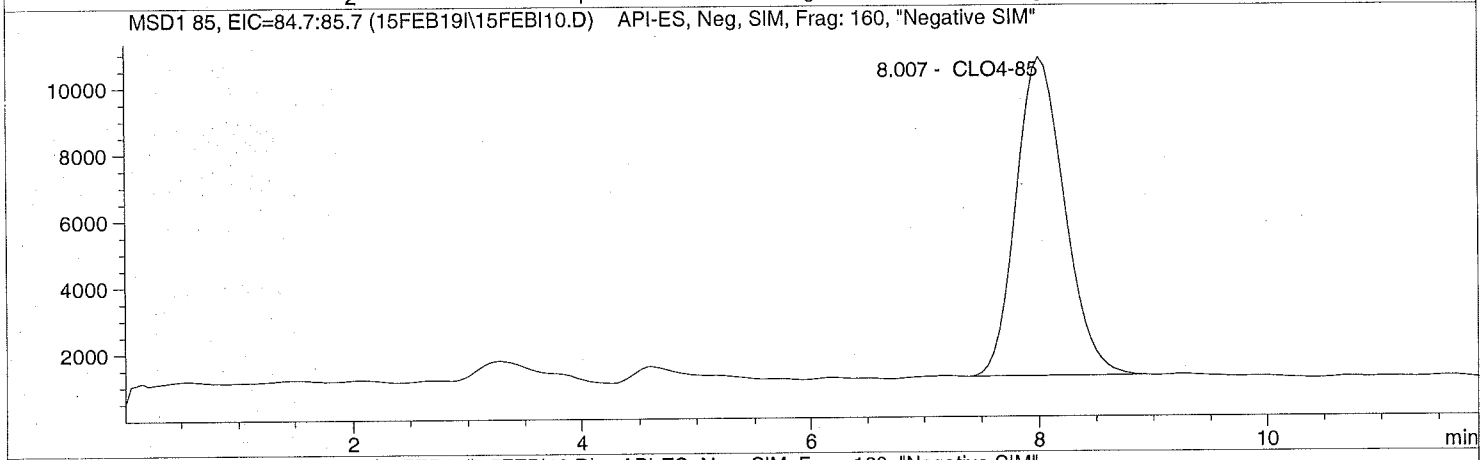
Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

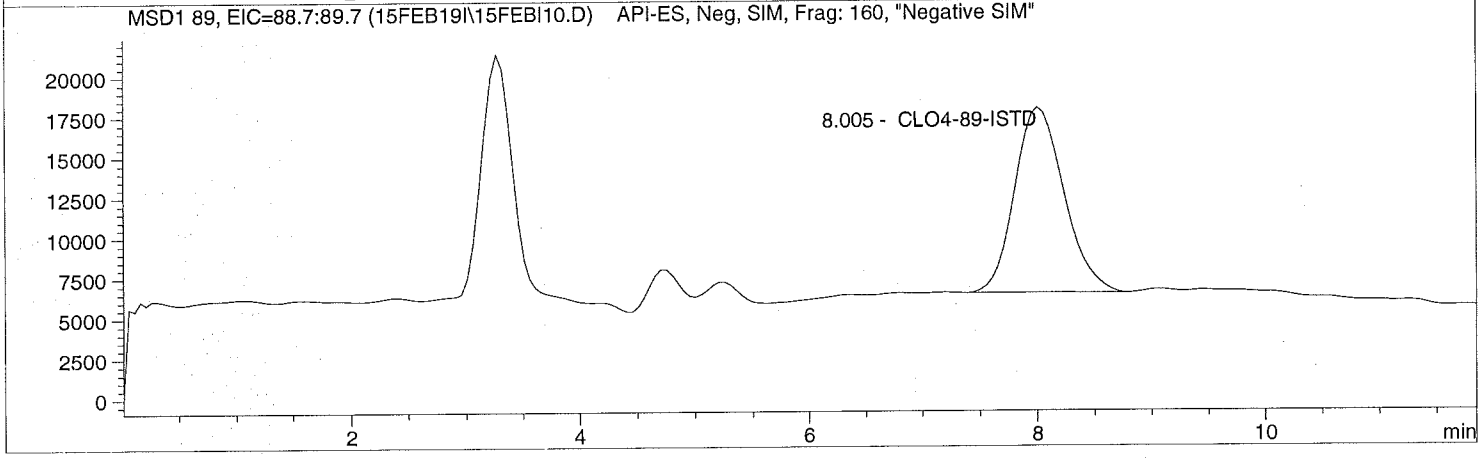
Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI10.D Sample Name: ICAL Verf@10ug/L

Injection Date:	2/15/2019 12:51:29	Seq Line:	10
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:09:20

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.988	BBA	1011409.8	9.4602	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.007	BBA	281229.9	9.8786	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.005	BBA	341503.2	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

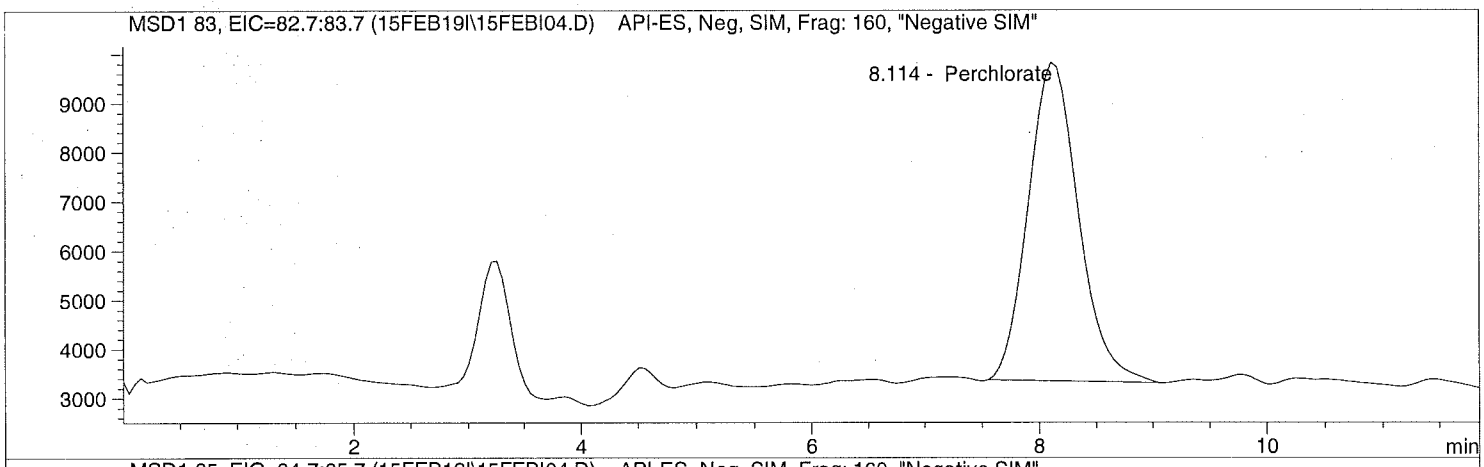
Unmodified

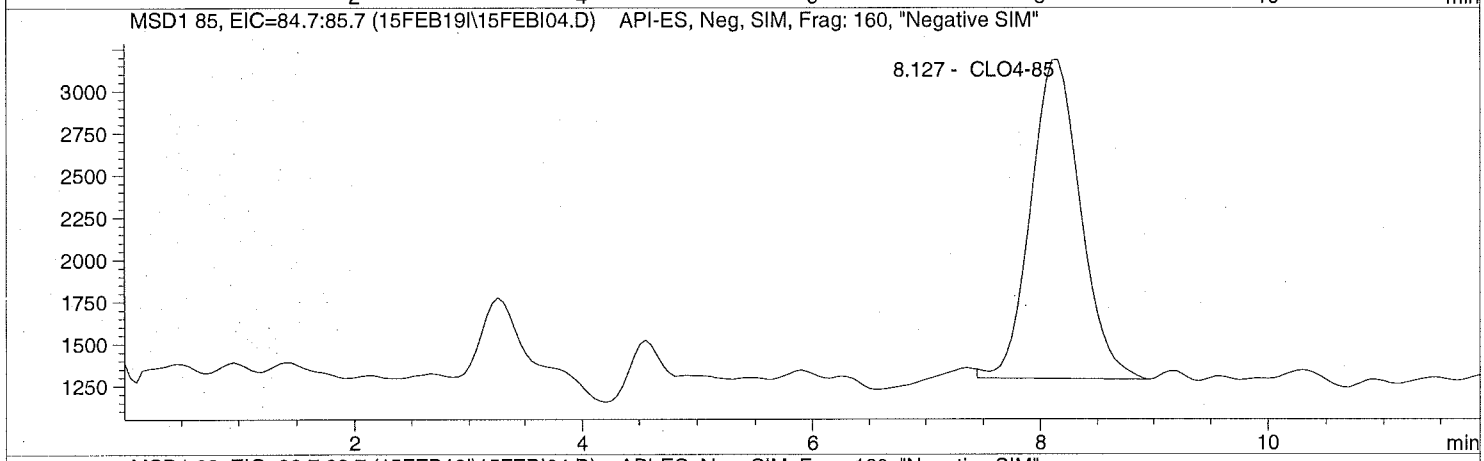
Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

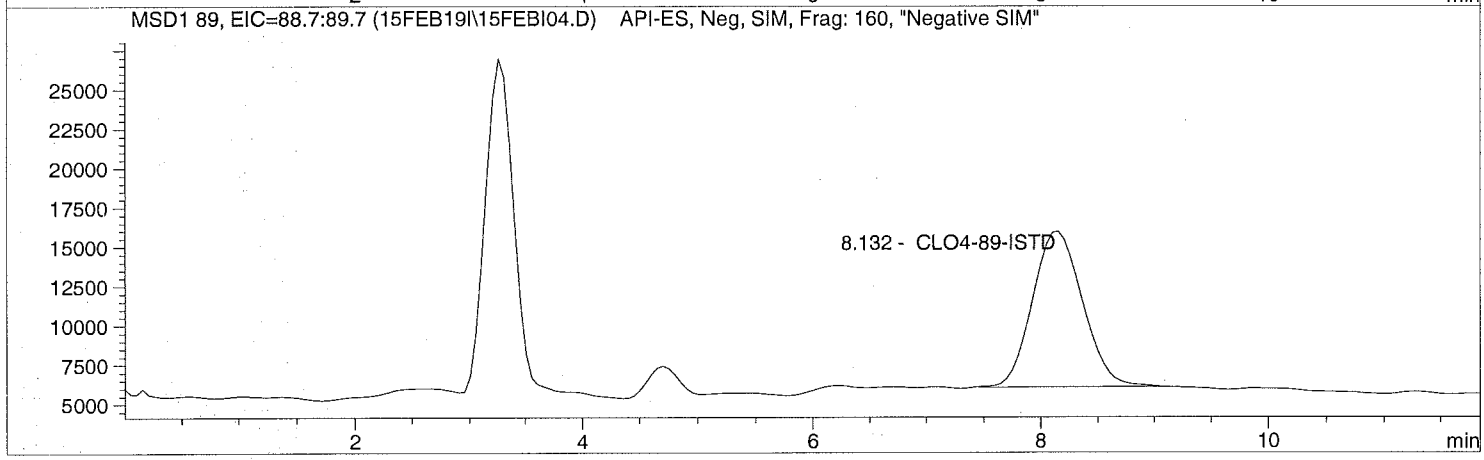
Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\15FEB19I\15FEBI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	2/15/2019 10:05:24	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 09:12:36

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
8.114	PBA	197442.9	2.2603	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.127	BBA	57206.1	2.1923	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.132	BBA	299650.6	5.0000	CLO4-89-ISTD

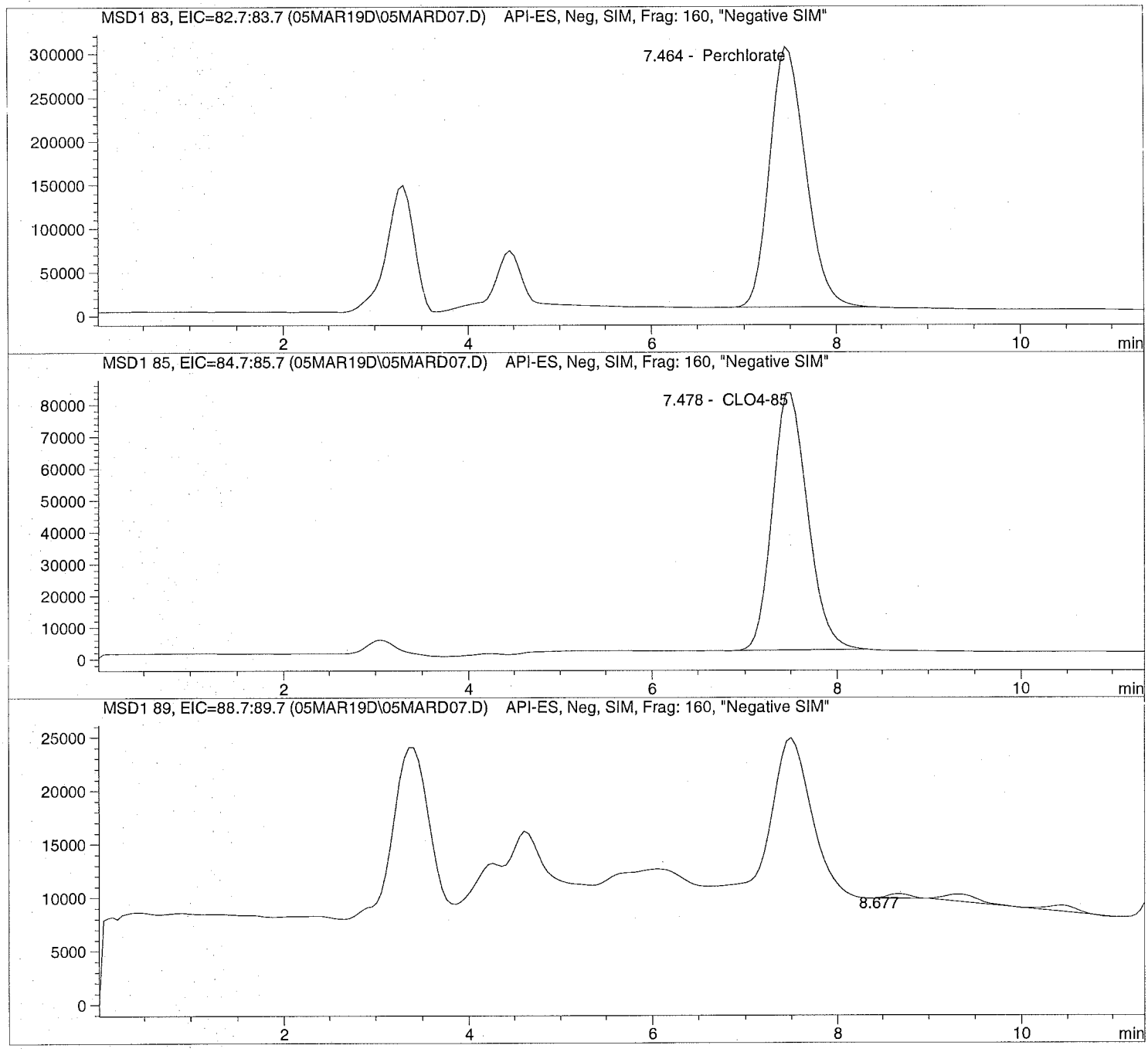
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD07.D Sample Name: 1906112002 MS

Injection Date:	3/05/2019 10:07:11	Seq Line:	7
Sample Name:	1906112002 MS	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.464	PBA	8026959.0	419.8794	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.478	PBA	2146365.0	402.6179	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.677	BB	7208.6	0.0000	
9.316	VBA	28561.1	5.0000	CLO4-89-ISTD

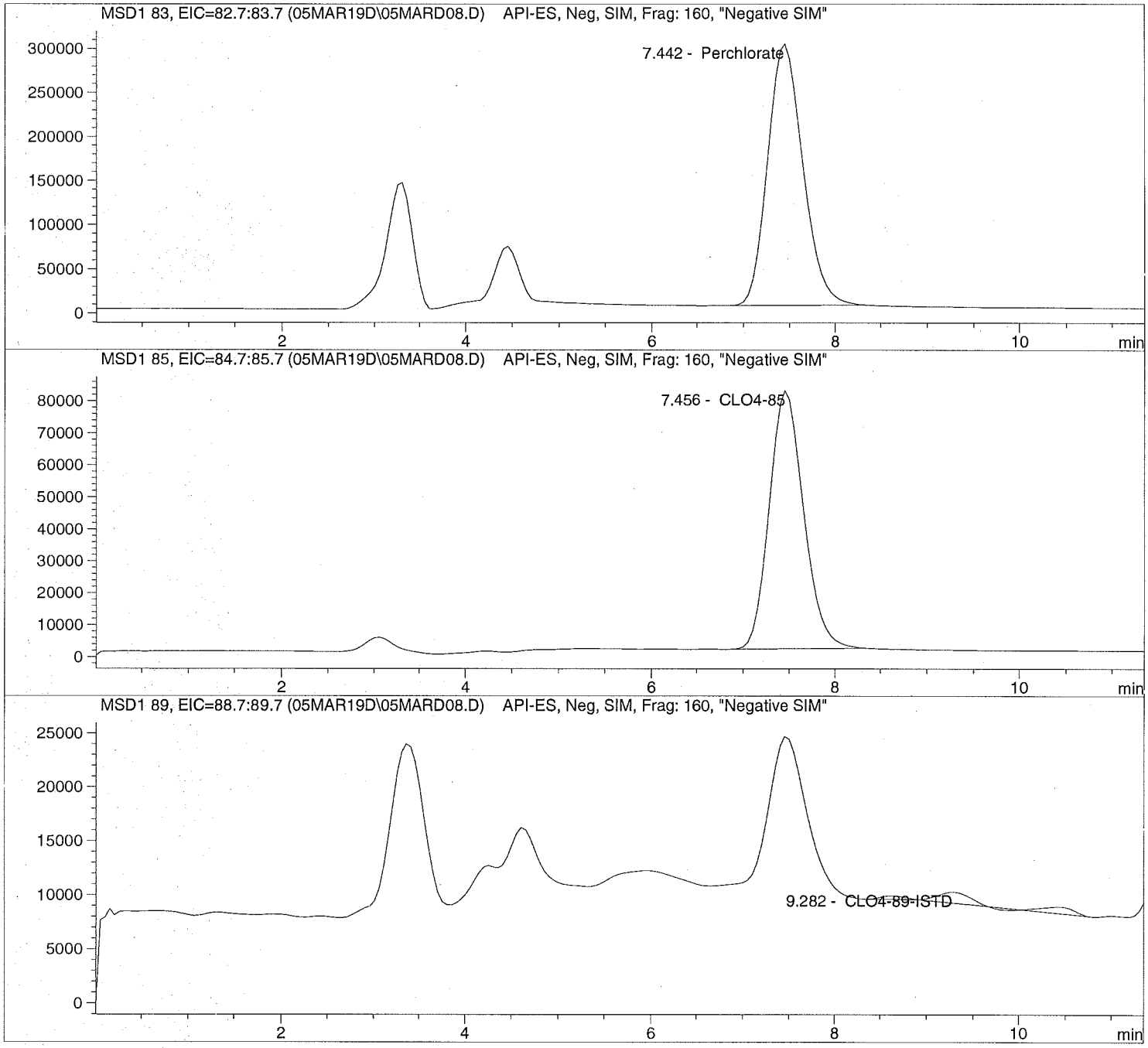
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD08.D Sample Name: 1906112003 MSD

Injection Date:	3/05/2019 10:20:17	Seq Line:	8
Sample Name:	1906112003 MSD	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed:	2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.442	PBA	7942422.5	359.0996	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.456	PBA	2109911.2	344.2233	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.621	VB	5769.9	0.0000	
9.282	VBA	35831.6	5.0000	CLO4-89-ISTD

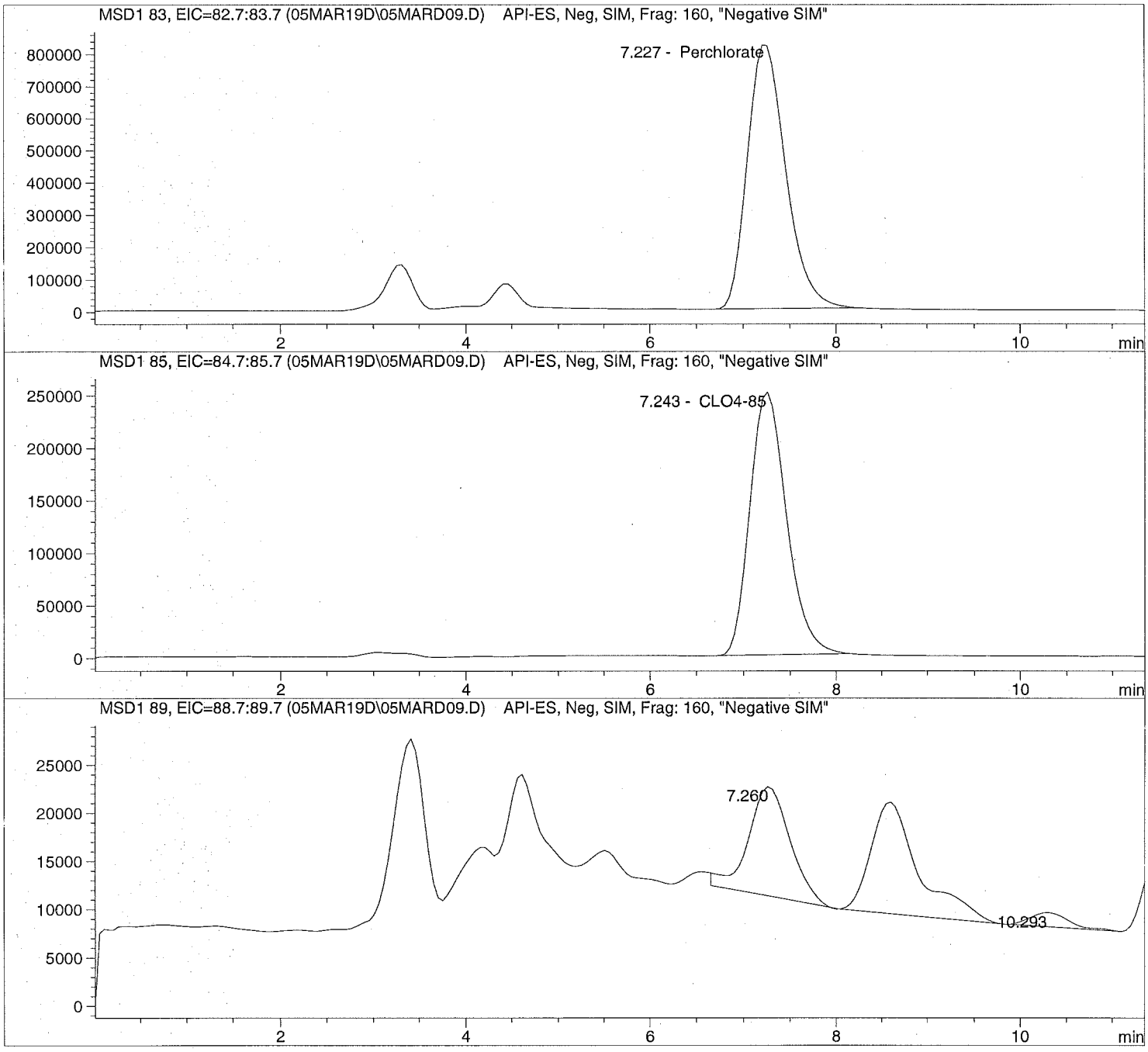
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD09.D Sample Name: 1906112004

Injection Date:	3/05/2019 10:33:21	Seq Line:	9
Sample Name:	1906112004	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.227	PBA	23301694.0	131.1742	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.243	PBA	6796677.5	138.8050	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.260	BB	352149.7	0.0000	
8.589	VBA	421141.9	5.0000	CLO4-89-ISTD
10.293	BBA	41603.7	0.0000	

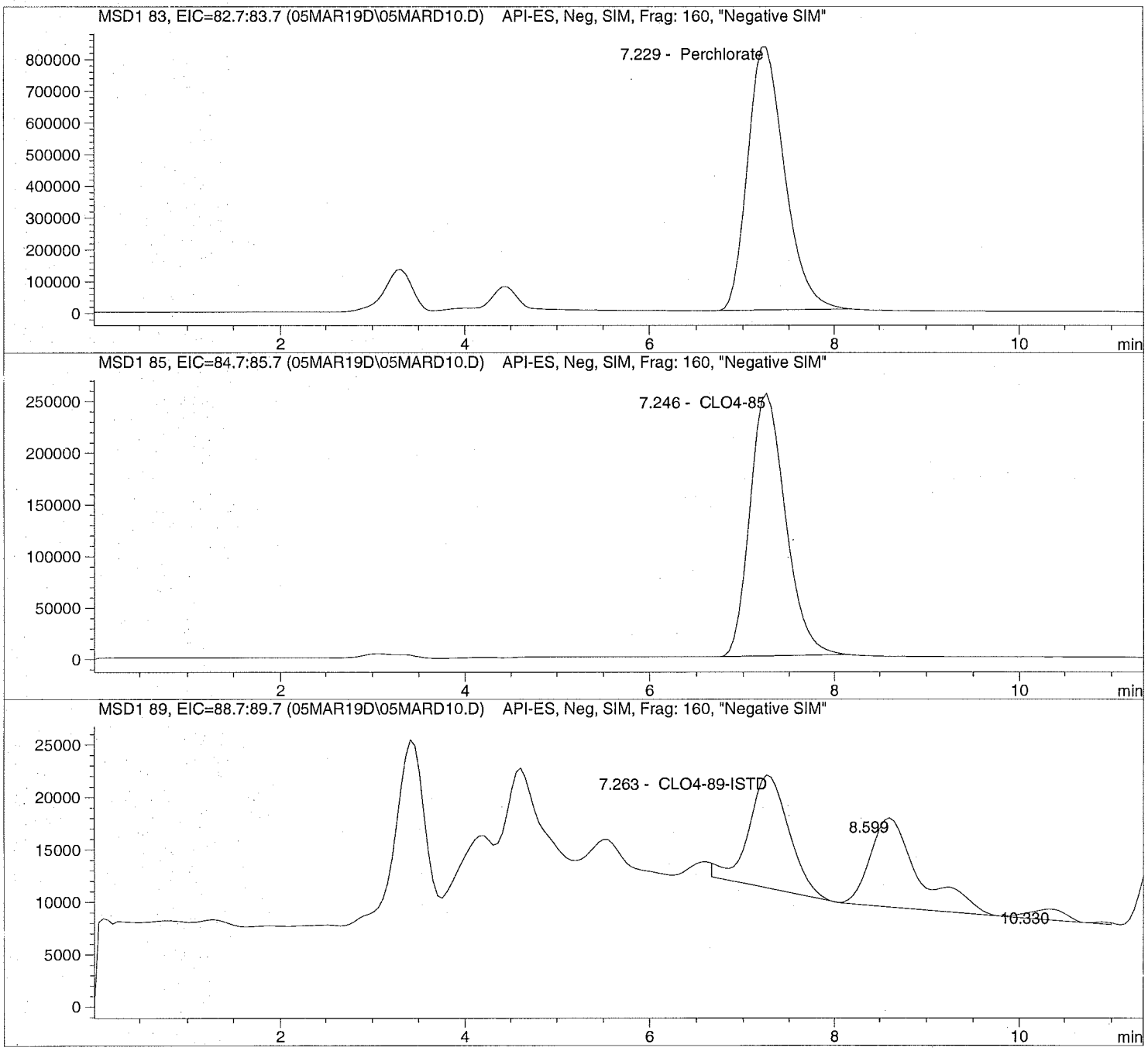
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD10.D Sample Name: 1906112005

Injection Date:	3/05/2019 10:46:26	Seq Line:	10
Sample Name:	1906112005	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.229	PBA	23099082.0	159.0418	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.246	PBA	6828341.5	168.6882	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.263	BB	325841.0	5.0000	CLO4-89-ISTD
8.599	VB	308921.9	0.0000	
10.330	VBA	30210.3	0.0000	

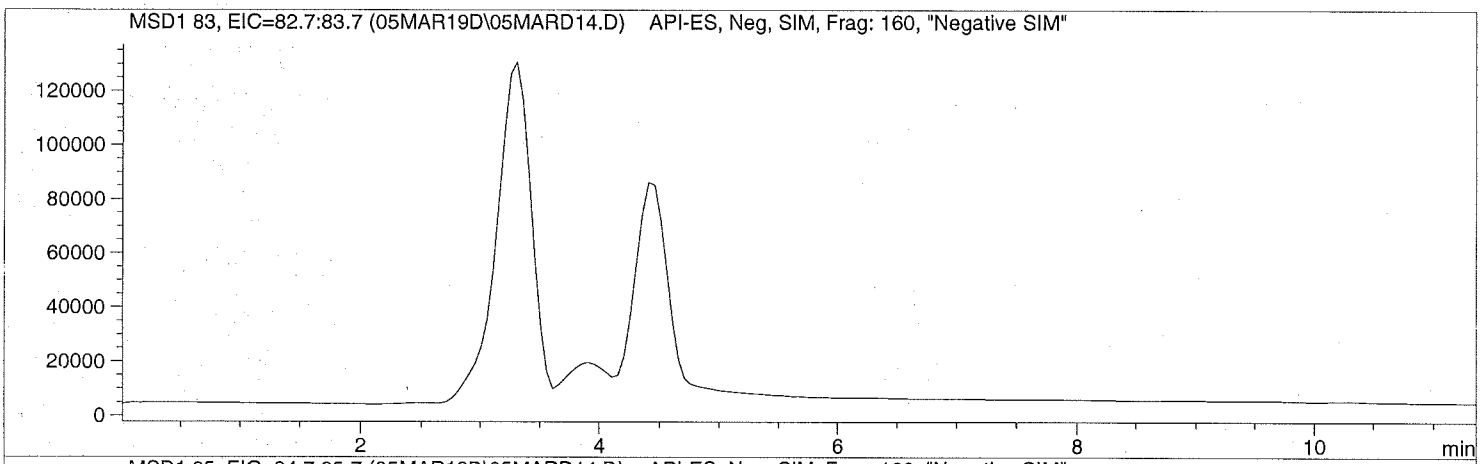
*** End of Report ***

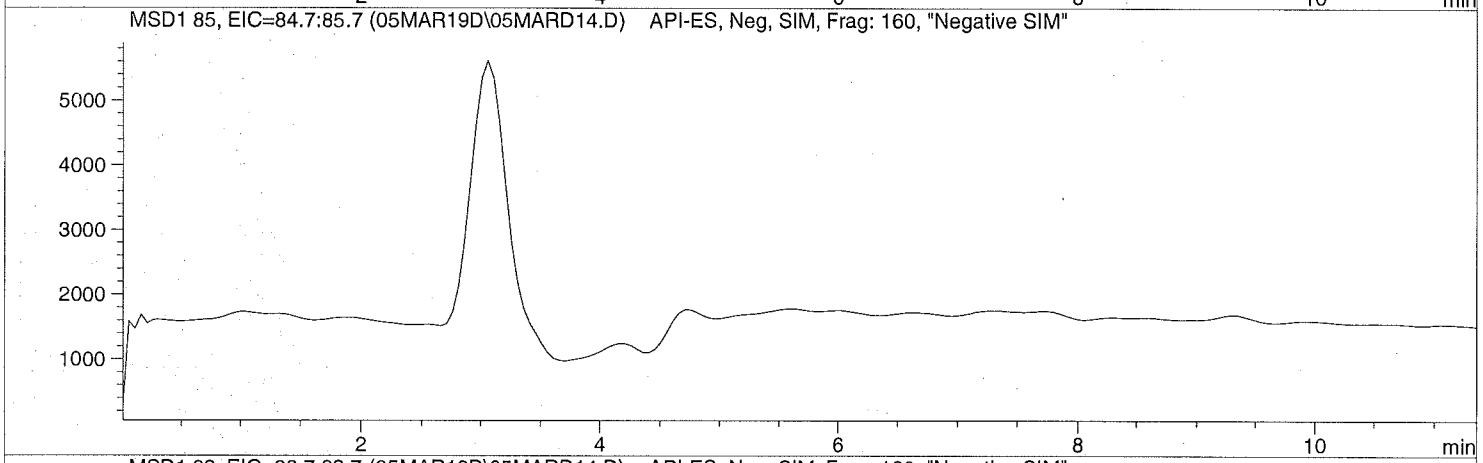
Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

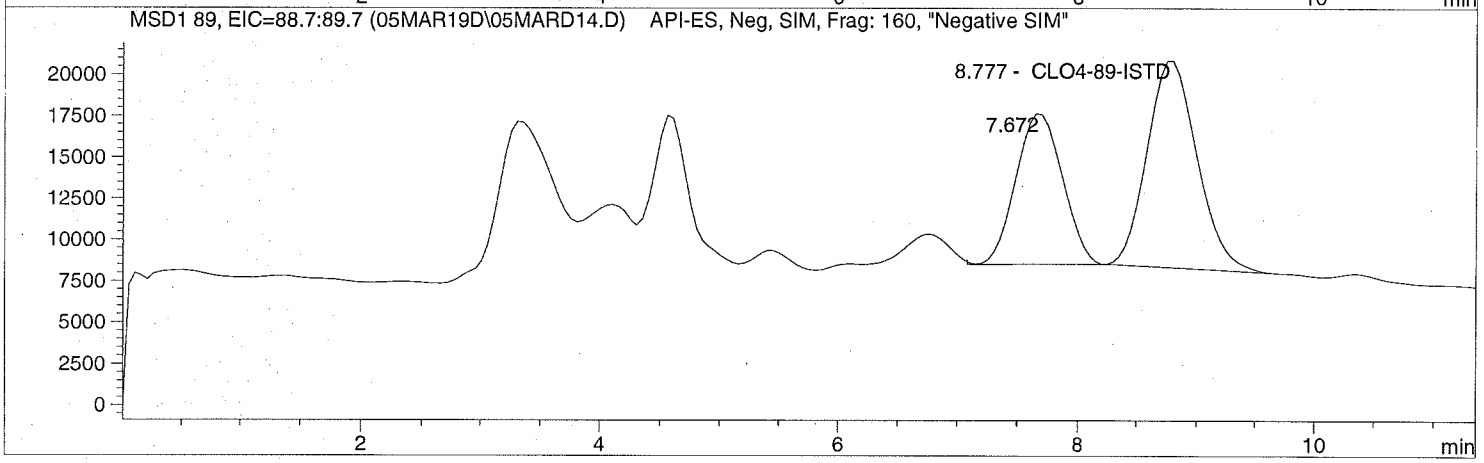
Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\05MAR19D\05MARD14.D Sample Name: 1906112009

Injection Date:	3/05/2019 11:39:24	Seq Line:	14
Sample Name:	1906112009	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	20 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP1.M
Last Changed: 2/19/2019 12:13:46

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 19. Feb. 2019,09:07:33 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
7.672	BB	243675.3	0.0000	
8.777	VBA	362717.3	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 28, 2019

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

Work Order: **HS19030298**

Laboratory Results for: **LH18/24 Longhorn GW Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Mar 07, 2019 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 Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
Work Order: HS19030298

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19030298-01	LH18/24-SP650_030619	Water		06-Mar-2019 13:00	07-Mar-2019 08:51	☐
HS19030298-02	LH18/24-SP650_030619_BIX	Water		06-Mar-2019 13:00	07-Mar-2019 08:51	☐

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LH18/24 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.

Work Order Comments

• The analysis for TOC was subcontracted to ALS Environmental in Kelso WA. Final report attached.

WetChemistry by Method E350.3

Batch ID: R334781

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

WetChemistry by Method E365.3

Batch ID: R334240

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

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples WorkOrder:HS19030298
Sample ID: LH18/24-SP650_030619 Lab ID:HS19030298-01
Collection Date: 06-Mar-2019 13:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: KVL
Nitrogen, Ammonia (As N)	**5.5**		**0.20**	**0.20**	**0.20**	**mg/L**	1	18-Mar-2019 12:30
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**0.480**		**0.100**	**0.250**	**0.250**	**mg/L**	10	08-Mar-2019 11:50
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	28-Mar-2019 08:57

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

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**

Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples WorkOrder:HS19030298

Sample ID: LH18/24-SP650_030619_BIX Lab ID:HS19030298-02

Collection Date: 06-Mar-2019 13:00 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	21-Mar-2019 17:49

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

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS19030298

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R334240	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS19030298-01	LH18/24-SP650_030619	06 Mar 2019 13:00			08 Mar 2019 11:50	10
Batch ID R334781	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS19030298-01	LH18/24-SP650_030619	06 Mar 2019 13:00			18 Mar 2019 12:30	1
Batch ID R335013	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS19030298-02	LH18/24-SP650_030619_BIX	06 Mar 2019 13:00			21 Mar 2019 17:49	1
Batch ID R335428	**Test Name :** SUBCONTRACT ANALYSIS - TOC ANALYSIS			**Matrix:** Water		
HS19030298-01	LH18/24-SP650_030619	06 Mar 2019 13:00			28 Mar 2019 08:57	1

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS19030298

QC BATCH REPORT NEW

Batch ID: R334240 (0) **Instrument:** UV-2450 **Method:** ORTHO PHOSPHATE (PO4) AS P BY E365.3

MBLK Sample ID: **MBLK-334240** Units: **mg/L** Analysis Date: **08-Mar-2019 11:50**
Client ID: Run ID: **UV-2450_334240** SeqNo: **4980068** 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-334240** Units: **mg/L** Analysis Date: **08-Mar-2019 11:50**
Client ID: Run ID: **UV-2450_334240** SeqNo: **4980069** 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)	0.221	0.0250	0.25	0	88.4	85 - 115				

MS Sample ID: **HS19030298-01MS** Units: **mg/L** Analysis Date: **08-Mar-2019 11:50**
Client ID: **LH18/24-SP650_030619** Run ID: **UV-2450_334240** SeqNo: **4980071** 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)	2.83	0.250	2.5	0.48	94.0	80 - 120				

MSD Sample ID: **HS19030298-01MSD** Units: **mg/L** Analysis Date: **08-Mar-2019 11:50**
Client ID: **LH18/24-SP650_030619** Run ID: **UV-2450_334240** SeqNo: **4980072** 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)	2.92	0.250	2.5	0.48	97.6	80 - 120	2.83	3.13	20	

The following samples were analyzed in this batch: HS19030298-01

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: HS19030298

QC BATCH REPORT NEW

Batch ID: R334781 (0) **Instrument: WetChem_HS** **Method: AMMONIA AS N BY E350.3(ISE)**

MBLK Sample ID: **MBLK-R334781** Units: **mg/L** Analysis Date: **18-Mar-2019 12:30**
Client ID: Run ID: **WetChem_HS_334781** SeqNo: **4995674** 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)	0.20	0.20								U

LCS Sample ID: **LCS-R334781** Units: **mg/L** Analysis Date: **18-Mar-2019 12:30**
Client ID: Run ID: **WetChem_HS_334781** SeqNo: **5007379** 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)	9.398	0.20	10	0	94.0	80 - 120				

MS Sample ID: **HS19030689-05MS** Units: **mg/L** Analysis Date: **18-Mar-2019 12:30**
Client ID: Run ID: **WetChem_HS_334781** SeqNo: **4995676** 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)	10.4	0.20	10	0.1809	102	80 - 120				

MSD Sample ID: **HS19030689-05MSD** Units: **mg/L** Analysis Date: **18-Mar-2019 12:30**
Client ID: Run ID: **WetChem_HS_334781** SeqNo: **4995675** 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)	10.38	0.20	10	0.1809	102	80 - 120	10.4	0.192	20	

The following samples were analyzed in this batch: HS19030298-01

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
WorkOrder: **HS19030298**

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

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	20-Dec-2021
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019
North Carolina	624-2019	31-Dec-2019
California	2919, 2018-2019	30-Apr-2019
Maryland	343, 2018-2019	30-Jun-2019

ALS Houston, US Date: 28-Mar-19

Client: Bhate Environmental Associates, Inc.
Project: LH18/24 Longhorn GW Treatment Plant Weekly Samples
Work Order: HS19030298

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS19030298-01	LH18/24-SP650_030619	Login	3/7/2019 11:27:32 AM	NDR	WET176
HS19030298-01	LH18/24-SP650_030619	Login	3/7/2019 11:27:32 AM	NDR	WET176
HS19030298-01	LH18/24-SP650_030619	Login	3/7/2019 11:27:32 AM	NDR	Sub
HS19030298-02	LH18/24-SP650_030619_BIX	Login	3/7/2019 11:27:32 AM	NDR	Sub

ALS Houston, US Date: 28-Mar-19

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS19030298
Date/Time Received: **07-Mar-2019 08:51**
Received by: **NDR**

Checklist completed by: *Nilesh D. Ranchod* eSignature 7-Mar-2019 Date
Reviewed by: *RJ Modashia* eSignature 7-Mar-2019 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 ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:N/A
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	0.2C/0.2C UC/C	IR11	
Cooler(s)/Kit(s):	43601		
Date/Time sample(s) sent to storage:	03/07/2019 13:00		
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 (281) 530-5656 ATTN: R.J Modshia

Page 1 of 1

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

Project No.: NWO1312.0150.016.0001

Job:
GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O. Number:

HS19030298
Bhate Environmental Associates, Inc.
l18/24 Longhorn GW Treatment Plant Weekly Sampl

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_030619	Water	03/06/19 / 13:00		2	X	X			H2SO4	
LH18/24-SP650_030619	Water	03/06/19 / 13:00		1			X		NONE	
LH18/24-SP650_030619_BIX	Water	03/06/19 / 13:00		1				X	NONE	

Additional Remarks: **Standard TAT on all parameters**

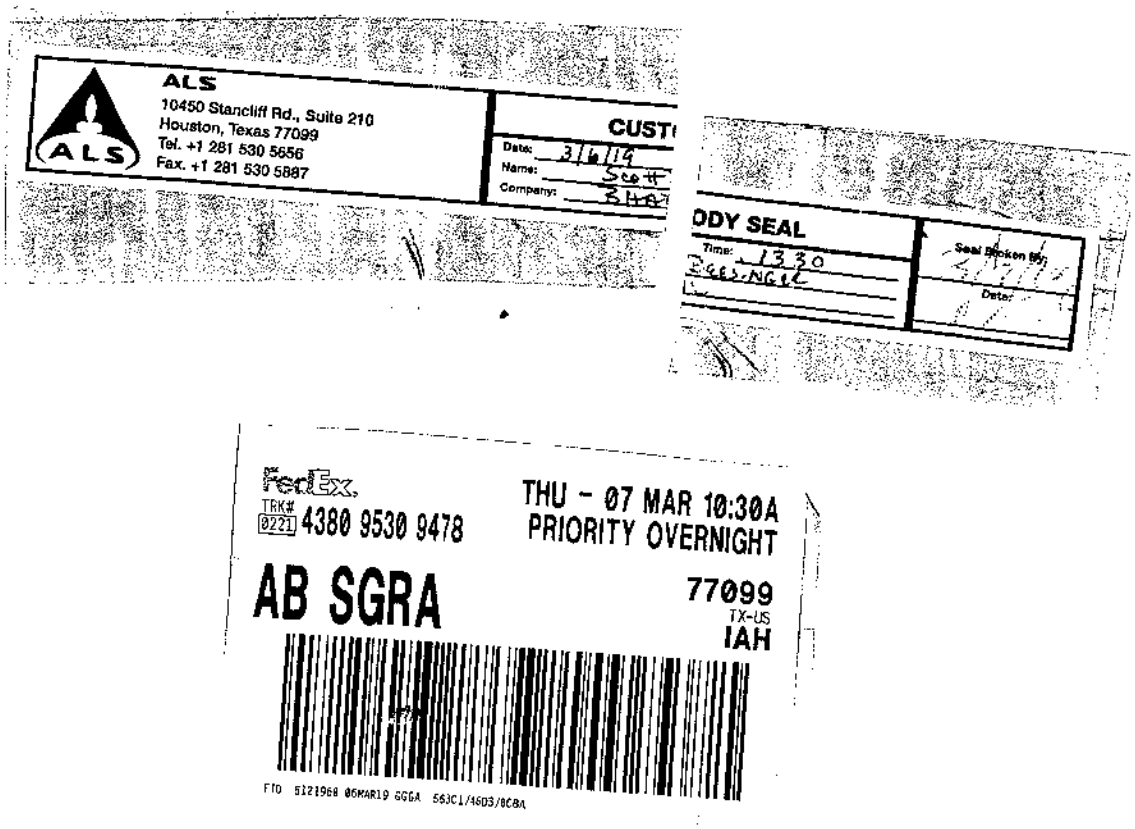
Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	03/06/19	13:30	Nia	3/7/19	07:51						

For Lab Use Only

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

Remarks: 43601 IR #11
Temp u/c 0.2

(Word) S:\l-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

CUST
Date: 3/6/19
Name:
Company:

ODY SEAL
Time: 1330
Seal Broken By
Date:

FedEx
TRK# 0221 4380 9530 9478
THU - 07 MAR 10:30A
PRIORITY OVERNIGHT
AB SGRA
77099
TX-US
IAH

FTD 5121968 06MAR19 GGGA 563C1/4603/8C8A

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

March 27, 2019

Analytical Report for Service Request No: K1902047

RJ Modashia
ALS Laboratory Group
10450 Stancliff Road
Suite 210
Houston, TX 77099-4338

RE: HS19030298

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory March 08, 2019
For your reference, these analyses have been assigned our service request number **K1902047.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3350. You may also contact me via email at Kelley.Lovejoy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kelley Lovejoy

Kelley Lovejoy
Project Manager

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

Table of Contents

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
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1317 South 13th Ave, Kelso, WA 98626 | 1-360-577-7222 | www.alsglobal.com

Client: ALS Environmental - US
Project: HS19030298
Sample Matrix: Water

Service Request: K1902047
Date Received: 03/08/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 03/08/2019. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4ºC upon receipt at the laboratory.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 03/27/2019

Chain of Custody

ALS Environmental—Kelso Laboratory
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K1902047

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: 10881

SUBCONTRACT TO:

ALS Environmental Kelso
1317 S. 13th Avenue
Kelso, WA 98626

Phone: +1 360 501 3312

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:	HS19030298
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19030298-01**	**LH18/24-SP650_031619**	**Water**	**06 Mar 2019 13:00**
	TOC Analysis for DOD Level IV			21 Mar 2019

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: 3/7/19 1800

Received By: _____ Date/Time: 3/8/19 0940

Cooler ID(s): _____ Temperature(s): _____

00934998

PC KV

Cooler Receipt and Preservation Form

Client ALS-Houston Service Request *K19* C20417

Received: 3/8/19 Opened: 3/8/19 By: BR Unloaded: 3/8/19 By: BR

1. Samples were received via? *USPS* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	Filed
-0.1	-0.3	1.9	1.7	-0.2	350	(NA)	480978314288	

4. Packing material: *Inserts* *Baggies* (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (~~ink, signed~~, etc.)? NA (Y) N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA (Y) N
   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
11. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
12. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

General Chemistry

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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K1902047
Project:	HS19030298	**Date Collected:**	03/6/19
Sample Matrix:	Water	**Date Received:**	03/8/19
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Carbon, Total Organic

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_030619	K1902047-001	**2.94**	0.50	0.20	0.07	1	03/21/19 23:03	
Method Blank	K1902047-MB	ND U	0.50	0.20	0.07	1	03/22/19 04:44	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1902047
Project:	HS19030298	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	03/22/19
		Date Extracted:	NA

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1902389-001	**Basis:**	NA
Analysis Method:	SM 5310 C		
Prep Method:	None		

Matrix Spike
K1902389-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	3.34	31.0	25.0	111	83-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1902047
Project:	HS19030298	**Date Analyzed:**	03/22/19
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	629144

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1902047-LCS	26.9	25.0	107	83-117

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: ALS Environmental - US **Service Request:** K1902047
Project: HS19030298

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	629144	KQ1903793-06	03/21/19 19:42	25.0	24.5	98	90-110
CCV2	629144	KQ1903793-07	03/21/19 23:31	25.0	24.5	98	90-110
CCV3	629144	KQ1903793-08	03/22/19 04:15	25.0	24.9	100	90-110
CCV4	629144	KQ1903793-09	03/22/19 08:58	25.0	24.4	98	90-110
CCV5	629144	KQ1903793-10	03/22/19 14:09	25.0	24.2	97	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: ALS Environmental - US **Service Request:**K1902047
Project: HS19030298

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic

Analysis Method: SM 5310 C **Units:**mg/L

	Analysis Lot	Lab Code	Date Analyzed	LOQ	LOD	MDL	Result	Q
CCB1	629144	KQ1903793-01	03/21/19 19:57	0.50	0.20	0.07	ND	U
CCB2	629144	KQ1903793-02	03/21/19 23:46	0.50	0.20	0.07	ND	U
CCB3	629144	KQ1903793-03	03/22/19 04:30	0.50	0.20	0.07	ND	U
CCB4	629144	KQ1903793-04	03/22/19 09:13	0.50	0.20	0.07	ND	U
CCB5	629144	KQ1903793-05	03/22/19 14:23	0.50	0.20	0.07	ND	U

Raw Data

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General Chemistry

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Work Request # Original ( ) K1902074, 2162, 1927, 2047, 2102, 2121, 2127, 2147, 2153, 2168, 2346, 2389, 2121, 2169, 2330, 2232, 2254, 2435

Tier: II II I IV II I II II II II IV IV I II II II IV

Date Analyzed: 3/21/19

Analyst: BCD

Run # DOC: 629142 TOC: 629144 629146 629149

Analysis: TOC/DOC

DATA QUALITY REPORT
INORGANICS

Explain any "no" responses to questions below, and any corrective actions in the comments section below.

1.	Is the method name and number correct and appropriate?	yes/no/NA
2.	Holding times met for all analyses and for all samples?	yes/no/NA
3.	Are calculations correct?	yes/no/NA
4.	Is the reporting basis correct? (Dry Weight)	yes/no/NA
5.	All quality control criteria met?	yes/no
6.	Is the calibration curve correlation coefficient ≥ 0.995?	yes/no/NA
7.	MBs, CCVs, CCBs, LCSs, Dups, and Spikes, analyzed at proper frequency?	yes/no/NA
8.	Are ICVs, CCVs, and CCBs all within acceptance limits?	yes/no/NA
9.	Are results for methods blanks all ND?	yes/no/NA
10.	Are all QC samples within acceptance criteria? (LCS % rec, MS/DMS % rec, DUP or MS/DMS RPDs, etc.)	yes/no/NA VKP 3/25/19
11.	Are all exceptions explained?	yes/no/NA
12.	Have all applicable service requests been reviewed?	yes/no/NA
13.	Are all samples labeled correctly?	yes/no/NA
14.	Have all instructions on the service request been followed? (e.g. Special MRLs, QC on a specific sample, Form V)	yes/no/NA
15.	Are detection limits and units reported correctly?	yes/no/NA
16.	Is the unused space on the benchsheet crossed out?	yes/no/NA
17.	Was analysis turned in by the due date? (n-2) (If not record SR#)	yes/no/NA

COMMENTS: K1902232-2/3, K1902121-1/2, K1902435-1/2/3/4/5/6/7, K1902254-1/2/3 Sent for reanalysis due to CCB above the MRL.
K1902102-1, K1902074-2/1 sent for reanalysis due to MS requiring a dilution.
K1902102-1 TOC sent reanalysis due to requiring a dilution.
K1902147-1 sent for reanalysis because it is overdiluted.
K1902155-1/Idup have a high %RSD due to dirty, non-homogenous sample.
K1902168-2/2d report a high %RSD, but these samples are less than 5x the MRL.

Final Approved by: [signature] Date: 03/25/19

DQREPORT

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 629142 **Method/Testcode:** SM 5310 C/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1902074-001	Carbon, Dissolved Organic (DOC)	N/A		Effluent	1.64 mg/L	10 ml	1.64 mg/L	1	0.07	0.50			3/21/19 20:56	N	II
K1902074-002	Carbon, Dissolved Organic (DOC)	N/A		Water	1.65 mg/L	10 ml	1.65 mg/L	1	0.07	0.50			3/21/19 21:24	N	II
K1902102-001	Carbon, Dissolved Organic (DOC)	N/A		Water	76.61 mg/L	10 ml	76.6 mg/L	1	0.07	0.50			3/21/19 21:52	N	II
KQ1903792-01	Carbon, Dissolved Organic (DOC)	CCB		Effluent	0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/21/19 19:57	N	II
KQ1903792-02	Carbon, Dissolved Organic (DOC)	CCB		Effluent	0.03 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/21/19 23:46	N	II
KQ1903792-03	Carbon, Dissolved Organic (DOC)	CCV		Effluent	24.51 mg/L	10 ml	24.5 mg/L	1			98		3/21/19 19:42	N	II
KQ1903792-04	Carbon, Dissolved Organic (DOC)	CCV		Effluent	24.47 mg/L	10 ml	24.5 mg/L	1			98		3/21/19 23:31	N	II
KQ1903792-05	Carbon, Dissolved Organic (DOC)	MB		Effluent	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/21/19 20:12	N	II
KQ1903792-06	Carbon, Dissolved Organic (DOC)	LCS		Effluent	26.54 mg/L	10 ml	26.5 mg/L	1	0.07	0.50	106		3/21/19 20:26	N	II
KQ1903792-07	Carbon, Dissolved Organic (DOC)	MS	K1902102-001	Water	99.38 mg/L	10 ml	99.4 mg/L	1	0.07	0.50	91		3/21/19 22:20	N	II
KQ1903792-08	Carbon, Dissolved Organic (DOC)	DUP	K1902102-001	Water	78.20 mg/L	10 ml	78.2 mg/L	1	0.07	0.50		2	3/21/19 21:52	N	II
KQ1903792-09	Carbon, Dissolved Organic (DOC)	DUP	K1902074-002	Water	1.68 mg/L	10 ml	1.68 mg/L	1	0.07	0.50		2	3/21/19 21:24	N	II
KQ1903792-10	Carbon, Dissolved Organic (DOC)	DUP	K1902074-001	Effluent	1.62 mg/L	10 ml	1.62 mg/L	1	0.07	0.50		1	3/21/19 20:56	N	II

03/25/19

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 629144 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1901927-005	Carbon, Total Organic	N/A		Ground Water	45.71 mg/L	10 ml	45.7 mg/L	1	0.07	0.50			3/22/19 00:01	N	I
K1902047-001	Carbon, Total Organic	N/A		Water	2.94 mg/L	10 ml	2.94 mg/L	1	0.07	0.50			3/21/19 23:03	N	IV
K1902102-001	Carbon, Total Organic	N/A		Water	83.22 mg/L	10 ml	83.2 mg/L	1	0.07	0.50			3/22/19 05:42	N	II
K1902121-002	Carbon, Total Organic	N/A		Reagent Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 20:19	N	I
K1902127-001	Carbon, Total Organic	N/A		Water	15.73 mg/L	10 ml	15.7 mg/L	1	0.07	0.50			3/22/19 06:10	N	II
K1902127-002	Carbon, Total Organic	N/A		Water	7.06 mg/L	10 ml	28.2 mg/L	4	0.3	2.0			3/22/19 06:38	N	II
K1902127-003	Carbon, Total Organic	N/A		Water	7.65 mg/L	10 ml	7.65 mg/L	1	0.07	0.50			3/22/19 07:06	N	II
K1902127-004	Carbon, Total Organic	N/A		Water	4.54 mg/L	10 ml	18.1 mg/L	4	0.3	2.0			3/22/19 07:34	N	II
K1902147-001 RA	Carbon, Total Organic	N/A		Water	0.23 mg/L	10 ml	50 mg/L U	100	7	50			3/22/19 08:02	N	II
K1902147-002	Carbon, Total Organic	N/A		Water	0.95 mg/L	10 ml	0.95 mg/L	1	0.07	0.50			3/22/19 08:30	N	II
K1902153-001	Carbon, Total Organic	N/A		Water	2.23 mg/L	10 ml	223 mg/L	100	7	50			3/22/19 02:50	N	II
K1902153-002	Carbon, Total Organic	N/A		Water	3.16 mg/L	10 ml	316 mg/L	100	7	50			3/22/19 03:19	N	II
K1902153-003	Carbon, Total Organic	N/A		Water	1.20 mg/L	10 ml	120 mg/L	100	7	50			3/22/19 03:47	N	II
K1902168-001	Carbon, Total Organic	N/A		Water	1.86 mg/L	10 ml	1.86 mg/L	1	0.07	0.50			3/22/19 09:28	N	II
K1902168-002	Carbon, Total Organic	N/A		Water	0.87 mg/L	10 ml	0.87 mg/L	1	0.07	0.50			3/22/19 09:56	N	II
K1902346-001	Carbon, Total Organic	N/A		Water	2.96 mg/L	10 ml	2.96 mg/L	1	0.07	0.50			3/22/19 05:14	N	IV
K1902389-001	Carbon, Total Organic	N/A		Water	3.34 mg/L	10 ml	3.34 mg/L	1	0.07	0.50			3/22/19 00:57	Y	IV
K1902389-002	Carbon, Total Organic	N/A		Water	27.06 mg/L	10 ml	27.1 mg/L	1	0.07	0.50			3/22/19 01:54	N	IV
K1902389-003	Carbon, Total Organic	N/A		Water	27.93 mg/L	10 ml	27.9 mg/L	1	0.07	0.50			3/22/19 02:22	N	IV
KQ1903793-01	Carbon, Total Organic	CCB		Water	9.45000000000001E	10 ml	0.50 mg/L U	1	0.07	0.50			3/21/19 19:57	N	IV
KQ1903793-02	Carbon, Total Organic	CCB		Water	0.03 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/21/19 23:46	N	IV
KQ1903793-03	Carbon, Total Organic	CCB		Water	0.05 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 04:30	N	IV
KQ1903793-04	Carbon, Total Organic	CCB		Water	-0.17 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 09:13	N	IV
KQ1903793-05	Carbon, Total Organic	CCB		Water	-0.19 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 14:23	N	IV
KQ1903793-06	Carbon, Total Organic	CCV		Water	24.51 mg/L	10 ml	24.5 mg/L	1			98		3/21/19 19:42	N	IV
KQ1903793-07	Carbon, Total Organic	CCV		Water	24.47 mg/L	10 ml	24.5 mg/L	1			98		3/21/19 23:31	N	IV
KQ1903793-08	Carbon, Total Organic	CCV		Water	24.91 mg/L	10 ml	24.9 mg/L	1			100		3/22/19 04:15	N	IV
KQ1903793-09	Carbon, Total Organic	CCV		Water	24.39 mg/L	10 ml	24.4 mg/L	1			98		3/22/19 08:58	N	IV
KQ1903793-10	Carbon, Total Organic	CCV		Water	24.24 mg/L	10 ml	24.2 mg/L	1			97		3/22/19 14:09	N	IV
KQ1903793-11	Carbon, Total Organic	MB		Water	1.65000000000001E	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 04:44	N	IV
KQ1903793-12	Carbon, Total Organic	LCS		Water	26.86 mg/L	10 ml	26.9 mg/L	1	0.07	0.50	107		3/22/19 04:59	N	IV
KQ1903793-13	Carbon, Total Organic	MS	K1902389-001	Water	30.99 mg/L	10 ml	31.0 mg/L	1	0.07	0.50	111		3/22/19 01:25	N	IV
KQ1903793-14	Carbon, Total Organic	DUP	K1902047-001	Water	2.93 mg/L	10 ml	2.93 mg/L	1	0.07	0.50		<1	3/21/19 23:03	N	IV
KQ1903793-15	Carbon, Total Organic	DUP	K1901927-005	Ground Water	46.15 mg/L	10 ml	46.1 mg/L	1	0.07	0.50		<1	3/22/19 00:01	N	I

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

03/25/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 629144 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1903793-16	Carbon, Total Organic	DUP	K1902389-001	Water	3.34 mg/L	10 ml	3.34 mg/L	1	0.07	0.50		<1	3/22/19 00:57	N	IV
KQ1903793-17	Carbon, Total Organic	DUP	K1902389-002	Water	27.77 mg/L	10 ml	27.8 mg/L	1	0.07	0.50		3	3/22/19 01:54	N	IV
KQ1903793-18	Carbon, Total Organic	DUP	K1902389-003	Water	27.82 mg/L	10 ml	27.8 mg/L	1	0.07	0.50		<1	3/22/19 02:22	N	IV
KQ1903793-19	Carbon, Total Organic	DUP	K1902153-001	Water	1.67 mg/L	10 ml	167 mg/L	100	7	50		29*	3/22/19 02:50	N	II
KQ1903793-20	Carbon, Total Organic	DUP	K1902153-002	Water	3.14 mg/L	10 ml	314 mg/L	100	7	50		<1	3/22/19 03:19	N	II
KQ1903793-21	Carbon, Total Organic	DUP	K1902153-003	Water	1.13 mg/L	10 ml	113 mg/L	100	7	50		6	3/22/19 03:47	N	II
KQ1903793-22	Carbon, Total Organic	DUP	K1902346-001	Water	2.84 mg/L	10 ml	2.84 mg/L	1	0.07	0.50		4	3/22/19 05:14	N	IV
KQ1903793-23	Carbon, Total Organic	DUP	K1902102-001	Water	83.37 mg/L	10 ml	83.4 mg/L	1	0.07	0.50		<1	3/22/19 05:42	N	II
KQ1903793-24	Carbon, Total Organic	DUP	K1902121-002	Reagent Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	3/22/19 20:19	N	I
KQ1903793-25	Carbon, Total Organic	DUP	K1902127-001	Water	15.57 mg/L	10 ml	15.6 mg/L	1	0.07	0.50		<1	3/22/19 06:10	N	II
KQ1903793-26	Carbon, Total Organic	DUP	K1902127-002	Water	6.91 mg/L	10 ml	27.6 mg/L	4	0.3	2.0		2	3/22/19 06:38	N	II
KQ1903793-27	Carbon, Total Organic	DUP	K1902127-003	Water	7.52 mg/L	10 ml	7.52 mg/L	1	0.07	0.50		2	3/22/19 07:06	N	II
KQ1903793-28	Carbon, Total Organic	DUP	K1902127-004	Water	4.39 mg/L	10 ml	17.6 mg/L	4	0.3	2.0		3	3/22/19 07:34	N	II
KQ1903793-29	Carbon, Total Organic	DUP	K1902147-001	Water	0.22 mg/L	10 ml	22 mg/L J	100	7	50		NC	3/22/19 08:02	N	II
KQ1903793-30	Carbon, Total Organic	DUP	K1902147-002	Water	0.91 mg/L	10 ml	0.91 mg/L	1	0.07	0.50		4	3/22/19 08:30	N	II
KQ1903793-31	Carbon, Total Organic	DUP	K1902168-001	Water	1.78 mg/L	10 ml	1.78 mg/L	1	0.07	0.50		4	3/22/19 09:28	N	II
KQ1903793-32	Carbon, Total Organic	DUP	K1902168-002	Water	0.76 mg/L	10 ml	0.76 mg/L	1	0.07	0.50		14*	3/22/19 09:56	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 629146 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1902121-001 RA	Carbon, Total Organic	N/A		Reagent Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 19:51	N	I
K1902169-001	Carbon, Total Organic	N/A		Water	14.29 mg/L	10 ml	14.3 mg/L	1	0.07	0.50			3/22/19 10:24	N	II
K1902169-002	Carbon, Total Organic	N/A		Water	17.52 mg/L	10 ml	17.5 mg/L	1	0.07	0.50			3/22/19 10:52	N	II
K1902169-003	Carbon, Total Organic	N/A		Water	18.67 mg/L	10 ml	18.7 mg/L	1	0.07	0.50			3/22/19 11:20	N	II
K1902169-004	Carbon, Total Organic	N/A		Water	9.18 mg/L	10 ml	9.18 mg/L	1	0.07	0.50			3/22/19 11:48	N	II
K1902169-005	Carbon, Total Organic	N/A		Water	11.61 mg/L	10 ml	11.6 mg/L	1	0.07	0.50			3/22/19 12:16	N	II
K1902169-006	Carbon, Total Organic	N/A		Water	11.71 mg/L	10 ml	11.7 mg/L	1	0.07	0.50			3/22/19 12:44	N	II
K1902169-007	Carbon, Total Organic	N/A		Water	12.46 mg/L	10 ml	12.5 mg/L	1	0.07	0.50			3/22/19 13:12	N	II
K1902169-008	Carbon, Total Organic	N/A		Water	15.31 mg/L	10 ml	15.3 mg/L	1	0.07	0.50			3/22/19 13:41	N	II
K1902230-001	Carbon, Total Organic	N/A		Water	1.86 mg/L	10 ml	1.86 mg/L	1	0.07	0.50			3/22/19 15:07	N	II
K1902230-002	Carbon, Total Organic	N/A		Water	0.70 mg/L	10 ml	0.70 mg/L	1	0.07	0.50			3/22/19 15:35	N	II
K1902230-003	Carbon, Total Organic	N/A		Water	0.80 mg/L	10 ml	0.80 mg/L	1	0.07	0.50			3/22/19 16:03	N	II
K1902230-004	Carbon, Total Organic	N/A		Water	1.23 mg/L	10 ml	1.23 mg/L	1	0.07	0.50			3/22/19 16:32	N	II
K1902230-005	Carbon, Total Organic	N/A		Water	0.32 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 17:00	N	II
K1902232-001	Carbon, Total Organic	N/A		Water	5.72 mg/L	10 ml	5.72 mg/L	1	0.07	0.50			3/22/19 17:28	N	II
K1902232-002 RA	Carbon, Total Organic	N/A		Water	9.75 mg/L	10 ml	9.75 mg/L	1	0.07	0.50			3/22/19 18:55	N	II
K1902232-003 RA	Carbon, Total Organic	N/A		Water	13.90 mg/L	10 ml	13.9 mg/L	1	0.07	0.50			3/22/19 19:23	N	II
KQ1903794-01	Carbon, Total Organic	CCB		Water	-0.17 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 09:13	N	II
KQ1903794-02	Carbon, Total Organic	CCB		Water	-0.19 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 14:23	N	II
KQ1903794-03	Carbon, Total Organic	CCB		Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 18:40	N	II
KQ1903794-04	Carbon, Total Organic	CCB (High)		Water	0.89 mg/L	10 ml	0.89 mg/L	1	0.07	0.50			3/22/19 23:50	N	II
KQ1903794-05	Carbon, Total Organic	CCV		Water	24.39 mg/L	10 ml	24.4 mg/L	1			98		3/22/19 08:58	N	II
KQ1903794-06	Carbon, Total Organic	CCV		Water	24.24 mg/L	10 ml	24.2 mg/L	1			97		3/22/19 14:09	N	II
KQ1903794-07	Carbon, Total Organic	CCV		Water	23.91 mg/L	10 ml	23.9 mg/L	1			96		3/22/19 18:25	N	II
KQ1903794-08	Carbon, Total Organic	CCV		Water	27.39 mg/L	10 ml	27.4 mg/L	1			110		3/22/19 23:35	N	II
KQ1903794-09	Carbon, Total Organic	MB		Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 14:38	N	II
KQ1903794-10	Carbon, Total Organic	LCS		Water	26.10 mg/L	10 ml	26.1 mg/L	1	0.07	0.50	104		3/22/19 14:53	N	II
KQ1903794-11	Carbon, Total Organic	MS	K1902232-001	Water	33.31 mg/L	10 ml	33.3 mg/L	1	0.07	0.50	110		3/22/19 17:56	N	II
KQ1903794-12	Carbon, Total Organic	DUP	K1902169-001	Water	14.17 mg/L	10 ml	14.2 mg/L	1	0.07	0.50		<1	3/22/19 10:24	N	II
KQ1903794-13	Carbon, Total Organic	DUP	K1902169-002	Water	17.70 mg/L	10 ml	17.7 mg/L	1	0.07	0.50		1	3/22/19 10:52	N	II
KQ1903794-14	Carbon, Total Organic	DUP	K1902169-003	Water	18.63 mg/L	10 ml	18.6 mg/L	1	0.07	0.50		<1	3/22/19 11:20	N	II
KQ1903794-15	Carbon, Total Organic	DUP	K1902169-004	Water	9.05 mg/L	10 ml	9.05 mg/L	1	0.07	0.50		1	3/22/19 11:48	N	II
KQ1903794-16	Carbon, Total Organic	DUP	K1902169-005	Water	11.53 mg/L	10 ml	11.5 mg/L	1	0.07	0.50		<1	3/22/19 12:16	N	II
KQ1903794-17	Carbon, Total Organic	DUP	K1902169-006	Water	11.48 mg/L	10 ml	11.5 mg/L	1	0.07	0.50		2	3/22/19 12:44	N	II
KQ1903794-18	Carbon, Total Organic	DUP	K1902169-007	Water	12.85 mg/L	10 ml	12.9 mg/L	1	0.07	0.50		3	3/22/19 13:12	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

03/25/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 629146 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1903794-19	Carbon, Total Organic	DUP	K1902169-008	Water	15.02 mg/L	10 ml	15.0 mg/L	1	0.07	0.50		2	3/22/19 13:41	N	II
KQ1903794-20	Carbon, Total Organic	DUP	K1902230-001	Water	1.86 mg/L	10 ml	1.86 mg/L	1	0.07	0.50		<1	3/22/19 15:07	N	II
KQ1903794-21	Carbon, Total Organic	DUP	K1902230-002	Water	0.64 mg/L	10 ml	0.64 mg/L	1	0.07	0.50		8	3/22/19 15:35	N	II
KQ1903794-22	Carbon, Total Organic	DUP	K1902230-003	Water	0.79 mg/L	10 ml	0.79 mg/L	1	0.07	0.50		<1	3/22/19 16:03	N	II
KQ1903794-23	Carbon, Total Organic	DUP	K1902230-004	Water	1.14 mg/L	10 ml	1.14 mg/L	1	0.07	0.50		7	3/22/19 16:32	N	II
KQ1903794-24	Carbon, Total Organic	DUP	K1902230-005	Water	0.30 mg/L	10 ml	0.30 mg/L J	1	0.07	0.50		NC	3/22/19 17:00	N	II
KQ1903794-25	Carbon, Total Organic	DUP	K1902232-001	Water	5.79 mg/L	10 ml	5.79 mg/L	1	0.07	0.50		1	3/22/19 17:28	N	II
KQ1903794-26	Carbon, Total Organic	DUP	K1902232-002	Water	9.86 mg/L	10 ml	9.86 mg/L	1	0.07	0.50		1	3/22/19 18:55	N	II
KQ1903794-27	Carbon, Total Organic	DUP	K1902232-003	Water	13.87 mg/L	10 ml	13.9 mg/L	1	0.07	0.50		<1	3/22/19 19:23	N	II
KQ1903794-28	Carbon, Total Organic	DUP	K1902121-001	Reagent Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	3/22/19 19:51	N	I

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Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 629149 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1902254-001	Carbon, Total Organic	N/A		Water	6.54 mg/L	10 ml	6.54 mg/L	1	0.07	0.50			3/23/19 01:02	N	II
K1902254-002	Carbon, Total Organic	N/A		Water	18.37 mg/L	10 ml	18.4 mg/L	1	0.07	0.50			3/23/19 01:30	N	II
K1902254-003	Carbon, Total Organic	N/A		Water	22.01 mg/L	10 ml	22.0 mg/L	1	0.07	0.50			3/23/19 01:58	N	II
K1902435-001	Carbon, Total Organic	N/A		Ground Water	119.91 mg/L	10 ml	120 mg/L	1	0.07	0.50			3/22/19 20:47	N	IV
K1902435-002	Carbon, Total Organic	N/A		Ground Water	5.07 mg/L	10 ml	5.07 mg/L	1	0.07	0.50			3/22/19 21:15	N	IV
K1902435-003	Carbon, Total Organic	N/A		Ground Water	3.20 mg/L	10 ml	3.20 mg/L	1	0.07	0.50			3/22/19 21:43	N	IV
K1902435-004	Carbon, Total Organic	N/A		Ground Water	5.08 mg/L	10 ml	5.08 mg/L	1	0.07	0.50			3/22/19 22:11	N	IV
K1902435-005	Carbon, Total Organic	N/A		Ground Water	137.01 mg/L	10 ml	137 mg/L	1	0.07	0.50			3/22/19 22:39	N	IV
K1902435-006	Carbon, Total Organic	N/A		Ground Water	118.27 mg/L	10 ml	118 mg/L	1	0.07	0.50			3/22/19 23:07	N	IV
K1902435-007	Carbon, Total Organic	N/A		Ground Water	12.50 mg/L	10 ml	12.5 mg/L	1	0.07	0.50			3/23/19 00:05	Y	IV
KQ1903795-01	Carbon, Total Organic	CCB		Ground Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/22/19 18:40	N	IV
KQ1903795-02	Carbon, Total Organic	CCB		Ground Water	0.89 mg/L	10 ml	0.89 mg/L	1	0.07	0.50			3/22/19 23:50	N	IV
KQ1903795-03	Carbon, Total Organic	CCB		Ground Water	-0.24 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			3/23/19 03:09	N	IV
KQ1903795-04	Carbon, Total Organic	CCV		Ground Water	23.91 mg/L	10 ml	23.9 mg/L	1			96		3/22/19 18:25	N	IV
KQ1903795-05	Carbon, Total Organic	CCV		Ground Water	27.39 mg/L	10 ml	27.4 mg/L	1			110		3/22/19 23:35	N	IV
KQ1903795-06	Carbon, Total Organic	CCV		Ground Water	23.81 mg/L	10 ml	23.8 mg/L	1			95		3/23/19 02:55	N	IV
KQ1903795-09	Carbon, Total Organic	MS	K1902435-007	Ground Water	33.24 mg/L	10 ml	33.2 mg/L	1	0.07	0.50	83		3/23/19 00:33	N	IV
KQ1903795-10	Carbon, Total Organic	DUP	K1902435-001	Ground Water	112.05 mg/L	10 ml	112 mg/L	1	0.07	0.50		7	3/22/19 20:47	N	IV
KQ1903795-11	Carbon, Total Organic	DUP	K1902435-002	Ground Water	3.05 mg/L	10 ml	3.05 mg/L	1	0.07	0.50		50*	3/22/19 21:15	N	IV
KQ1903795-12	Carbon, Total Organic	DUP	K1902435-003	Ground Water	2.88 mg/L	10 ml	2.88 mg/L	1	0.07	0.50		11*	3/22/19 21:43	N	IV
KQ1903795-13	Carbon, Total Organic	DUP	K1902435-004	Ground Water	4.70 mg/L	10 ml	4.70 mg/L	1	0.07	0.50		8	3/22/19 22:11	N	IV
KQ1903795-14	Carbon, Total Organic	DUP	K1902435-005	Ground Water	127.76 mg/L	10 ml	128 mg/L	1	0.07	0.50		7	3/22/19 22:39	N	IV
KQ1903795-15	Carbon, Total Organic	DUP	K1902435-006	Ground Water	127.20 mg/L	10 ml	127 mg/L	1	0.07	0.50		7	3/22/19 23:07	N	IV
KQ1903795-16	Carbon, Total Organic	DUP	K1902435-007	Ground Water	12.30 mg/L	10 ml	12.3 mg/L	1	0.07	0.50		2	3/23/19 00:05	N	IV
KQ1903795-17	Carbon, Total Organic	DUP	K1902254-001	Water	6.38 mg/L	10 ml	6.38 mg/L	1	0.07	0.50		3	3/23/19 01:02	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

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03/25/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 629149 **Method/Testcode:** SM 5310 C/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1903795-18	Carbon, Total Organic	DUP	K1902254-002	Water	18.17 mg/L	10 ml	18.2 mg/L	1	0.07	0.50		1	3/23/19 01:30	N	II
KQ1903795-19	Carbon, Total Organic	DUP	K1902254-003	Water	21.93 mg/L	10 ml	21.9 mg/L	1	0.07	0.50		<1	3/23/19 01:58	N	II

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DOC; 629142
TOC: 629144, 629146, 629149

Schedule: 03212019

Version: 4
Instrument: Fusion1
Last Saved by: Fusion1 (Fusion1)
Last Saved on: 2019/03/21 18:03 - Thursday

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps	Use	State
(Clean)	Clean	Clean		1	True	Ready
(Clean)	Clean	Clean		1	True	Ready
(Clean)	Clean	Clean		1	True	Ready
(Blank)	Blank	Reagent/Acid Blank		1	True	Ready
D	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
1	Sample	MB1	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
2	Sample	ICS	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
3	Sample	K1902074-001.03 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
4	Sample	K1902074-002.03 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
5	Sample	K1902102-001.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
6	Sample	K1902102-001.01 ms doc	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
7	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
8	Sample	FB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
9	Sample	K1902047-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
10	Sample	K1901927-005.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
11	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
12	Sample	K1902389-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
13	Sample	K1902389-001.01 ms	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
14	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
15	Sample	K1902389-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
16	Sample	K1902389-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
17	Sample	K1902153-001.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
18	Sample	K1902153-002.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
19	Sample	K1902153-003.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
20	Sample	MB2	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
21	Sample	K1902346-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
22	Sample	K1902102-001.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
23	Sample	K1902127-001.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
24	Sample	K1902127-002.12 4x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
25	Sample	K1902127-003.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
26	Sample	K1902127-004.12 4x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
27	Sample	K1902147-001.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
28	Sample	K1902147-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
29	Sample	K1902168-001.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
30	Sample	K1902168-002.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
31	Sample	K1902169-001.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
32	Sample	K1902169-002.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
33	Sample	K1902169-003.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
34	Sample	K1902169-004.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
35	Sample	K1902169-005.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
36	Sample	K1902169-006.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
37	Sample	K1902169-007.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
38	Sample	K1902169-008.24	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready

3/25/19

Schedule: 03212019

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps	Use	State
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
39	Sample	MB3	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
40	Sample	K1902230-001.05	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
41	Sample	K1902230-002.05	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
42	Sample	K1902230-003.05	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
43	Sample	K1902230-004.05	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
44	Sample	K1902230-005.05	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
45	Sample	K1902232-001.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
46	Sample	K1902232-001.12 ms	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
47	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
48	Sample	K1902232-002.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
49	Sample	K1902232-003.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
50	Sample	K1902121-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
51	Sample	K1902121-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
52	Sample	K1902435-001.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
53	Sample	K1902435-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
54	Sample	K1902435-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
55	Sample	K1902435-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
56	Sample	K1902435-005.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
57	Sample	K1902435-006.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
58	Sample	MB4	CAS_salt_010711 (CAS_salt_010711)	1	False	Ready
C	Check Standard	[TOC] LCS [24.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	False	Ready
59	Sample	K1902435-007.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
60	Sample	K1902435-007.01 ms	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
61	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
62	Sample	K1902254-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
63	Sample	K1902254-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
64	Sample	K1902254-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
65	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
B	Check Standard	[TOC] CCV 25 ppm [25 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
D	Check Standard	[TOC] CCB [0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
					False	

Fusion Report - 03212019
Thursday, March 21, 2019 04:58 PM

(View - Reps, Unused Reps, Meta-Data, Signature, History)
Printed on 2019/03/23 11:38 - Saturday

Report Summary Information

Company Location:	Gen Chem Lab		
Schedule Name:	03212019	Engine Version:	1.1.5.1
Instrument Name:	Fusion1	Firmware Version:	1.2.0696
Report Version:	1 of 1	Connection:	RS232 COM1
Report Creation by Operators (schedule version):	Fusion1 (Fusion1) (v2) Fusion1 (Fusion1) (v3) Fusion1 (Fusion1) (v4)		
Comment:			

Report Results

03/25/19

Sample Type: Clean — From Schedule Version 2

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/03/21 16:58

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	13.69	16.58	2.89	49.93	07:59
2	TC Clean	20.38	23.31	2.93	49.73	07:19
3	TC Clean	2.42	5.55	3.13	49.79	07:01
4	TC Clean	1.97	4.69	2.71	49.80	07:01

Sample Type: Clean — From Schedule Version 3

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/03/21 17:32

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	10.80	13.84	3.04	49.90	08:01
2	TC Clean	4.74	7.49	2.75	49.73	07:16
3	TC Clean	1.91	4.68	2.77	49.81	06:59
4	TC Clean	1.32	4.10	2.77	49.81	07:04

Sample Type: Clean

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/03/21 18:06

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	1.03	3.77	2.74	49.95	08:00
2	TC Clean	4.31	6.95	2.64	49.79	07:16
3	TC Clean	1.72	4.56	2.84	49.85	07:02
4	TC Clean	1.74	4.48	2.74	49.84	07:03

Sample Type: Blank (Creating v1238)

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Start Time
◆	(blank)		Reagent/Acid Blank	2019/03/21 18:41

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	1.00	3.60	2.60	49.84	05:29
2	TC Clean	4.32	7.12	2.80	49.86	07:17
3	TC Clean	2.15	5.14	2.99	49.89	07:02
4	TC Clean	2.00	4.74	2.74	49.91	07:02
5	Reagent Blank	8.64	11.55	2.91	49.90	08:11
6	Acid Blank	1.76	4.51	2.75	49.59	05:29

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	D	TOC	RB	0.6753 ppm	0.0000 ppm	0.0000%	2019/03/21 19:27

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6753	6.7532	13.68	16.57	2.90	50.05	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.7429 ppm (PASS)	0.0000 ppm	0%	2019/03/21 19:42

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.7429	247.4293	177.42	180.64	3.22	50.08	10:34

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.2462 ppm (PASS)	0.0000 ppm	0%	2019/03/21 19:57

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.2462	2.4625	11.13	14.12	2.99	50.11	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	1	TOC	MB1	0.1945 ppm	0.0000 ppm	0.0000%	2019/03/21 20:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1945	1.9447	10.41	13.45	3.03	50.13	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS [24.0 ppm]	0 / infinity (NA / NA)	26.7752 ppm (PASS)	0.0000 ppm	0%	2019/03/21 20:26

Pos	Base Analysis	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

	Type									
C	TOC	25.0 ppm	1	26.7752	267.7521	191.21	194.15	2.94	50.12	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	25 ppmC

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	2	TOC	ICS	0.5996 ppm	0.0000 ppm	0.0000%	2019/03/21 20:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5996	5.9960	13.16	16.20	3.04	50.14	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	3	TOC	K1902074-001.03 doc	1.8667 ppm	0.0140 ppm	0.7500%	2019/03/21 20:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.8766	18.7657	21.83	24.73	2.90	50.18	10:27
2	TOC	1.8568	18.5683	21.70	24.80	3.10	50.17	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	4	TOC	K1902074-002.03 doc	1.9020 ppm	0.0253 ppm	1.3300%	2019/03/21 21:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.8841	18.8408	21.88	24.73	2.85	50.15	10:26
2	TOC	1.9199	19.1988	22.12	24.96	2.84	50.11	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	5	TOC	K1902102-001.01 doc	77.6461 ppm	1.1244 ppm	1.4500%	2019/03/21 21:52

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	76.8510	768.5100	530.75	533.65	2.90	50.09	10:28
2	TOC	78.4412	784.4117	541.55	544.57	3.03	50.08	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC)	CAS_salt_010711	CAS_salt_010711

(v1238) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	6	TOC	K1902102-001.01 ms doc	99.6155 ppm	0.0000 ppm	0.0000%	2019/03/21 22:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	99.6155	996.1549	685.28	688.33	3.06	50.06	10:33

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	7	TOC	RB	0.8853 ppm	0.0000 ppm	0.0000%	2019/03/21 22:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.8853	8.8525	15.10	18.27	3.17	50.02	10:33

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	8	TOC	FB	0.3991 ppm	0.0000 ppm	0.0000%	2019/03/21 22:49

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3991	3.9909	11.80	14.63	2.83	50.08	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	9	TOC	K1902047-001.01	3.1747 ppm	0.0064 ppm	0.2000%	2019/03/21 23:03

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.1792	31.7917	30.67	33.69	3.02	50.09	10:26
2	TOC	3.1702	31.7018	30.61	33.43	2.82	50.08	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.7049 ppm (PASS)	0.0000 ppm	0%	2019/03/21 23:31

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.7049	247.0492	177.16	180.15	2.99	50.08	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.2679 ppm (PASS)	0.0000 ppm	0%	2019/03/21 23:46

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.2679	2.6790	11.28	14.33	3.04	50.09	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	10	TOC	K1901927-005.03	46.1675 ppm	0.3093 ppm	0.6700%	2019/03/22 00:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	45.9488	459.4884	320.99	323.90	2.91	50.06	10:30
2	TOC	46.3862	463.8624	323.96	326.76	2.80	50.07	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	11	TOC	RB	0.6373 ppm	0.1548 ppm	24.2900%	2019/03/22 00:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7468	7.4677	14.16	17.16	3.00	50.07	10:28
2	TOC	0.5279	5.2785	12.68	15.49	2.81	50.05	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	12	TOC	K1902389-001.01	3.5762 ppm	0.0031 ppm	0.0900%	2019/03/22 00:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.5740	35.7399	33.35	36.29	2.94	50.02	10:24
2	TOC	3.5784	35.7841	33.38	36.25	2.87	50.02	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	13	TOC	K1902389-001.01 ms	31.2217 ppm	0.0000 ppm	0.0000%	2019/03/22 01:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.2217	312.2170	221.02	223.80	2.78	50.00	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	14	TOC	RB	0.3757 ppm	0.0000 ppm	0.0000%	2019/03/22 01:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3757	3.7567	11.64	14.47	2.82	50.01	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	15	TOC	K1902389-002.01	27.6512 ppm	0.5067 ppm	1.8300%	2019/03/22 01:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.2930	272.9296	194.36	197.15	2.80	50.00	10:27
2	TOC	28.0095	280.0953	199.22	201.90	2.69	49.98	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	16	TOC	K1902389-003.01	28.1127 ppm	0.0750 ppm	0.2700%	2019/03/22 02:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	28.1657	281.6569	200.28	203.19	2.91	49.97	10:27
2	TOC	28.0596	280.5962	199.56	202.41	2.85	49.98	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

		Analysis			Std. Dev.		

	Pos	Type	Sample ID	Result (ppmC)	(ppmC)	RSD	Start Time
◈	17	TOC	K1902153-001.01 100x	2.1834 ppm	0.3944 ppm	18.0600%	2019/03/22 02:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.4623	24.6231	25.81	28.60	2.80	49.95	10:30
2	TOC	1.9046	19.0456	22.02	24.86	2.84	49.96	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	18	TOC	K1902153-002.01 100x	3.3888 ppm	0.0121 ppm	0.3600%	2019/03/22 03:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.3974	33.9735	32.15	35.09	2.93	50.01	10:28
2	TOC	3.3803	33.8026	32.04	34.91	2.87	49.96	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	19	TOC	K1902153-003.01 100x	1.4009 ppm	0.0500 ppm	3.5700%	2019/03/22 03:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4362	14.3623	18.84	21.63	2.79	49.95	10:28
2	TOC	1.3655	13.6551	18.36	21.10	2.74	49.93	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	25.1491 ppm (PASS)	0.0000 ppm	0%	2019/03/22 04:15

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.1491	251.4909	180.17	182.80	2.63	49.90	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.2848 ppm (PASS)	0.0000 ppm	0%	2019/03/22 04:30

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.2848	2.8484	11.40	14.09	2.70	49.89	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample — From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	20	TOC	MB2	0.2384 ppm	0.0000 ppm	0.0000%	2019/03/22 04:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2384	2.3837	10.71	13.39	2.68	49.91	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS [24.0 ppm]	0 / infinity (NA / NA)	27.0967 ppm (PASS)	0.0000 ppm	0%	2019/03/22 04:59

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	27.0967	270.9666	193.39	196.26	2.87	49.90	10:29

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	25 ppmC

Sample Type: Sample — From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	21	TOC	K1902346-001.01	3.1362 ppm	0.0803 ppm	2.5600%	2019/03/22 05:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.1930	31.9302	30.77	33.56	2.79	49.89	10:30

2	TOC	3.0794	30.7944	30.00	32.92	2.92	49.86	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	22	TOC	K1902102-001.02	83.5303 ppm	0.1033 ppm	0.1200%	2019/03/22 05:42

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	83.4573	834.5727	575.59	578.46	2.87	49.88	10:28
2	TOC	83.6034	836.0342	576.59	579.49	2.90	49.93	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	23	TOC	K1902127-001.12	15.8880 ppm	0.1089 ppm	0.6900%	2019/03/22 06:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	15.9649	159.6493	117.46	120.43	2.96	49.89	10:27
2	TOC	15.8110	158.1098	116.42	119.03	2.61	49.79	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	24	TOC	K1902127-002.12 4x	7.2203 ppm	0.1077 ppm	1.4900%	2019/03/22 06:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.2965	72.9647	58.62	61.29	2.67	49.75	10:31
2	TOC	7.1441	71.4414	57.59	60.28	2.69	49.70	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	25	TOC	K1902127-003.12	7.8209 ppm	0.0934 ppm	1.1900%	2019/03/22 07:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.8869	78.8693	62.63	65.27	2.64	49.66	10:27
2	TOC	7.7548	77.5479	61.73	64.50	2.77	49.65	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◆	26	TOC	K1902127-004.12 4x	4.6989 ppm	0.1032 ppm	2.2000%	2019/03/22 07:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.7718	47.7185	41.48	44.27	2.79	49.59	10:29
2	TOC	4.6259	46.2585	40.49	43.16	2.66	49.58	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	27	TOC	K1902147-001.01 100x	0.4629 ppm	0.0021 ppm	0.4500%	2019/03/22 08:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4644	4.6436	12.24	14.96	2.71	49.56	10:28
2	TOC	0.4614	4.6141	12.22	14.96	2.74	49.50	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	28	TOC	K1902147-002.01	1.1631 ppm	0.0267 ppm	2.2900%	2019/03/22 08:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.1820	11.8195	17.11	19.97	2.86	49.64	10:31
2	TOC	1.1442	11.4424	16.86	19.60	2.74	49.76	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.6255 ppm (PASS)	0.0000 ppm	0%	2019/03/22 08:58

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.6255	246.2551	176.62	179.28	2.66	49.91	10:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB

From Schedule Version 4

			Concentration			Min / Max				

	Pos	BAT	(ppm)	Dil	Sample ID	(% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.0686 ppm (PASS)	0.0000 ppm	0%	2019/03/22 09:13

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0686	0.6858	9.93	12.79	2.86	49.93	10:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	29	TOC	K1902168-001.04	2.0571 ppm	0.0518 ppm	2.5200%	2019/03/22 09:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.0937	20.9372	23.30	25.96	2.66	49.96	10:30
2	TOC	2.0205	20.2050	22.81	25.66	2.86	50.00	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	30	TOC	K1902168-002.04	1.0525 ppm	0.0826 ppm	7.8500%	2019/03/22 09:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.1109	11.1094	16.63	19.46	2.83	50.01	10:25
2	TOC	0.9941	9.9412	15.84	18.81	2.97	50.01	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	31	TOC	K1902169-001.24	14.4701 ppm	0.0860 ppm	0.5900%	2019/03/22 10:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	14.5309	145.3092	107.73	110.45	2.72	49.97	10:29
2	TOC	14.4092	144.0923	106.90	109.89	2.99	49.97	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	32	TOC	K1902169-002.24	17.8450 ppm	0.1318 ppm	0.7400%	2019/03/22 10:52

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	17.7518	177.5178	129.59	132.45	2.86	49.97	10:26
2	TOC	17.9381	179.3814	130.85	133.67	2.81	49.97	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	33	TOC	K1902169-003.24	18.8828 ppm	0.0274 ppm	0.1500%	2019/03/22 11:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	18.9022	189.0220	137.40	140.21	2.81	49.95	10:32
2	TOC	18.8635	188.6346	137.14	140.09	2.96	49.96	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	34	TOC	K1902169-004.24	9.3550 ppm	0.0898 ppm	0.9600%	2019/03/22 11:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.4185	94.1847	73.02	75.99	2.97	49.97	10:27
2	TOC	9.2915	92.9148	72.16	75.02	2.86	49.97	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	35	TOC	K1902169-005.24	11.8106 ppm	0.0557 ppm	0.4700%	2019/03/22 12:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	11.8500	118.4999	89.53	92.49	2.96	49.98	10:28
2	TOC	11.7712	117.7117	88.99	92.00	3.01	49.97	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	36	TOC	K1902169-006.24	11.8325 ppm	0.1654 ppm	1.4000%	2019/03/22 12:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	11.9494	119.4943	90.20	93.00	2.79	49.99	10:29
2	TOC	11.7155	117.1549	88.62	91.50	2.88	49.96	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC)	CAS_salt_010711	CAS_salt_010711

(v1238) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	37	TOC	K1902169-007.24	12.8921 ppm	0.2771 ppm	2.1500%	2019/03/22 13:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	12.6962	126.9620	95.27	98.09	2.82	50.01	10:30
2	TOC	13.0881	130.8807	97.93	100.84	2.91	50.03	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	38	TOC	K1902169-008.24	15.4016 ppm	0.2088 ppm	1.3600%	2019/03/22 13:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	15.5492	155.4920	114.64	117.52	2.88	50.05	10:30
2	TOC	15.2540	152.5397	112.64	115.67	3.04	50.06	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.4810 ppm (PASS)	0.0000 ppm	0%	2019/03/22 14:09

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.4810	244.8099	175.64	178.60	2.96	50.07	10:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.0485 ppm (PASS)	0.0000 ppm	0%	2019/03/22 14:23

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0485	0.4854	9.79	12.80	3.01	50.09	10:33

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	39	TOC	MB3	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/22 14:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.49	11.48	2.99	50.09	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS [24.0 ppm]	0 / infinity (NA / NA)	26.3372 ppm (PASS)	0.0000 ppm	0%	2019/03/22 14:53

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	26.3372	263.3722	188.24	191.16	2.92	50.10	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos C
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	25 ppmC

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	40	TOC	K1902230-001.05	2.0965 ppm	0.0063 ppm	0.3000%	2019/03/22 15:07

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.1009	21.0094	23.35	26.30	2.94	50.08	10:27
2	TOC	2.0921	20.9210	23.29	26.37	3.08	50.08	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	41	TOC	K1902230-002.05	0.9090 ppm	0.0394 ppm	4.3300%	2019/03/22 15:35

Rep	Base	ppm	µg	Adjusted	NDIR (Abs)	Baseline	Pressure	Run

#	Analysis Type			(Abs)		(Abs)	(psig)	Time
1	TOC	0.9368	9.3681	15.45	18.19	2.74	50.11	10:24
2	TOC	0.8811	8.8113	15.07	17.96	2.89	50.10	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	42	TOC	K1902230-003.05	1.0304 ppm	0.0033 ppm	0.3200%	2019/03/22 16:03

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0327	10.3272	16.10	18.96	2.86	50.11	10:29
2	TOC	1.0280	10.2800	16.07	18.99	2.92	50.10	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	43	TOC	K1902230-004.05	1.4208 ppm	0.0626 ppm	4.4100%	2019/03/22 16:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4651	14.6510	19.04	22.03	2.99	50.09	10:29
2	TOC	1.3766	13.7656	18.44	21.48	3.04	50.06	10:23

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	44	TOC	K1902230-005.05	0.5452 ppm	0.0150 ppm	2.7500%	2019/03/22 17:00

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5558	5.5584	12.86	15.72	2.85	50.11	10:28
2	TOC	0.5346	5.3463	12.72	15.64	2.92	50.10	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	45	TOC	K1902232-001.12	5.9922 ppm	0.0482 ppm	0.8000%	2019/03/22 17:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.9581	59.5807	49.54	52.48	2.94	50.09	10:26
2	TOC	6.0263	60.2628	50.00	53.07	3.07	50.11	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	33.5471	335.4714	236.81	239.79	2.98	50.10	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	47	TOC	RB	0.0443 ppm	0.0000 ppm	0.0000%	2019/03/22 18:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0443	0.4435	9.39	12.26	2.87	50.11	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.1426 ppm (PASS)	0.0000 ppm	0%	2019/03/22 18:25

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.1426	241.4260	173.34	176.18	2.84	50.17	10:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/22 18:40

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	8.99	12.03	3.03	50.10	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	0 ppmC

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	48	TOC	K1902232-002.12	10.0441 ppm	0.0777 ppm	0.7700%	2019/03/22 18:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.9892	99.8919	76.90	79.97	3.07	50.16	10:29
2	TOC	10.0991	100.9909	77.64	80.42	2.78	50.05	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	49	TOC	K1902232-003.12	14.1220 ppm	0.0201 ppm	0.1400%	2019/03/22 19:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	14.1362	141.3625	105.05	108.04	3.00	50.06	10:26
2	TOC	14.1078	141.0782	104.86	107.79	2.93	50.04	10:23

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	50	TOC	K1902121-001.01	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/22 19:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.86	11.75	2.89	50.04	10:25
2	TOC	0.0000	0.0000	9.03	12.04	3.01	50.03	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	51	TOC	K1902121-002.01	0.0000 ppm	0.0000 ppm	0.0000%	2019/03/22 20:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.20	11.22	3.02	50.00	10:31
2	TOC	0.0000	0.0000	8.53	11.57	3.04	50.01	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	52	TOC	K1902435-001.02	116.2162 ppm	5.5539 ppm	4.7800%	2019/03/22 20:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	120.1434	1201.4336	824.62	827.61	2.99	49.98	10:28
2	TOC	112.2890	1122.8899	771.30	774.91	3.61	49.98	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	53	TOC	K1902435-002.01	4.2973 ppm	1.4335 ppm	33.3600%	2019/03/22 21:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.3109	53.1089	45.14	48.45	3.31	49.96	10:25
2	TOC	3.2836	32.8362	31.38	34.42	3.04	49.97	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	54	TOC	K1902435-003.01	3.2785 ppm	0.2293 ppm	6.9900%	2019/03/22 21:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4407	34.4066	32.45	35.43	2.98	49.95	10:30
2	TOC	3.1164	31.1641	30.25	33.19	2.94	49.96	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	55	TOC	K1902435-004.01	5.1276 ppm	0.2636 ppm	5.1400%	2019/03/22 22:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.3140	53.1399	45.16	48.09	2.93	49.95	10:26
2	TOC	4.9413	49.4127	42.63	45.55	2.91	49.94	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	56	TOC	K1902435-005.01	132.6232 ppm	6.5383 ppm	4.9300%	2019/03/22 22:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	137.2465	1372.4649	940.71	943.70	2.99	49.92	10:25
2	TOC	127.9999	1279.9994	877.95	881.72	3.77	49.99	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC)	CAS_salt_010711	CAS_salt_010711

(v1238) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	57	TOC	K1902435-006.01	122.9733 ppm	6.3170 ppm	5.1400%	2019/03/22 23:07

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	118.5065	1185.0649	813.51	817.08	3.57	50.07	10:26
2	TOC	127.4401	1274.4013	874.15	878.10	3.95	50.09	10:27

Dilution: 1:10

Blank Contribution: (TC) 9.0920 (IC) (v1238)

Method: CAS_salt_010711 (v4)

Calibration: CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	27.6282 ppm (PASS)	0.0000 ppm	0%	2019/03/22 23:35

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	27.6282	276.2819	197.00	200.68	3.68	50.18	10:31

Completion State: Success - Criteria met.

Success Action: Do Nothing

Method: CAS_salt_010711 (v4)

Calibration: CAS_salt_010711 (v30)

STD Conc - Pos B: 50 ppmC

Sample Type: Check Standard --> CCB

From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	1.1283 ppm (PASS)	0.0000 ppm	0%	2019/03/22 23:50

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	1.1283	11.2825	17.12	20.21	3.09	50.20	10:30

Completion State: Success - Criteria met.

Success Action: Do Nothing

Method: CAS_salt_010711 (v4)

Calibration: CAS_salt_010711 (v30)

STD Conc - Pos D: 0 ppmC

Sample Type: Sample

From Schedule Version 4

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	59	TOC	K1902435-007.01	12.6387 ppm	0.1397 ppm	1.1100%	2019/03/23 00:05

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	12.7374	127.3745	95.55	98.46	2.91	50.20	10:30
2	TOC	12.5399	125.3989	94.21	97.27	3.06	50.20	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	60	TOC	K1902435-007.01 ms	33.4785 ppm	0.0000 ppm	0.0000%	2019/03/23 00:33

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	33.4785	334.7849	236.34	239.34	3.00	50.22	10:33

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	61	TOC	RB	0.6159 ppm	0.0000 ppm	0.0000%	2019/03/23 00:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6159	6.1595	13.27	16.42	3.14	50.22	10:33

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	62	TOC	K1902254-001.01	6.6998 ppm	0.1143 ppm	1.7100%	2019/03/23 01:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.7806	67.8056	55.12	58.04	2.92	50.23	10:28
2	TOC	6.6189	66.1895	54.02	57.06	3.04	50.22	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	63	TOC	K1902254-002.01	18.5047 ppm	0.1440 ppm	0.7800%	2019/03/23 01:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	18.6065	186.0653	135.39	138.31	2.92	50.23	10:30
2	TOC	18.4029	184.0293	134.01	137.12	3.11	50.22	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

		Analysis			Std. Dev.		

	Pos	Type	Sample ID	Result (ppmC)	(ppmC)	RSD	Start Time
◈	64	TOC	K1902254-003.01	22.2028 ppm	0.0577 ppm	0.2600%	2019/03/23 01:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	22.2436	222.4357	160.08	163.10	3.02	50.23	10:28
2	TOC	22.1620	221.6195	159.53	162.65	3.12	50.23	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	65	TOC	RB	0.0278 ppm	0.0393 ppm	141.4200%	2019/03/23 02:27

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0555	0.5554	9.47	12.55	3.08	50.21	10:29
2	TOC	0.0000	0.0000	8.79	11.75	2.96	50.21	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 9.0920 (IC) (v1238)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	B	TOC	25.0000	1:2	[TOC] CCV 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.0426 ppm (PASS)	0.0000 ppm	0%	2019/03/23 02:55

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0426	240.4257	172.66	175.53	2.87	50.20	10:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)	50 ppmC

Sample Type: Check Standard --> CCB From Schedule Version 4

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	D	TOC	0.0000	1:1	[TOC] CCB [0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2019/03/23 03:09

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	9.20	12.29	3.09	50.20	10:29

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria	Do Nothing	CAS_salt_010711	CAS_salt_010711	0 ppmC

met.	(v4)	(v30)	

Meta Data Used in this Report

Blanks

Version	Reagent (Abs)	Acid (Abs)	DI IC (Abs)	DI TC (Abs)	DI TOC (Abs)	Save Time	Operator
v1237	1.0520	0.7490	0.0000	0.0000	0.0000	2019/03/19 18:04	Fusion1 (Fusion1)
v1238	2.8787	1.7600	0.0000	0.0000	0.0000	2019/03/21 19:27	Fusion1 (Fusion1)

Calibrations

Name: CAS_salt_010711 (TOC)

Version:	v30	Calibration curve formula:	TOC: y = 6.788x + 9.463
Ver Creation:	2019/03/05 17:42	r^2 value:	TOC: r^2 = 0.99963
Comment:			
Operator:	Fusion1 (Fusion1)		
Basic Analysis Type	TOC		

Basic Analysis Type: TOC

Sample ID	Y Raw Value	X Expected	Message	End Time
DI Water	7.8970	0.0000		2019/03/05 16:15
0.500 ppm	11.5280	0.5000		2019/03/05 16:29
1.0 ppm	14.9760	1.0000		2019/03/05 16:44
5.0 ppm	43.6500	5.0000		2019/03/05 16:58
10 ppm	79.6020	10.0000		2019/03/05 17:12
25 ppm	183.3580	25.0000		2019/03/05 17:26
50 ppm	346.3230	50.0000		2019/03/05 17:40

Methods

Name: CAS_salt_010711 (TOC)

Version:	v4	Operator:	Fusion1 (Fusion1)
Ver Creation:	2019/02/21 17:57		
Comment:			

Parameter	Value	Advanced Parameter	Value
SampleVolume	10.0 mL	NeedleRinseVolume	5.0 ml
Dilution	1:10	VialPrimeVolume	2.0 ml
AcidVolume	0.5 ml	ICSamplePrimeVolume	2.0 ml

ReagentVolume	2.0 ml	ICSpargeRinseVolume	12.0 ml
UVReactorPrerinse	Off	BaselineStabilizeTime	0.70 min
UVReactorPrerinseVolume	5.0	DetectorPressureFlow	150 ml/min
NumberOfUVReactorPrerinses	1	SyringeSpeedWaste	10
ICSpargeTime	1.00 mins	SyringeSpeedAcid	7
DetectorSweepFlow	500 ml/min	SyringeSpeedReagent	7
PreSpargeTime	2.00 mins	SyringeSpeedDIWater	7
SystemFlow	500 ml/min	NDIRPressurization	60 psig
		SyringeSpeedSampleDispense	5
		SyringeSpeedSampleAspirate	4
		SyringeSpeedUVDispense	5
		SyringeSpeedUVAspirate	5
		SyringeSpeedICDispense	5
		SyringeSpeedICAspirate	5
		NDIRPressureStabilize	1.75 min
		SampleMixing	Off
		SampleMixingCycles	1
		SampleMixingVolume	10.0
		LowLevelFilterNDIR	Off

Acceptance / Approval

Electronic Signatures

Report Version	User Name	Acceptance	Reason	Date

Report History

Report History

Report Version	User Name	System Reason	User Reason	Date
1	Fusion1 (Fusion1)	Schedule completed	Schedule completed	2019/03/23 03:26

ALS Environmental

StarLIMS Run: 629142, 629144, 629629146, 629149

Analysis: TOC/DOC

Method: 9060, 415.1, SM 5310 C, 9060A

CCV: 11-GEN-05-76B 50 ppm LCS: 11-GEN-05-74L 25.0 ppm

ICAL Date: 3/6/19

ICAL ID: 11-GEN-05-76H

ICS ID: 11-GEN-05-74A

ICS TV: 25.0 ppm ICS % R = 2

Spike ID: 11-GEN-05-70O 0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-77B

21 % H3PO4: 11-GEN-05-77A

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, 129001F, N11314F, Marge

FILTER ID: NA

Analyzed By:	BCD	Date Analyzed:	3/23/19
Reviewed By:	[signature]	Date Reviewed:	03/25/19

BCD 3/23/19

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1906774

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2227 (234852)

General Set Information: There was one field sample in this Work Order. The sample was 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 644168) was less than 1/2 the CRDL. The recovery for the LCS (644169) was within acceptable parameters.

MS/MSD Analysis: MS/MSD was performed on sample 1906774001 (Client ID's: LH18/24-SP650_030619_BIX). 4.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 4.µg/L. 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 5.1.1. The Reporting Limit Verification Standard (RLVS – 644166) is reported from the analysis of the Laboratory Control Sample (LCS – 644169) at a level of 4.0µg/L. Due to limitations of the Chemstation Software, some of the chromatographic peaks may require manual integrations. A manual integration was performed for one of the Initial Calibration analyses (datafile: 19MARI03).

Thomas Bosch March 21, 2019
Analyst Date

ANALYTICAL REPORT

Report Date: March 21, 2019

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ALS Environmental (Houston)
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E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1906774**
Project ID: HS19030298
Purchase Order: HS19030298
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_030619_BIX	1906774001	03/06/19	03/08/19	

ANALYTICAL REPORT

Workorder: 34-1906774
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_030619_BIX**	Sampling Site: NA	Collected: 03/06/2019
Lab ID: 1906774001	Media: 125 mL Nalgene	Received: 03/08/2019
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/2227 (HBN: 234852)	**Percent Solid:** NA
	Analyzed: 03/19/2019 12:35	**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 03/20/2019 13:02	/S/ Stephen Brose 03/21/2019 11:52

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