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

April 15, 2021

DAIN-ODB-LO

Ms. Lauren Poulos
U.S. Environmental Protection Agency
1201 Elm Street, Suite 500
Dallas, TX 75270-2002

Re: Final Remedial Action Completion Report, LHAAP-04 Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, April 2021

Dear Ms. Poulos,

An electronic copy of the above referenced document has been added to the project portal's "Documents" folder at the following address for your records: (https://docs.cbifederalservices.com/sites/501032/regulators/Shared%20Documents/Forms/AllItems.aspx). An electronic copy of this letter and download instructions for the electronic file have been sent via email. The TCEQ comments dated August 18, 2020 were resolved via email on September 1, 2020.

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 (electronic/online)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy/1 CD)
R. Smith USACE, Tulsa District, OK (electronic/online)
A. Williams, USACE, Tulsa District, OK (electronic/online)
A. Maly USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (electronic/online)
P. Srivastav, APTIM, Houston, TX (electronic/online)

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

April 15, 2021

DAIN-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Final Remedial Action Completion Report, LHAAP-04 Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, April 2021

Dear Ms. Palmie,

An electronic copy of the above referenced document has been added to the project portal's "Documents" folder at the following address for your records: (https://docs.cbifederalservices.com/sites/501032/regulators/Shared%20Documents/Forms/AllItems.aspx). An electronic copy of this letter and download instructions for the electronic file have been sent via email. The TCEQ comments dated August 18, 2020 were resolved via email on September 1, 2020.

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The point of contact for this action is the undersigned. I may be contacted at 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished (letter only):
L. Poulos, USEPA Region 6, Dallas, TX
P. Bruckwicki, Caddo Lake NWR, TX
R. Smith, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
A. Maly, USAEC, San Antonio, TX
K. Nemmers, Bhate, Lakewood, CO
P. Srivastav, APTIM, Houston, TX

Final

Remedial Action Completion Report, LHAAP-04 Former Pilot Wastewater Treatment Plant

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

1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

Prepared by

APTIM

Aptim Federal Services, LLC
2500 CityWest, Suite 1700
Houston, Texas 77042

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Acronyms and Abbreviations

µg/L	micrograms per liter
§	section
AECOM	AECOM Technical Services
APTIM	Aptim Federal Services, LLC
Bhate	Bhate Environmental, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COC	contaminant of concern
DPT	direct-push technology
EPA	see USEPA
EVO	emulsified vegetable oil
GWTP	groundwater treatment plant
ISB	in situ bioremediation
LHAAP	Longhorn Army Ammunition Plant
LTM	long-term monitoring
LUC	land use control
mg/L	milligrams per liter
MSCs	medium-specific concentrations
NCP	National Contingency Plan
PCL	Protective Concentration Level
psi	pounds per square inch
RACR	Response Action Completion Report
RA-O	Remedial Action Operation
RAOs	remedial action objectives
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
Shaw	Shaw Environmental & Infrastructure, Inc.
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TOC	total organic carbon
TRRP	Texas Risk Reduction Program
U.S.	United States
U.S. Army	U.S. Department of the Army
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

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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 National Small Business Multiple Award Task Order Contract Environmental Remediation Services with Military Munitions Response Program, Task Order No. W9128BV17F0150 to conduct environmental restoration of site LHAAP-04 at Longhorn Army Ammunition Plant (LHAAP). The Bhate Team is comprised of Bhate and Aptim Federal Services, LLC (APTIM). LHAAP is an inactive, government owned formerly contractor operated and maintained Department of Defense facility located in central east Texas (**Figure 1-1**). This Remedial Action Completion Report (RACR) describes remedial actions taken to address risks associated with contaminated groundwater at LHAAP-04 (Former Pilot Wastewater Treatment Plant). Specifically, this RACR describes activities associated with field implementation of an in situ bioremediation (ISB) remedy in accordance with the Final Remedial Design (RD) and Remedial Action Work Plan (RAWP) for LHAAP-04 (Bhate 2019a).

1.1 Organization of Response Action Completion Report

This RACR is composed of the following sections:

- **Section 1.0:** "Introduction" summarizes the site description, remedial action objectives (RAOs), the contaminants of concern (COCs) and their respective cleanup levels, the selected remedy, and the associated land use control (LUC) plan.
- **Section 2.0:** "Baseline Sampling" describes the sampling activities that were conducted during or before the beginning of the ISB injections and presents the associated results.
- **Section 3.0:** "In Situ Bioremediation" describes the injection of amendments to enhance microbial degradation of contaminants.
- **Section 4.0:** "Design Effectiveness Sampling" presents analytical results for samples collected to monitor the local distribution of amendments and changes in geochemical parameters during the first few weeks after the injections.
- **Section 5.0:** "LUC Implementation" identifies activities that were performed to implement the LUCs in accordance with the LUC Plan in the RD/RAWP.
- **Section 6.0:** "References" provides a list of references cited in the document.

This work plan also includes the following appendices to support the text:

- **Appendix A** provides:
  - The Notice of LUCs recorded at the Harrison County Courthouse and the Survey Plat and Legal Description of the parcel subject to the LUCs.
  - The notice of LUCs for Soil and Groundwater Contamination letter provided to the landowners and occupants, federal, state, and local officials, and the Texas Department of Licensing and Registration for notification to water well drillers, as required by the LUC Plan.
  - Example LUC Inspection Checklist and Certification Forms.
- **Appendix B** contains sample collection logs associated with the Pre-Remedy and Design Effectiveness samples.
- **Appendix C** consists of photographs of the field work.
- **Appendix D** includes the laboratory analytical reports for those samples that were collected during and after implementation of the ISB.
- **Appendix E** is the Data Quality Summary Report for the laboratory analyses.

1.2 Site Description

LHAAP is approximately 14 miles northeast of Marshall, Texas, and approximately 40 miles west of Shreveport, Louisiana. The installation occupies approximately 1,400 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-04, known as Site 04 or the former pilot wastewater treatment plant, is approximately 0.5 acres and is located in the central portion of LHAAP at the northwest corner of 6th and 60th Streets near the former fire station (**Figure 1-2**). LHAAP-04 is surrounded by light duty roads. Wastewater treatment operations began at LHAAP-04 in 1984. The demolition of the former pilot wastewater treatment facility structures, tanks, and piping, and the disposal of the associated wastes were completed in the summer of 1997 as part of the Resource Conservation and Recovery Act closure of the plant. The final remedy for soil was conducted in 2009 as a Non-Time-Critical Removal Action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) program. Soil along the southern edge of the slab that formerly housed storage tanks for the former pilot wastewater treatment facility that was impacted with mercury and perchlorate at the LHAAP-04 site, was removed to meet the soil medium-specific concentrations (MSCs). The soil was removed to the soil/air and

ingestion MSC for industrial use for mercury, and the groundwater protective MSC for industrial use for perchlorate.

The U.S. Department of the Army (U.S. Army) issued the Final Record of Decision (ROD) for LHAAP-04 (AECOM 2016) in October 2016, and was signed by the Army on December 15, 2016, and the U.S. Environmental Protection Agency (USEPA) on March 30, 2017. The Texas Commission on Environmental Quality (TCEQ) issued a letter concurring with the ROD on February 7, 2017. The ROD identified perchlorate as the only COC in groundwater for LHAAP-04. The remedy selected in the ROD included ISB for perchlorate concentrations in groundwater, long-term monitoring (LTM) of groundwater, and LUCs to maintain the remedy and prohibit groundwater use until COC concentrations are reduced to levels supportive of unlimited use and unrestricted exposure.

1.3 Remedial Action Objectives

The RAOs developed for LHAAP-04 and outlined in the Final ROD (AECOM 2016) are:

- Protect human health by preventing ingestion of groundwater contaminated with perchlorate.
- Return groundwater to its potential beneficial use, wherever practicable, within a reasonable time period given the particular site circumstances.
- Prevent groundwater contaminated with perchlorate from migrating into nearby surface water.

The above RAOs recognize the USEPA's policy to return all groundwater to beneficial uses, based on the non-binding programmatic expectation in the National Contingency Plan (NCP), and is consistent with the NCP regulations requiring the lead agency, the U.S. Army in this case, to establish RAOs specifying contaminants and media of concern, potential exposure pathways, and remediation goals.

Per the ROD's RAOs, and consistent with the NCP, groundwater will be returned to its beneficial uses as drinking water. The groundwater cleanup level for perchlorate at the Site is the Texas Risk Reduction Program (TRRP) Tier 1 Residential Groundwater Protective Concentration Level (PCL), 17 micrograms per liter (µg/L), and is protective of human health and the environment.

1.4 Selected Remedy

The selected remedy was summarized in Section 1.4 of the Final ROD (AECOM 2016) as follows (some of the text has been revised slightly from the text in the ROD to reflect that the tasks have already been completed):

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- ISB of perchlorate contaminated groundwater in an area in the vicinity of monitoring well 04WW04. Multiple injections of substrate may be needed based on effectiveness of the ISB. Bioaugmentation using appropriate microbial culture to facilitate ISB may be performed, if necessary. Prior to ISB, two shallow zone monitoring wells and one intermediate zone monitoring well were installed to refine the perchlorate plume configuration and address the plume migration detected by the wells described in the ROD.
- LTM to confirm the protection of human health and the environment by documenting the return of groundwater to the cleanup level (maximum contaminant level or TRRP Tier 1 Residential Groundwater PCL) through reduction of the contaminant mass, and by preventing the perchlorate-contaminated groundwater plume from migrating into surface water.
- The LUC objectives include maintaining the integrity of any current or future remedial or monitoring systems and preventing the use of groundwater contaminated above cleanup levels as a potable water source. The groundwater treatment and LTM remedial components include a groundwater monitoring system that will be used to characterize the condition of the groundwater during the period the groundwater remedy is in place until the groundwater remediation goals are achieved, and to demonstrate achievement of the groundwater remediation goals when the groundwater remedy is complete. As a part of this groundwater remedy, the Army will maintain the remedial and monitoring systems associated with the groundwater remedies until these components of the remedy are no longer needed to achieve cleanup levels, and cleanup levels have been achieved. During the period of operation of the groundwater remedy, if any of the elements of the remedial and groundwater monitoring systems are damaged, destroyed, or become ineffective, they will be repaired or replaced with suitable components to assure that the remedial and groundwater monitoring systems are able to provide data of the quality necessary to determine the progress of and eventual completion of this component of the remedy. The actions to be taken to implement these LUC objectives and requirements will be provided through modifying the "Comprehensive Land Use Control Management Plan, Former Longhorn Army Ammunition Plant, Karnack, Texas" and detailed in the LUC RD.
- The LUC for prohibition of groundwater use (except for monitoring and testing) shall be implemented and shall remain in place at the Site until the levels of COCs in surface and subsurface soil and groundwater are reduced below levels that would support unlimited use and unrestricted exposure. A LUC RD was finalized as the land use component of the RD. Within 21 days of the issuance of the ROD, the Army proposed deadlines for completion of the RD Work Plan, RD, and RAWP. The

documents were prepared and submitted to the EPA and the TCEQ pursuant to the Federal Facility Agreement. The LUC RD contained implementation and maintenance actions, including periodic inspections. The LTM groundwater plan was also presented in the RD. The recordation notification for the Site, which was filed with Harrison County, included a description of the LUCs.

The groundwater monitoring network and LUC Plan development included in the ROD were detailed in the RD/RAWP (Bhate 2019a). The LUC Plan was incorporated into the Comprehensive LUC Management Plan (U.S. Army 2019) in the October 2019 revision. The Notice of LUCs and the Survey Plat and Legal Description for the parcel subject to the LUCs are included in **Appendix A**. Letters providing initial notice of LUCs for Soil and Groundwater Contamination were sent to landowners and occupants, federal, state, and local officials and the Texas Department of Licensing and Registration on June 26, 2017 (U.S. Army 2017), within 90 days of signature of the ROD, as required. The notice of LUCs and the Final LUC Boundary Survey Plat and Legal Description were filed with Harrison County on March 22, 2021 (**Appendix A**). A notification letter was also sent to federal, state, and local officials and to the Texas Department of Licensing and Regulation (Water Well Drillers and Pump Installers Section) on February 23, 2021 showing the area covered by the final groundwater use restriction LUC (**Appendix A**). Annual inspections of the LUCs and CERCLA five year reviews of the remedy will continue until levels of COCs in groundwater allow for unlimited use and unrestricted exposure.

1.5 Land Use Control Plan

The Final ROD (AECOM 2016) indicated that the U.S. Army or its representative will be responsible for LUC implementation, certification, reporting, and enforcement. The U.S. Army will address any LUC problems within its control that are likely to impact remedy integrity as soon as practicable. The details of LUC components are provided in the RD/RAWP (Bhate 2019a). The continued successful implementation of LUCs will be documented in annual remedial action operation (RA-O) reports.

The Comprehensive LUC Management Plan (U.S. Army 2019) provides a repository for LUC plans for sites throughout the former LHAAP. The LUC Plan for LHAAP-04 can be found within the Comprehensive LUC Management Plan. That document includes blank copies of the Inspection and Maintenance Checklist and the Land Use Control Compliance Inspection Form.

The LUC Plan includes restrictions on both land and groundwater use. **Appendix A** presents the Notice of LUCs and the Survey Plat and Legal Description that were filed with Harrison County. The final LUC boundary is shown on **Figure 1-3**. Implementation of the LUC Plan will include annual inspections which are recorded on the Inspection and Maintenance

Checklist and the Land Use Control Compliance Certification Form. The Checklist and the Certification Form are provided within **Appendix A**.

1.6 Performance Monitoring and Follow-up Activities

While this RACR documents the implementation of ISB, the RD/RAWP (Bhate 2019a) describes several activities that are to be conducted following ISB. Those activities are briefly described below. The RD/RAWP should be referenced for detailed information (including reporting requirements) regarding all these activities.

- **Performance Monitoring Year 1 and Year 2.** Quarterly sampling will be conducted to determine geochemical conditions and perchlorate concentrations. Any recommendations to modify the sampling frequency, analytical parameters, or wells will be made in the Annual RA-O Report. Additionally, results will be used to evaluate the impacts of biodegradation reactions and to determine if reinjections are needed.
- **LTM Year 3 through Year 5.** Semiannual monitoring will continue following the first two years of performance monitoring.
- **LTM Beyond Year 5.** LTM will be implemented at an annual frequency from Year 6 until the next Five Year Review. The need for ongoing monitoring and the appropriate frequency will be evaluated in the Five Year Review.

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2.0 BASELINE SAMPLING

The RD/RAWP (Bhate 2019a) presented a baseline sampling plan for the shallow and intermediate groundwater zones at LHAAP-04 (**Table 2-1**). The pre-remedy sampling of the groundwater was to be conducted prior to injections to characterize the perchlorate concentrations and geochemical conditions. However, the injections were completed on November 6, 2019, and the baseline samples were collected on November 5–6, 2019 upon identification of the non-compliance with the RD/RAWP. At monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 within the treatment area (**Figure 2-1**), the groundwater was a milky white color due to the emulsified vegetable oil (EVO) that had already been injected near the wells. Samples from those four wells were not sent for analysis to avoid laboratory instrument disruption that may have resulted from running samples containing high concentrations of EVO. The primary purpose of the pre-injection sampling was to provide baseline results for comparison against future performance monitoring results. Therefore, for the four wells that were not analyzed in early November 2019 (04WW01, 04WW07, 04WW09, and 04WW10), the samples collected in January 2019 will serve as the baseline for comparison of perchlorate concentrations to subsequent sampling results. The January 2019 samples were not analyzed for anions, alkalinity, or total organic carbon (TOC).

The baseline sampling locations (**Table 2-1**) included 12 shallow zone wells inside and outside of the plume area, one intermediate zone well (04WW08), and the Fire Station Well completed in the deep zone. The baseline samples were collected on November 5–6, 2019 for all the locations on **Table 2-1** except the four wells previously discussed and the results are shown on **Table 2-2**. The baseline samples shown on **Table 2-2** for the four wells that were not sampled due to the presence of EVO were collected on January 22, 2019. Perchlorate was detected above the TCEQ PCL of 17 µg/L at three shallow wells (04WW07, 04WW09, and 04WW10), which are all within the treatment zone. The highest concentration detected was 10,000 µg/L at 04WW10, located near the center of the treatment zone. Perchlorate was detected below the PCL at a concentration of 13 µg/L in 04WW08 in the intermediate zone. Perchlorate was not detected in the sample collected from the Fire Station Well.

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3.0 IN SITU BIOREMEDIATION

ISB was conducted at LHAAP-04 in accordance with the RD/RAWP (Bhate 2019a) to treat the area of perchlorate impacted groundwater exceeding five times the 17 µg/L PCL. Injections were performed at 25 direct-push technology (DPT) locations as shown on **Figure 3-1**. The implementation of ISB involved steps prior to and following the injections. The sections below describe the major steps, from notifications through demobilization, in approximate chronological order.

3.1 Notification

On August 1, 2019, a Memorandum for Record was provided to TCEQ (Bhate 2019b) to provide information regarding planned injections to comply with the substantive requirements of 30 Texas Administrative Code (TAC) Section (§) 331, Subchapters A, C, and H for Class V Injections Wells. The memorandum described the planned injection of EVO and microbial nutrients at 25 DPT injection locations.

TCEQ and USEPA were notified two weeks in advance of commencement of fieldwork activities.

3.2 Utility Clearance

Utility location and clearance for intrusive activities were conducted prior to drilling and in accordance with Section 3.1 of the Installation-Wide Work Plan (Bhate 2018). Utility clearance tasks included the following:

- Contacting the Texas Excavation Safety System, Inc. utility notification service.
- Manually probe all boreholes to at least 5 feet prior to driving the injection rods.
- Holding safety meetings and completing job safety analyses with all personnel who were involved in intrusive activities.

3.3 Site Clearance and Staking Locations

Prior to the ISB injection, the site was cleared of tall vegetation. The DPT injection point locations were staked out using global positioning system or relative to existing wells. Due to field obstructions associated with a wooded ditch and a culvert within the treatment area, DPT locations 17 and 18 were adjusted approximately 5 to 10 feet from the locations proposed in the RD/RAWP to allow access for the DPT rig.

3.4 Mobilization

Personnel were mobilized to LHAAP-04 on October 21, 2019, and injections began on October 22, 2019.

The following major pieces of equipment were mobilized over the course of the injections:

- DPT drill rig
- Injection system trailer
- One mobile 4000-gallon tank

The EVO and nutrients to be injected were delivered directly to site LHAAP-16, instead of LHAAP-04, where two 20,000-gallon tanks were already in place from injections being performed at LHAAP-16. The two tanks were used to mix and store the amendment solution for LHAAP-04. The EVO and nutrient solution were brought to LHAAP-04 using a 2,000-gallon water truck and stored in the mobile 4,000-gallon tank prior to injection. Water for mixing the EVO solution was obtained from the Leigh Water Company from one of their wells located in Karnack, Texas and trucked to the 20,000-gallon tanks using the 2,000-gallon water truck.

3.5 Injections

The injection amendments were mixed as shown on **Table 3-1** and injected at the 25 DPT locations in accordance with the RD/RAWP (Bhate 2019a). Details of the injections are described in the following sections.

3.5.1 Overall Sequence of Injections

Section 5.1 of the RD/RAWP (Bhate 2019a) called for the ISB injections to begin in the outermost locations of the injection grid and then to proceed inward to minimize dispersion of the perchlorate plume. The locations at the downgradient edge of the grid (04DPT19, 04DPT20, 04DPT24, and 04DPT25) were initially injected beginning on October 22, 2019. As discussed further in **Section 3.5.3**, daylighting became a significant issue due to the shallow depth of injection, the location of several injection locations within a former excavation area where the native soils had been removed and replaced, and the presence of a ditch and culvert within the treatment area. The injection pattern was adjusted to minimize the use of adjacent locations simultaneously, while maintaining the general pattern of injecting from the outer edge and moving inward. The injections were completed on November 6, 2019.

3.5.2 Amendment Preparation

The amendment solution was prepared in accordance with the RD/RAWP (Bhate 2019a) as shown on **Table 3-1**. The primary injection components were the EVO carbon source (Electron

Donor Solution – Extended Release™ from Tersus Environmental, LLC) and diammonium phosphate. Approximately 24 hours prior to the start of each injection cycle, the solution of ISB amendments was prepared in a 20,000-gallon mixing tank located at site LHAAP-16. The solution was prepared by adding the required volume of EVO, dilution water, and nutrients into the mixing tank.

3.5.3 Injection Process

The amendments were injected into the subsurface at the depths ranges shown on **Table 3-1**, using the system shown schematically in **Figure 3-2**. Four locations were connected to the injection manifold at a time and flow rates and injection pressures were controlled by individual control valves for each injection line. Initial injection pressures were at or below 40 pounds per square inch (psi), and flow rates ranged from 2 to 6 gallons per minute. As injections progressed, it became apparent that injection pressures and flow rates needed to be reduced in most locations to limit daylighting and that multiple adjacent locations could not be injected simultaneously without inducing daylighting around the injection point or through adjacent monitoring wells. The subsequent injection pattern was altered slightly to allow for alternating injection locations to spread out the effect of the simultaneous injections, while generally following the intent of the original injection pattern.

The daylighting was most frequently observed in the former excavation area near 04DPT05 and 04DPT09, and along the edge of the ditch and culvert near 04DPT18, 04DPT13, and 04DPT20. When necessary, injections were shut down and locations were allowed to "rest" before proceeding with the injections to minimize daylighting. Injection pressures were lowered to as low as 5 psi when necessary to limit daylighting. After each injection location was completed, the probe was withdrawn and the DPT point was abandoned by filling with grout. No soil cuttings were generated using DPT.

During the injection activities, Bhate/APTIM personnel performed the following:

- Checking the injection system gauges to monitor pressure, volume, and flow into each injection point.
- Recording injection interval, volume, and time (**Appendix B**).
- Monitoring injection pressures for sudden decreases that might indicate the loss of amendment in the subsurface (possibly due to fracturing induced by the injection or encountering a high-permeability zone).
- Visually monitoring the injection locations for surfacing of injected material.
- TOC monitoring in the performance wells to assess EVO distribution, as indicated in the RAWP, was not performed because white discoloration of the water from EVO

was visible in three of the four performance monitoring wells during the injections. The fourth well was not opened for sampling during injections to avoid creating a potential route for daylighting via the well.

3.6 Management of Remediation Derived Waste

During the activities described above, various types of waste were generated. Those wastes are identified in the table provided below. The table also summarizes the storage and disposal for each waste type.

Waste Type	Storage and Disposal [a]
Groundwater from purging of wells prior to sampling	Collected in 5-gallon containers or drums and transported to the GWTP for disposal
Disposable personal protective equipment and disposable supplies	Disposed as municipal solid waste

Notes:

[a] GWTP refers to the Groundwater Treatment Plant at Site LHAAP-18/24.

3.7 Demobilization

After completion of the final injections on November 6, 2019, the injection rig and amendment tanks were demobilized from LHAAP-04. Repairs were made, where possible, to smooth out divots or ruts in the grass caused by the drilling rig in the saturated soil conditions.

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4.0 DESIGN EFFECTIVENESS MONITORING

In accordance with the RD/RAWP (Bhate 2019a), design effectiveness samples were collected seven days after the ISB injections from four wells within the treatment area (04WW05, 04WW07, 04WW09, and 04WW10) and analyzed for TOC to evaluate the distribution of carbon source. The purpose the design effectiveness sampling was to evaluate whether the injections successfully distributed amendments. The determination of successful distribution of amendments was based on increased TOC concentrations relative to baseline or concentrations greater than 20 milligrams per liter (mg/L), which is the concentration considered to be supportive of biological degradation. For 04WW07, 04WW09, and 04WW10, a TOC sample was not collected during the November 5–6, 2019 sampling due to the visible presence of EVO and the January 2019 samples were not analyzed for TOC; therefore, no comparison to baseline TOC values was performed. The EVO observed in the wells during the injections confirmed successful distribution of the carbon source to those wells.

Table 4-1 shows the results from the post-injection design effectiveness sampling. All four of the wells contained post-injection concentrations of TOC exceeding 20 mg/L. The concentrations ranged from 32.8 mg/L (04WW05) to 680 mg/L (04WW09). At 04WW05, the baseline concentration of 20 mg/L increased to 32.8 mg/L, representing a 64% increase over the baseline concentration. Based on these results, the injections achieved the desired distribution of TOC into the shallow groundwater zone at LHAAP-04.

4.1 Future Performance Monitoring

As noted in **Section 1.6**, this RACR documents the implementation of ISB, but activities that follow the ISB are described in the RD/RAWP (Bhate 2019a). **Section 1.6** provides a brief description of those activities, but the RD/RAWP should be referenced for detailed information.

In accordance with Table 6-1 of the RD/RAWP, the need for inclusion of LHSMW02, 04WW02, 04WW03, 04WW08, and the Fire Station Well in the monitoring network was to be evaluated following collection of the baseline samples. In an email exchange between the U.S. Army, TCEQ, and USEPA on January 23–27, 2020, it was decided to drop 04WW03 and the Fire Station well from the performance monitoring network based on the lack of perchlorate detections and their distance from the plume. Monitoring wells 04WW08 and LHSMW02 will be retained in the performance monitoring network due to their value as sentry wells, to monitor the vertical and horizontal extent of the remaining plume. At the request of TCEQ, 04WW02 will be sampled quarterly for the first two rounds of performance sampling, and a decision on whether to retain it in the network will be made once the data has been validated and provided to the regulators. **Table 4-2** and **Figure 2-1** show the Performance

Monitoring Plan for LHAAP-04 based on the changes agreed upon by TCEQ and USEPA. Performance monitoring will be conducted quarterly for Years 1 and 2 at the wells shown on **Table 4-2** and **Figure 2-1**. LTM will be conducted semiannually in Year 3 through Year 5. The monitoring wells shown in blue on **Figure 2-1** will be analyzed for perchlorate and monitored natural attenuation parameters, as shown on **Table 4-2**. The monitoring wells shown in green will only be analyzed for perchlorate. The first quarterly sampling event (Year 1, Quarter 1) was performed in late January 2020, and the validated data was provided to the regulators at the March 2020 monthly managers' meeting call. That data will be included in the Year 1 RA-O Report and evaluated with the other three quarters of data from Year 1.

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5.0 LUC IMPLEMENTATION

The actions required to implement the LUCs for LHAAP-04 are described below. An initial notice of LUCs for Soil and Groundwater Contamination was completed on June 26, 2017, within 90 days of ROD signature as required (U.S. Army 2017). The Notice of LUCs including the final LUC boundary survey plat and legal description of the LUC boundary, filed with Harrison County on March 22, 2021, is included in **Appendix A**. A second Notice of LUCs for Soil and Groundwater Contamination was sent to federal, state, and local officials, and to the Texas Department of Licensing and Regulation (Water Well Drillers and Pump Installers Section) on February 23, 2021 showing the final area covered by the groundwater use restriction LUC (**Appendix A**).

The following actions were performed to implement LUCs for LHAAP-04:

- Finalize the boundaries of the LUCs as part of the remedial action (See **Figure 1-3** and **Appendix A**).
- Survey the LUC boundary. The final boundary was surveyed by a State of Texas licensed surveyor. A legal description of the surveyed area accompanies the survey plat.
- Record the Notice of LUCs at Harrison County. The LUC plats and legal descriptions and LUC restriction language were recorded at the Harrison County Courthouse in accordance with Title 30 TAC §335.566 (**Appendix A**).
- Transmit the notice to federal, state, and local governments involved at LHAAP-04, and to owners and occupants of the property whom are subject to restrictions and LUCs. The notice of the final boundary for LUCs was sent to federal, state, and local officials including:
  - State Representatives, the Harrison County Judge, Harrison County Historical Courthouse, the City of Uncertain Mayor, and Caddo Lake and Leigh Water Supply Corporations' Presidents. Notice will also be sent to the Caddo Lake National Wildlife Refuge Manager—as a representative of the U.S. Fish and Wildlife Service (the future transferee of the property), and the Water Well Driller and Pump Installer's Program at the Texas Department of Licensing and Registration.

Following implementation of the LUCs, the administrative maintenance activities required to ensure LUCs remain in place and effective will include:

- Annual field inspections of LHAAP-04 to confirm that no violations of the LUCs have occurred. Documentation of the inspection will be included on the Inspection and Maintenance Checklist (see **Appendix A**).
- Annual certifications that no LUC-restricted activities have been authorized and that LHAAP-04 conditions and use are consistent with the LUCs. The Annual LUC Compliance Certification Form is presented in **Appendix A**.
- Periodic transmittal of a LUC Notice to federal, state, and local authorities. The notice will include the land use restrictions referenced in the ROD, a written description of the LUCs, and a figure depicting the LUC boundary. The transmittal will coincide with each Five Year Review and will be documented in the report.
- The Final LUC Boundary and copies of filed notices will be added to the Comprehensive LUC Management Plan and the plan will be provided to the owner or occupant of LHAAP-04. The update to the Comprehensive LUC Management Plan will be completed during the next annual update, which will be in the fourth quarter of 2020.

The U.S. Army will address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

6.0 REFERENCES

AECOM Technical Services (AECOM). 2016. *Final Record of Decision LHAAP-04, Longhorn Army Ammunition Plant, Karnack, Texas*.

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Contract No. W9128F-13-D-0012, Task Order No. W9128BV17F0150 • Final • Rev 0 • April 2021

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Tables

Table 2-1
Baseline and Design Effectiveness Monitoring Network Locations and Analyses

Monitoring Location	Primary Rationale for Well Selection	Proposed Analyses								
		Baseline								Design Effectiveness [b] (7 days post-injection)
		Perchlorate (314.0)	Dissolved Oxygen (field reading)	Oxidation-Reduction Potential (field reading)	pH (field reading)	Ferrous Iron (field reading)	Alkalinity (2320B)	Anions [c] (E300.0)	Total Organic Carbon (SW9060)	Total Organic Carbon (SW9060)
04WW05	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW07 [a]	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW09 [a]	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW10 [a]	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW01 [a]	Downgradient well for measuring plume stability	✓	✓	✓	✓					
04WW04	Upgradient well for measuring plume stability	✓	✓	✓	✓					
04WW06	Upgradient well for measuring plume stability	✓	✓	✓	✓					
04WW11	Downgradient well for measuring plume stability	✓	✓	✓	✓					
LHSMW01	Crossgradient well for measuring plume stability	✓	✓	✓	✓					
LHSMW02	Crossgradient well	✓	✓	✓	✓					
04WW02	Upgradient well	✓	✓	✓	✓					
04WW03	Upgradient well	✓	✓	✓	✓					
04WW08	Intermediate Zone well	✓	✓	✓	✓					
Fire Station Well	Downgradient well	✓	✓	✓	✓					

Notes:

[a] The baseline samples were collected near the completion of injections and emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted. Samples were not collected from these wells during the November 5-6, 2019 sampling event. The January 2019 sample results will be used as the baseline at these locations. Samples were only analyzed for perchlorate during the January 2019 sampling event.

[b] To be conducted approximately 7 days after the completion of substrate injection.

[c] Anions include nitrate, nitrites, and sulfate.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

Table 2-2

Baseline Sampling Results

		Location Code	04WW01 [a]		04WW02		04WW03		04WW04		04WW05		04WW06		04WW07 [a]	
		Sample ID	04WW01-190122		04WW02-191105		04WW03-191106		04WW04-191106		04WW05-191106		04WW06-191106		04WW07-190122	
		Sample Date	1/22/2019		11/5/2019		11/5/2019		11/6/2019		11/6/2019		11/6/2019		1/22/2019	
		Location Description	Shallow Zone, Downgradient of Plume		Shallow Zone, Upgradient of Plume		Shallow Zone, Upgradient of Plume		Shallow Zone, Within Plume Area		Shallow Zone, Within Plume Area		Shallow Zone, Cross-Gradient to Plume Area		Shallow Zone, Within Treatment Zone	
Analyte	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		438		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		72.8		NA		NA	
Total organic carbon	mg/L	NV	NA		NA		NA		NA		20		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 2	U	< 2	U	<2	U	< 2	U	< 2	U	< 2	U	110	
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.15		1.44		1.26		0.06		0.18		0.10		1.83	
Oxidation-Reduction Potential	mV	NV	327		221		153		-43		-36		2		338	
pH	Std Units	NV	6.17		6.08		6.13		6.3		5.94		6.65		6.22	
Ferrous Iron	mg/L	NV	NM		NM		NM		NM		0.31		NM		NM	

Notes:

Blue highlighting indicates concentrations above the PCL.

[a] The baseline samples were collected near the completion of injections and emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted. Samples were not collected from these wells during the November 5–6, 2019 sampling event. The January 2019 sample results will be used as the baseline at these locations. Samples were only analyzed for perchlorate during the January 2019 sampling event.

< The analyte was not detected above the laboratory reporting limit shown.

µg/L - micrograms per liter

U - Undetected: The analyte was analyzed for, but not detected.

mg/L - milligrams per liter

mV - millivolts

NA - not analyzed

NM - not measured

NV - No PCL value has been established for the analyte.

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

Std Units - standard units

Val Qual - validation qualifier

Table 2-2

Baseline Sampling Results

			Location Code		04WW08		04WW09 [a]		04WW10 [a]		04WW11		LHSMW01		LHSMW02		Fire Station Well	
			Sample ID		04WW08-191106		04WW09-190122		04WW10-190122		04WW11-191106		LHSMW01-191106		LHSMW02-191105		Fire Station Well-191106	
			Sample Date		11/6/2019		1/22/2019		1/22/2019		11/6/2019		11/6/2019		11/5/2019		11/6/2019	
			Location Description		Intermediate Zone, Slightly Upgradient of Plume		Shallow Zone, Within Treatment Area		Shallow Zone, Within Treatment Area		Shallow Zone, Downgradient of Plume		Shallow Zone, Cross-Gradient to Plume		Shallow Zone, Downgradient of Plume		Deep Zone, Downgradient of Plume	
Analyte	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
General Chemistry																		
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA		NA	
Perchlorate																		
Perchlorate	µg/L	17	13		2,100		10,000		< 2	U	< 2	U	< 2	U	< 2	U	< 2	U
Field Parameters																		
Dissolved Oxygen	mg/L	NV	0.03		5.78		3.59		3.21		0.48		0.22		NM			
Oxidation-Reduction Potential	mV	NV	-151		326		333		158		127		52		NM			
pH	Std Units	NV	8.65		6.02		5.62		7.13		6.34		5.79		NM			
Ferrous Iron	mg/L	NV	NM		NM		NM		NM		NM		NM		NM			

Notes:

Blue highlighting indicates concentrations above the PCL.

[a] The baseline samples were collected near the completion of injections and emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted. Samples were not collected from these wells during the November 5–6, 2019 sampling event. The January 2019 sample results will be used as the baseline at these locations. Samples were only analyzed for perchlorate during the January 2019 sampling event.

< The analyte was not detected above the laboratory reporting limit shown.

µg/L - micrograms per liter

U - Undetected: The analyte was analyzed for, but not detected.

mg/L - milligrams per liter

mV - millivolts

NA - not analyzed

NM - not measured

NV - No PCL value has been established for the analyte.

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

Std Units - standard units

Val Qual - validation qualifier

Table 3-1
Injection Locations and Amendment Volumes

DPT Location	Amendment Volume per Location			Nearest Monitoring Well	DPT Injection Depths (ft bgs)
	Gallons of EVO **(EDS-ER™ or** Equivalent)	Gallons of Nutrients (DAP)	Gallons of Water		
04DPT03, -06, and -07	15	6	1,463	04WW05	12 - 20
04DPT01, -02, -04, and -05	15	6	1,463	04WW09	6 - 14
04DPT08, -09, -10, -11, -12, -13, -14, -17, -18, -19, -20, -24, and -25	15	6	1,463	04WW10	7 - 15
04DPT15, -16, -21, -22, and -23	15	6	1,463	04WW07	7 - 15

Notes:

DAP - Diammonium phosphate

DPT - direct-push technology

EDS-ER™ - Electron Donor Solution–Extended Release

EVO - emulsified vegetable oil

ft bgs - feet below ground surface

Table 4-1
Design Effectiveness Sampling Results

	Location Code	04WW05				04WW07		04WW09		04WW10	
	Sample ID	04WW05-191106		04WW05-191113-POST-INJ		04WW07-191113-POST-INJ		04WW09-191113-POST-INJ		04WW010-191113-POST-INJ	
	Sample Date	11/6/2019		11/13/2019		11/13/2019		11/13/2019		11/13/2019	
	Location Description	Shallow Zone, Within Plume Area - Baseline		Shallow Zone, Within Plume Area - Post Injection		Shallow Zone, Within Plume Area		Shallow Zone, Within Treatment Area		Shallow Zone, Within Treatment Area	
Analyte	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Measurements												
Dissolved Oxygen	mg/L	NV	0.18		0.46		0.08		0.33		0.08	
Oxidation-Reduction Potential	mV	NV	-36		-135.1		-333.1		-27.5		-291.8	
pH	Std Units	NV	5.94		5.68		5.96		4.36		5.61	
General Chemistry												
Total organic carbon	mg/L	NV	20		32.8		35.3		680		65	

Notes:

ID - identification

INJ - injection

mg/L - milligrams per liter

mV - millivolts

NV - No PCL value has been established for the analyte.

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

Std Units - standard units

Val Qual - validation qualifier

Table 4-2
LHAAP-04 Performance Monitoring Plan

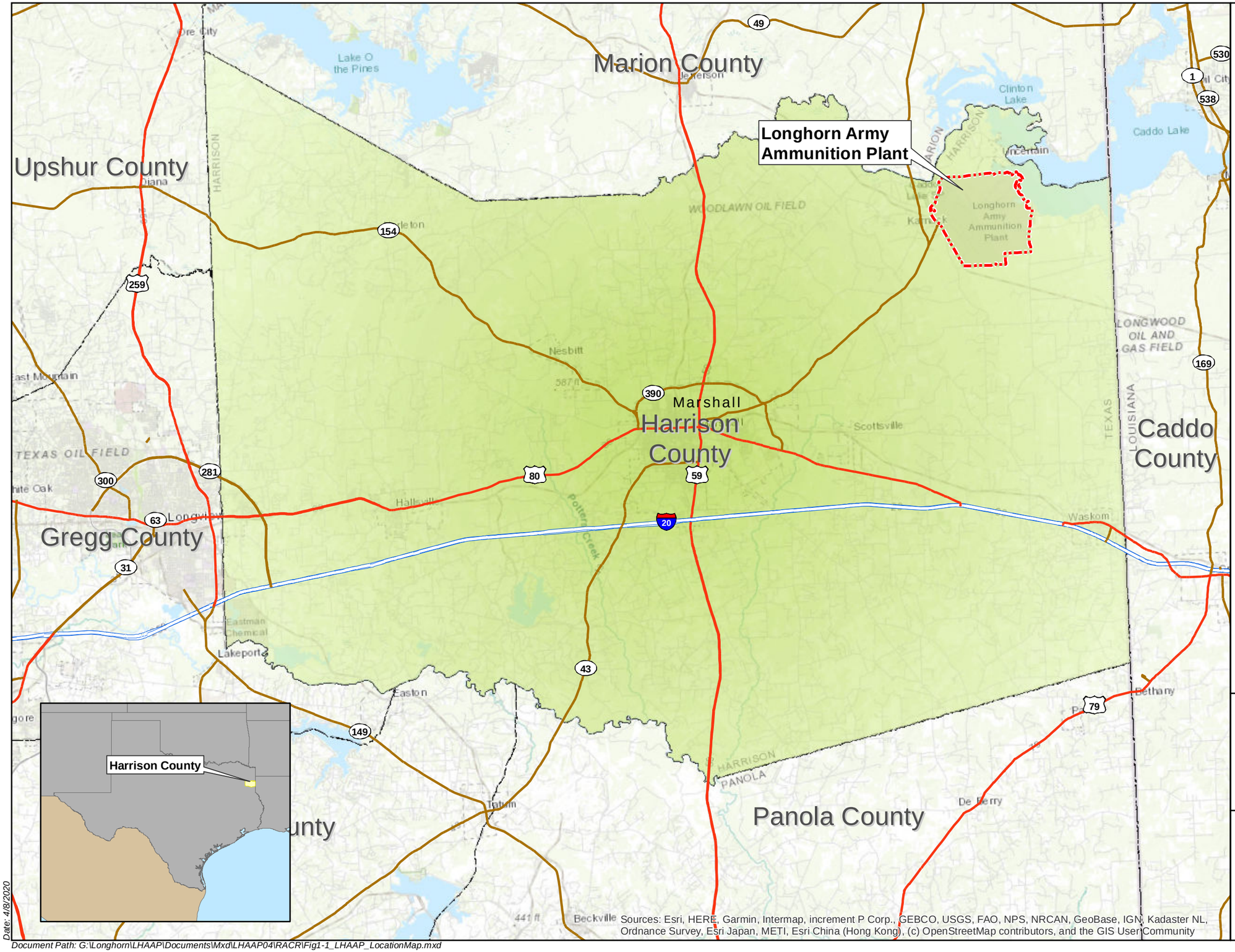
Monitoring Location	Primary Rationale for Well Selection	Performance – Years 1 and 2 (Quarterly)								LTM – Years 3 thru 5 (Semiannual)				
		Perchlorate (314.0)	Dissolved Oxygen (field)	Oxidation-Reduction Potential (field)	pH (field)	Ferrous Iron (field reading)	Alkalinity (2320B)	Anions [a] (E300.0)	Total Organic Carbon (SW9060)	Perchlorate (314.0)	Dissolved Oxygen (field)	Oxidation-Reduction Potential (field)	pH (field reading)	Total Organic Carbon (SW9060)
04WW05	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW07	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW09	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW10	Performance data within the treatment zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
04WW01	Downgradient well for measuring plume stability	✓	✓	✓	✓					✓	✓	✓	✓	
04WW04	Upgradient well for measuring plume stability	✓	✓	✓	✓					✓	✓	✓	✓	
04WW06	Upgradient well for measuring plume stability	✓	✓	✓	✓					✓	✓	✓	✓	
04WW11	Downgradient well for measuring plume stability	✓	✓	✓	✓					✓	✓	✓	✓	
LHSMW01	Crossgradient well for measuring plume stability	✓	✓	✓	✓					✓	✓	✓	✓	
LHSMW02	Crossgradient well	✓	✓	✓	✓					✓	✓	✓	✓	
04WW08	Intermediate Zone well	✓	✓	✓	✓					✓	✓	✓	✓	
04WW02	Upgradient well	✓	✓	✓	✓	Monitoring well 04WW02 will be sampled for the first 2 quarters of Year 1 and the results will be used to evaluate the need for further sampling								

Notes:
The wells where MNA parameters are included in the analyte list above are shown in blue on Figure 2-1. The remaining wells that are only being analyzed for perchlorate are shown on Figure 2-1 in green. 04WW02 is shown in black on Figure 2-1 since it will not be determined if it is included in the performance or LTM monitoring network until after the 2nd quarterly sampling event is complete.

[a] Anions include nitrate, nitrites, and sulfate.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

Figures


Marion County
Upshur County
Harrison County
Gregg County
Panola County
Caddo County
Longhorn Army Ammunition Plant
Lake O the Pines
Clinton Lake
Caddo Lake
Marshall
Nesbitt
Scottsville
Hallsville
Longview
Waskom
Lakeport
Easton
Tatum
Beckville
Bethany
De Berry
Woodlawn Oil Field
Longwood Oil and Gas Field
Texas Oil Field
Eastman Chemical
Potter Creek
49
530
1
538
154
259
169
390
80
59
20
281
300
63
31
43
149
79
Harrison County
N
0 2 4
Miles
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 1-1
LHAAP Location Map
LHAAP-04
Remedial Action Completion Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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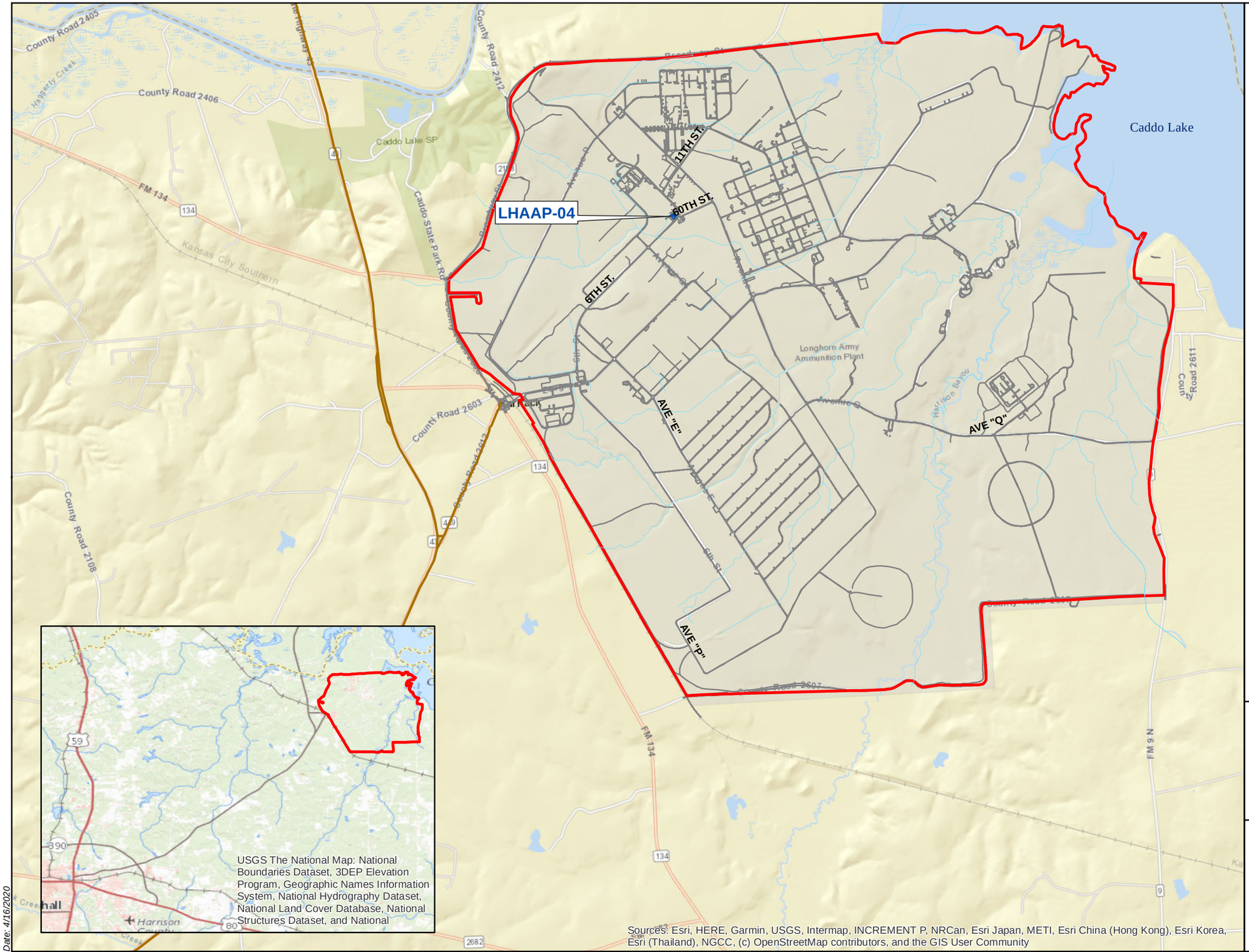

Stream
Road
LHAAP Boundary
LHAAP-04 Site Boundary

N

0 1,500 3,000
Feet

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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Figure 1-2

Site Location Map

LHAAP-04
Remedial Action Completion Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/16/2020

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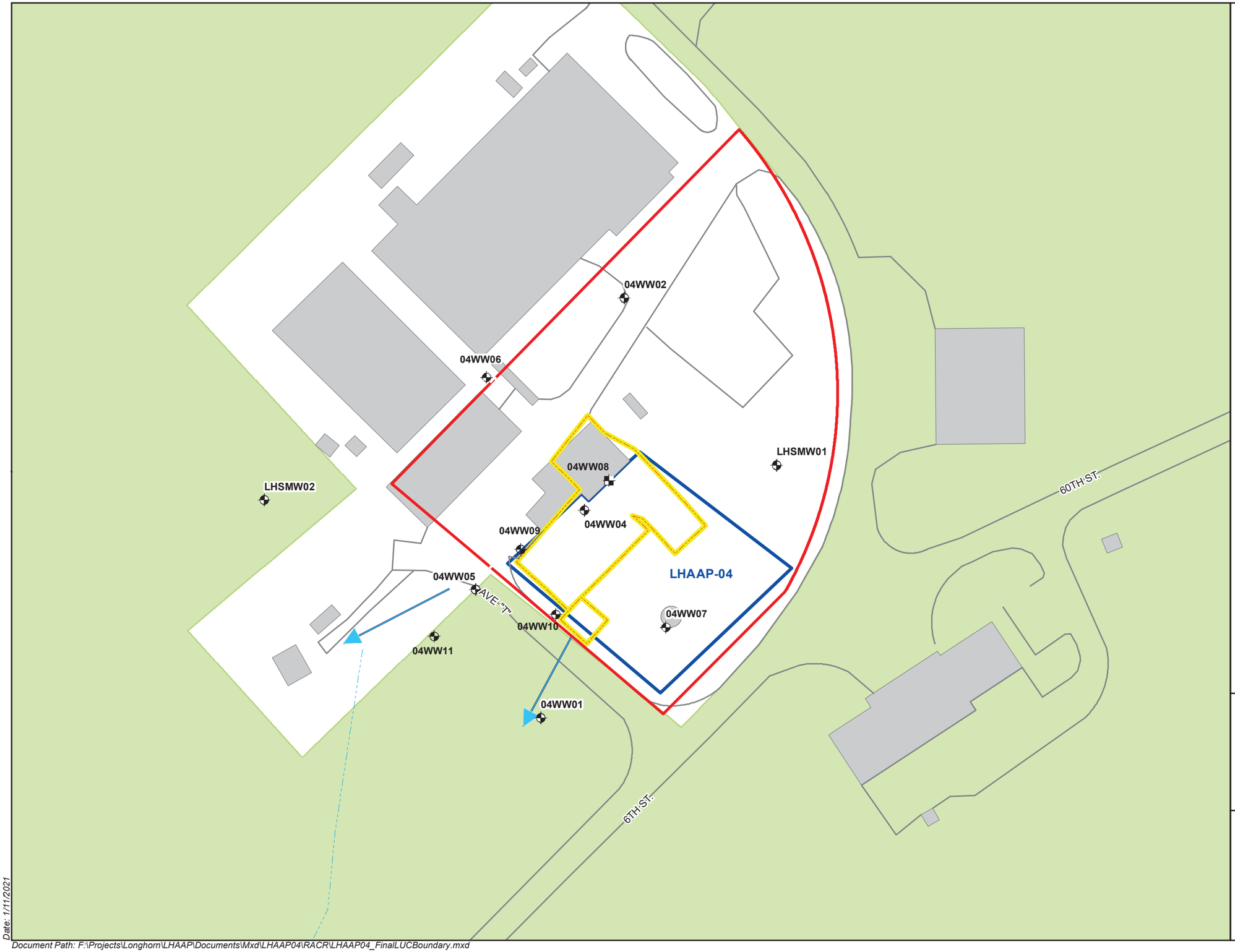

Shallow Monitoring Well

Groundwater Flow Direction based on January 2019 Potentiometric Contours (Bhate 2019a)

Limits of Excavation at Surface (*Source: LHAAP-04 Final Completion Report, Shaw, 2011*)

Stream

Road

Final LUC Boundary

Building

Site Boundary

National Wildlife Refuge

N

0 35 70 Feet

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TULSA, OKLAHOMA

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Figure 1-3

LHAAP-04
Final LUC Boundary Map

Remedial Action Completion Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/11/2021

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RACR\LHAAP04_FinalLUCBoundary.mxd

Shallow Monitoring Well

Intermediate Monitoring Well

Groundwater Flow Direction based on January 2019 Potentiometric Contours (Bhate 2019a)

Limits of Excavation at Surface (*Source: LHAAP-04 Final Completion Report, Shaw, 2011*)

January 2019 Perchlorate Plume Extent (PCL - 17 µg/L)

Stream

Road

Building

Site Boundary

Proposed Final LUC Boundary

Note:
Blue = Monitoring well will be analyzed for perchlorate and MNA parameters as defined on Table 4-2.
Green = Monitoring well will only be analyzed for perchlorate.
Black = Baseline well, not included in the performance or LTM monitoring network.

N

0 35 70 Feet

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Figure 2-1
Monitoring Well Location and January 2019 Plume Map

LHAAP-04
Remedial Action Completion Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/17/2020

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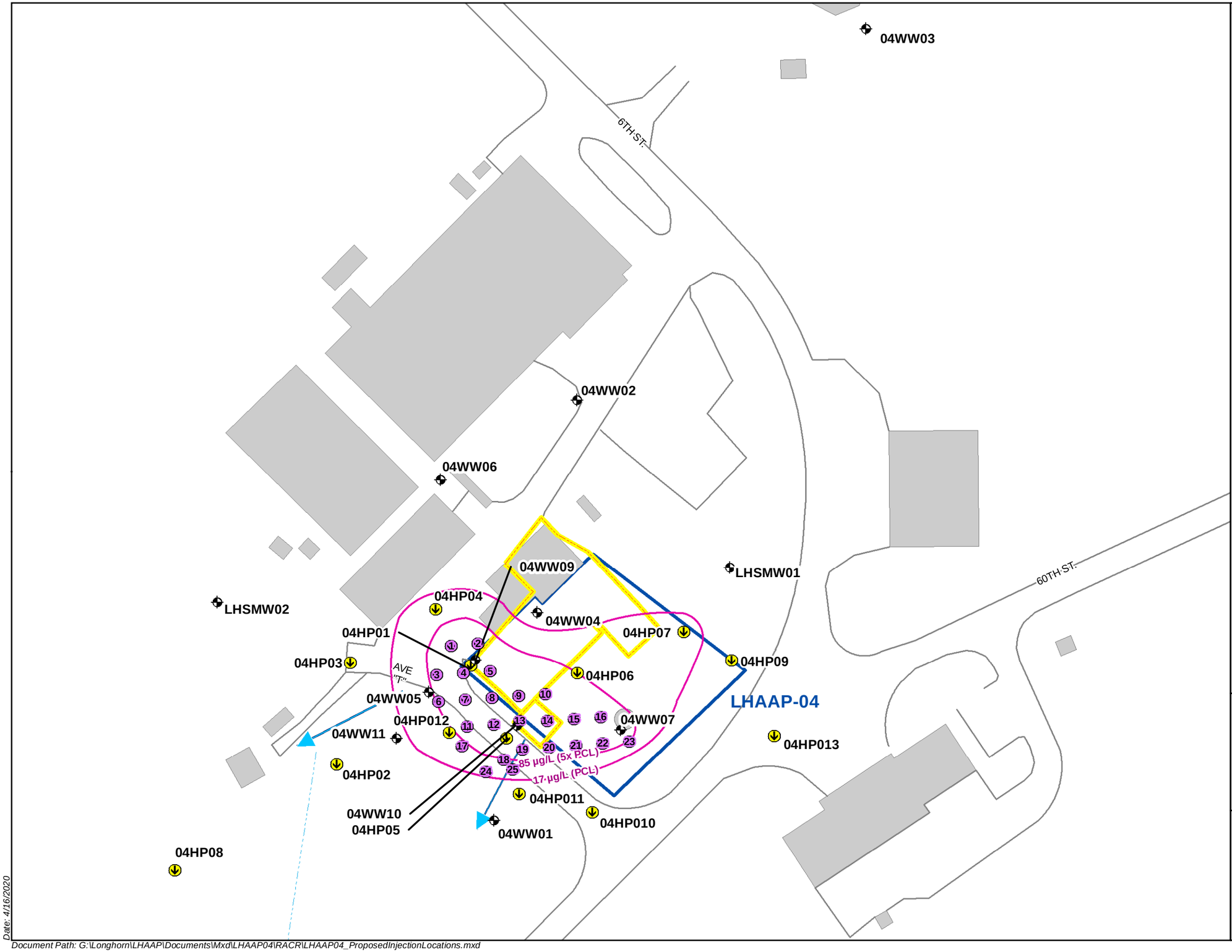

Shallow Monitoring Well

Proposed Injection Location

Hydropunch Location

Groundwater Flow Direction based on January 2019 Potentiometric Contours (Bhate 2019a)

January 2019 Perchlorate Plume Extent (PCL - 17 µg/L)

Limits of Excavation at Surface (*Source: LHAAP-04 Final Completion Report, Shaw, 2011*)

Stream

Road

Building

Site Boundary

Note:
1. Plume boundaries based on most recent results available at each well (2018).
2. PCL - Texas Risk Reduction Program Protective Concentration Level for Residential Groundwater
3. The injection pattern generally targets the area within the 85 µg/L contour, but has been shifted to the southwest to account for future migration.

N

0 50 100 Feet

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Figure 3-1

In Situ Bioremediation Injection Map

LHAAP-04
Remedial Action Completion Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/16/2020

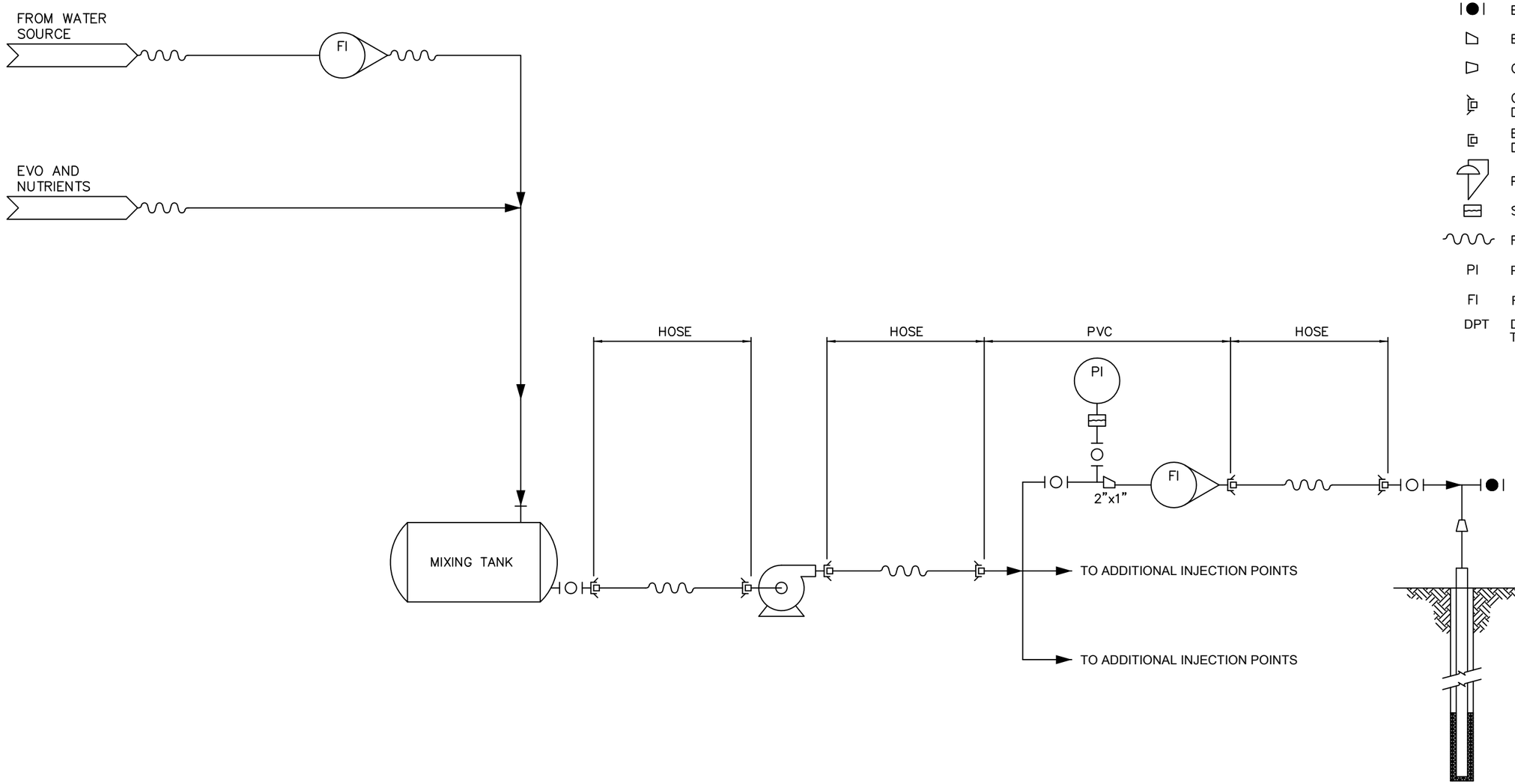
Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RACR\LHAAP04_ProposedInjectionLocations.mxd

NOTE:

1. EVO – EMULSIFIED VEGETABLE OIL.

LEGEND:

- BALL VALVE (OPEN)
- BALL VALVE (CLOSED)
- ECCENTRIC REDUCER
- CONCENTRIC REDUCER
- CAMLOCK QUICK DISCONNECT
- BALL LOCK QUICK DISCONNECT
- PNEUMATIC ACTUATOR
- SEAL
- FLEXHOSE
- PI — PRESSURE INDICATOR
- FI — FLOW INDICATOR
- DPT — DIRECT PUSH TECHNOLOGY



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TULSA, OKLAHOMA

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Figure 3-2
ISB DPT Injection System

LHAAP-04
Remedial Action Completion Report
Longhorn Army Ammunition Plant
Karnack, Texas

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Contract No. W9128F-13-D-0012, Task Order No. W9128BV17F0150 • Final • Rev 0 • April 2021

Appendix A

Notice of LUCs and Final LUC Boundary

2021-000003203

*** DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT***

NOTICE

8 Pages

FILED AND RECORDED-OPR	CLERKS NOTES
On: 03/22/2021 03:29 PM Document Number: 2021-000003203 Receipt No: 2103298 Amount: $ 50.00 By: Emily Najera, Deputy Elizabeth James, County Clerk Harrison County, Texas	

STATE OF TEXAS

COUNTY OF HARRISON

I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Elizabeth James

Elizabeth James, Harrison County Clerk

Record and Return To:

WILLIAM FOSS
2500 CITY WEST BLVD., SUITE 1700

HOUSTON, TX 77042

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROLS AT LHAAP-04

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is a former pilot wastewater treatment plant, located in the central portion of the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-04. LHAAP was placed on the National Priorities List (NPL) in August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA) and the TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-04 were performed in accordance with the FFA requirements.

Wastewater treatment operations began at LHAAP-04 in 1984. The demolition of the former pilot wastewater treatment facility structures, tanks, and piping, and the disposal of the associated wastes were completed in the summer of 1997 as part of the Resource Conservation and Recovery Act closure of the plant. The final remedy for soil was conducted in 2009 as a Non-Time-Critical Removal Action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) program. The soil was removed to non-residential levels. The Site was not remediated to levels suitable for unrestricted use. The U.S. Department of the Army issued the Final Record of Decision (ROD) for LHAAP-04 in October 2016, and the ROD was signed by the Army on December 15, 2016, and the U.S. Environmental Protection Agency on March 30, 2017. The Texas Commission on Environmental Quality (TCEQ) issued a letter concurring with the ROD on February 7, 2017. The final remedy selected in the ROD included in-situ bioremediation for perchlorate concentrations in groundwater, long-term monitoring of groundwater, and Land Use Controls (LUCs). The LUCs at LHAAP-04 will ensure protection of human health by restricting groundwater use to environmental monitoring and testing only, requiring only non-residential

use of the site, and maintaining groundwater monitoring systems until levels of contaminants of concern (COCs) allow for unlimited use and unrestricted exposure.

Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E (Room 103. first floor) 12100 Park 35 Circle, Austin, Texas 78753, (512) 239-2900, Monday through Friday 8:00 am to 5:00 pm, or the Administrative Record available at the Marshall Public Library, 300 South Alamo Boulevard, Marshall, Texas 75670, (930) 935-4465, Monday through Friday 9:30AM – 5:30PM.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public on the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-04 site covers an area of approximately 0.44 acres, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in **Exhibit A**. The LUC boundary, which includes the LHAAP-04 site, encompasses a 1.885 acre tract, more or less, as described in **Exhibit A**. The LUC Boundary is also presented in the attached **Figure 1**.

Future use of the parcel is intended as a national wildlife refuge, consistent with non-residential use. For the purposes of this certification, residential land use includes, but is not limited to, single family to multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of education purpose for children/young adults in grades kindergarten through 12. The U.S. Department of the Army has undertaken careful environmental study of the LHAAP-04 site and concluded that the LUCs set forth below are required to ensure protection of human health and the environment:

- Groundwater Use Restriction. The groundwater use restriction boundary consists of the 1.885-acre tract, more or less. Groundwater underlying this land is contaminated with perchlorate. A prohibition of groundwater use (except for monitoring and testing) as a potable source will remain in place until the levels of COCs in soil and groundwater allow for unlimited use and unrestricted exposure.

- Non-Residential Use Restriction. The non-residential use restriction boundary is coincident with the boundary for Groundwater Use Restriction and consists of the 1.885-acre tract, more or less. The site is restricted to nonresidential use until it is demonstrated that surface and subsurface soil and groundwater COCs are at levels that allow for unlimited use and unrestricted exposure.

- Maintain Integrity of Monitoring Systems. The integrity of any current or future remedial or monitoring systems will remain in place until the cleanup levels of COCs in groundwater are met.

III

The owner of this site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIN-ISE-LO (H. Procter)
Program Manager/Analyst
Office of the Deputy Chief of Staff, (DAIN-ISE)
Environmental Division, BRAC Field Branch
600 Army Pentagon
Washington, D.C. 22310-0600

Or

Mr. Thomas A. Lineer
Chief
Office of the Deputy Chief of Staff, (DAIN-ISE)
Environmental Division, BRAC Field Branch
600 Army Pentagon
Washington, D.C. 22310-0600

Rose M. Zeiler
Longhorn AP Site Manager

EXECUTED this the 25th day of Feb., 2021.

BEFORE ME, on this 25th day of Feb 2021, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 25th day of February 2021.

STATE OF ARKANSAS NOTARY PUBLIC
KAREN DAVIS
MY COMMISSION # 12382216
EXPIRES: May 20, 2021
Logan County

Notary Public in and for the State of Arkansas,
County of Logan

Exhibit A

Survey and Legal Plat

G. W. LEWIS SURVEY, A–426
HARRISON COUNTY, TEXAS

Legal Description

All that certain 1.885 acre tract of land contained within Longhorn Army Ammunition Plant, Harrison County, Texas, said 1.885 acre tract more particularly described as follows:

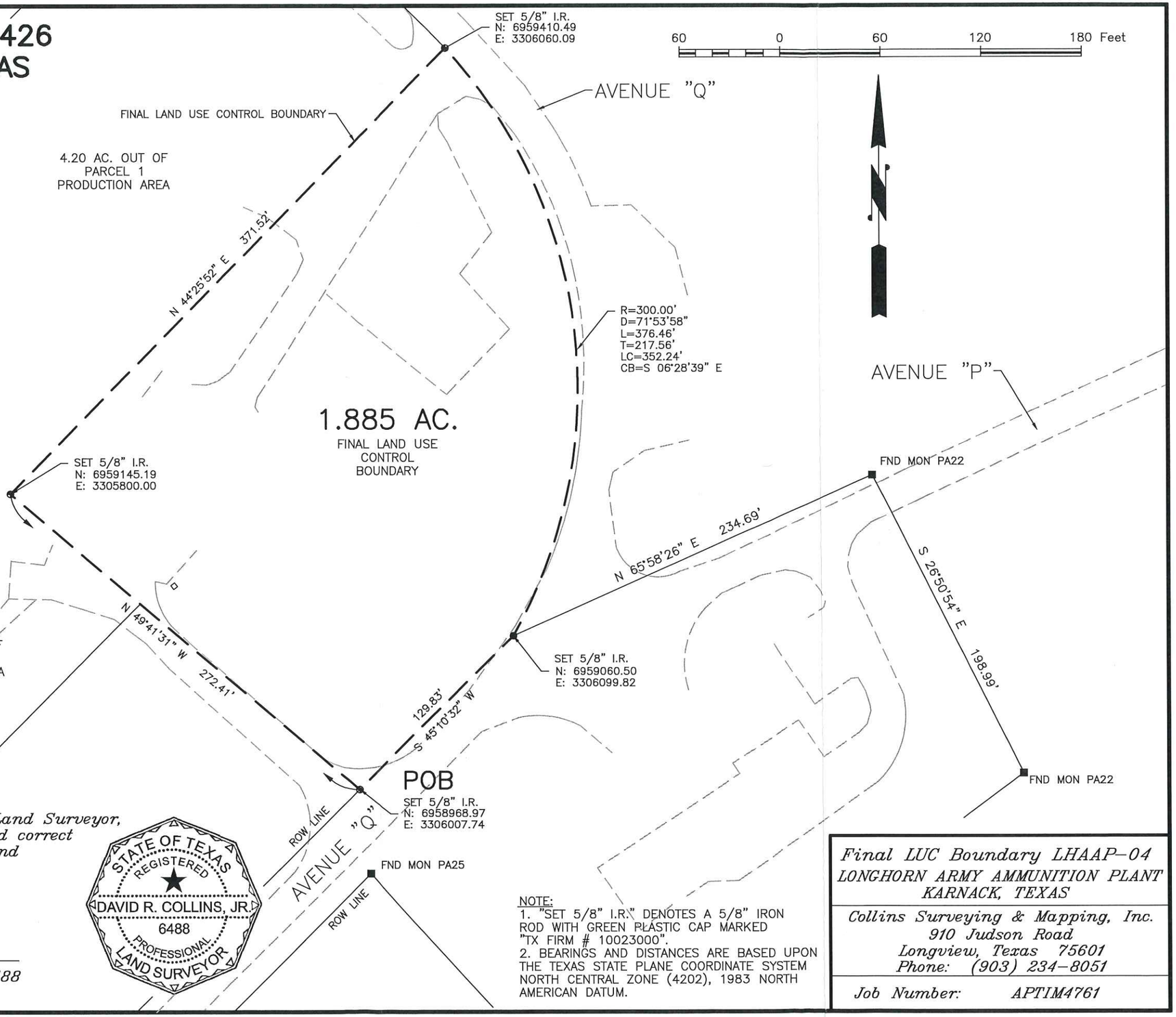
BEGINNING at a 5/8" iron rod set in the northwest right of way line of Avenue "Q" for the southeast corner of this tract with the coordinates of N: 6958968.97, E: 3306007.74;

THENCE: N 49°41'31" W with the southwest line of this tract 272.41 feet to a 5/8" iron rod set for the southwest corner of this tract with the coordinates of N: 6959145.19, E: 3305800.00;

THENCE: N 44°25'52" E with the northwest line of this tract 371.52 feet to a 5/8" iron rod set in the southwest right of way line of said Avenue "Q" for the northwest corner of this tract with the coordinates of N: 6959410.49, E: 3306060.09;

THENCE: in a southweasterly direction with said right of way line and along a cureve to the right having a radius of 300.00 feet, an arc length of 376.46 feet, and a chord bearing and destance of S 06°28'39" 352.24 feet to a 5/8" iron rod set for the end of said curve with the coordinates of N: 6959060.50, E: 3306099.82, from which a monument found in the northwest right of way line of Avenue "P" bears N 65°58'26" E 234.69 feet;

THENCE: S 45°10'32" W with said northwest right of line Avenue "Q" 129.83 feet to th e POINT OF BEGINNING, containing 1.885 acres of land, more or less.



I, David R. Collins, Jr., Reg. Professional Land Surveyor, do hereby certify that this Plat is true and correct according to a survey made upon the ground JANUARY 6, 2021.

STATE OF TEXAS
REGISTERED
DAVID R. COLLINS, JR.
6488
PROFESSIONAL
LAND SURVEYOR

David R. Collins, Jr. *R.P.L.S. #6488*
Firm License #10023000

NOTE:
1. "SET 5/8" I.R." DENOTES A 5/8" IRON ROD WITH GREEN PLASTIC CAP MARKED "TX FIRM # 10023000".
2. BEARINGS AND DISTANCES ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE (4202), 1983 NORTH AMERICAN DATUM.

Final LUC Boundary LHAAP–04
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Collins Surveying & Mapping, Inc.
910 Judson Road
Longview, Texas 75601
Phone: (903) 234–8051

Job Number: APTIM4761

Figure 1

Final LUC Boundary

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

bhate APTIM

Figure 1

LHAAP-04
Final LUC Boundary Map

Remedial Action Completion Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/11/2021

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RACR\LHAAP04_FinalLUCBoundary.mxd

LUC Inspection and Maintenance Checklist

General Information	
Project Name	LUC Inspection and Maintenance, LHAAP-04 Longhorn Army Ammunition Plant, Karnack, TX
Contractor	
Inspector's Name	
Inspector's Title	
Inspector's Signature	
Inspector's Contact Number	
Inspection Date	
Type of Inspection	☐ Quarterly ☐ Semiannual ☐ Annual ☐ Prior to forecast rain ☐ After a rain event ☐ Other ----------

A. Groundwater Monitoring Wells						
D.1	Are the installed groundwater monitoring wells in poor condition?					
D.2	Is the well cleared of vegetation and accessible?					
D.3	Any other relevant observations?					
D.4	Are there any significant cracks present?					
D.5	Are there any damaged areas?					

Annual Land Use Control Compliance Certification Form

In accordance with the Remedial Design dated _____ for LHAAP-04 an inspection of the site was conducted by _____ [indicate transferee] on _____.

The land use control mechanisms are:

- Groundwater restrictions - The groundwater underlying LHAAP-04 within the LUC boundary shall not be accessed or used for any purpose (except for environmental monitoring and testing) without the prior written approval of U.S. Army, the USEPA and the TCEQ. The LUC to prohibiting groundwater use shall be implemented and shall remain in place at the site until the levels of contaminants of concern (COCs) in soil and groundwater allow for unlimited use and unrestricted exposure.;
- Land use restrictions - restrict land use within the LUC boundary to nonresidential;
- Integrity of remedial and monitoring systems - maintain the integrity of any current or future remedial or monitoring systems until cleanup goals are met.

No unauthorized activities or uses have occurred. Compliance with land use controls and restrictions is as follows:

- No use of groundwater (other than environmental testing and monitoring), installation of new groundwater wells, or tampering with existing monitoring wells;
- No land use other than nonresidential; and
- No activities that would compromise the integrity of the remedial or monitoring systems.

I, the undersigned, do document that the inspection was conducted as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title: _____

Signature: _____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year, retained in the file and provided to Army, EPA and TCEQ upon request.

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

February 23, 2021

DAIN-ODB-LO

Hon. Chad L. Sims
Harrison County Judge
#1 Peter Whetstone Square, Room 314
Marshall, Texas 75670

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Judge Sims,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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

Attachments:
LHAAP-04 Land Use Controls for Soil and Groundwater Contamination
LHAAP-04 Site Location Map
LHAAP-04 Final Land Use Control Boundary Map
LHAAP-16 Land Use Controls for Soil and Groundwater Contamination
LHAAP-16 Site Location Map
LHAAP-16 Final Land Use Control Boundary Map

Copies furnished:
A. Palmie, TCEQ, Austin, TX
L. Poulos, USEPA, Dallas, TX
K. Nemmers, Bhate, Lakewood, CO (Administrative Record)

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

February 23, 2021

DAIN-ODB-LO

Mr. Thomas Speir
Chairman, Harrison County Historical Commission
200 West Houston Street
Marshall, Texas 75670

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Mr. Speir,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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Sincerely,

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Longhorn AAP Site Manager

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LHAAP-16 Final Land Use Control Boundary Map

Copies furnished:
A. Palmie, TCEQ, Austin, TX
L. Poulos, USEPA, Dallas, TX
K. Nemmers, Bhate, Lakewood, CO (Administrative Record)

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

February 23, 2021

DAIN-ODB-LO

Mr. William D. Hatfield
Harrison County Commissioner, Precinct 1
Waskom Sub-Courthouse
165 West Texas Avenue
Waskom, Texas 75692

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Commissioner Hatfield,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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K. Nemmers, Bhate, Lakewood, CO (Administrative Record)

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

February 23, 2021

DAIN-ODB-LO

Hon. Judye Patterson
Mayor, City of Uncertain, Texas
P.O. Box 277
Uncertain, Texas 75661

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Mayor Patterson,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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Sincerely,

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Longhorn AAP Site Manager

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L. Poulos, USEPA, Dallas, TX
K. Nemmers, Bhate, Lakewood, CO (Administrative Record)

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

February 23, 2021

DAIN-ODB-LO

Mr. Eric Duerkop
Manager, Caddo Lake National Wildlife Refuge
15600 Highway 134
Karnack, Texas 75661

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Mr. Duerkop,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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Longhorn AAP Site Manager

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

February 23, 2021

DAIN-ODB-LO

Mr. Terry Britt
President, Caddo Lake Water Supply Corporation
P.O. Box 136
Uncertain, Texas 75661

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Mr. Britt,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

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

February 23, 2021

DAIN-ODB-LO

Mr. Carl Shelton
President, Leigh Water Supply Corporation
342 Byrd Circle
Karnack, Texas 75661

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Mr. Shelton,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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Longhorn AAP Site Manager

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K. Nemmers, Bhate, Lakewood, CO (Administrative Record)

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

February 23, 2021

DAIN-ODB-LO

Rep. Chris Paddie
Texas House of Representatives, District 9
102 West Houston Street
Marshall, Texas 75670

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Representative Paddie,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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Sincerely,

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Longhorn AAP Site Manager

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

February 23, 2021

DAIN-ODB-LO

Sen. Bryan Hughes
Texas State Senate, District 1
201 West Houston Street, Suite 106
Marshall, Texas 75670

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Senator Hughes,

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Longhorn AAP Site Manager

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

February 23, 2021

DAIN-ODB-LO

Texas Department of Licensing and Regulation
Water Well Drillers and Pump Installers Program
P.O. Box 12157
Austin, Texas 78711

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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

February 23, 2021

DAIN-ODB-LO

Rep. Louis Gohmert
United States House of Representatives
Texas 1st Congressional District
102 West Houston Street
Marshall, Texas 75670

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Representative Gohmert,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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

Attachments:
LHAAP-04 Land Use Controls for Soil and Groundwater Contamination
LHAAP-04 Site Location Map
LHAAP-04 Final Land Use Control Boundary Map
LHAAP-16 Land Use Controls for Soil and Groundwater Contamination
LHAAP-16 Site Location Map
LHAAP-16 Final Land Use Control Boundary Map

Copies furnished:
A. Palmie, TCEQ, Austin, TX
L. Poulos, USEPA, Dallas, TX
K. Nemmers, Bhate, Lakewood, CO (Administrative Record)

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

February 23, 2021

DAIN-ODB-LO

Sen. John Cornyn
United States Senate
Regions Bank Building
100 East Ferguson Street, Suite 1004
Tyler, Texas 75702

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Senator Cornyn,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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Sincerely,

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Longhorn AAP Site Manager

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LHAAP-04 Land Use Controls for Soil and Groundwater Contamination
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DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

February 23, 2021

DAIN-ODB-LO

Sen. Ted Cruz
United States Senate
305 South Broadway, Suite 501
Tyler, Texas 75702

Re: Land Use Controls and Final Land Use Control Boundary for Soil and Groundwater Contamination at Two Environmental Sites at Former Longhorn Army Ammunition Plant, Karnack, Texas, February 2021

Dear Senator Cruz,

The final remedial actions for two sites, LHAAP 04, Former Pilot Wastewater Treatment Plant; and LHAAP-16 Landfill 16, were completed in November 2019 and December 2019, respectively. The attached information is provided to fulfill a requirement of the Remedial Action Completion Report for each site by giving notice of the land use restrictions referenced in the Record of Decision and to provide a Final Land Use Control boundary map. These notices are being sent to federal, state and local governments involved at this site and the owners and occupants of the property subject to the use restrictions and land use controls.

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.
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LHAAP-16 Final Land Use Control Boundary Map

Copies furnished:
A. Palmie, TCEQ, Austin, TX
L. Poulos, USEPA, Dallas, TX
K. Nemmers, Bhate, Lakewood, CO (Administrative Record)

Land Use Controls for Soil and Groundwater Contamination

LHAAP-04 Former Pilot Wastewater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

The Longhorn Army Ammunition Plant (LHAAP) is an inactive government-owned, formerly contractor-operated and maintained Department of Defense facility located in central east Texas in the northeast corner of Harrison County. LHAAP is approximately 14 miles northeast of Marshall, Texas. The facility is approximately 40 miles west of Shreveport, Louisiana. The installation occupies approximately 1,100 of its former 8,416 acres between State Highway 43 at Karnack, Texas and the southwestern shore of Caddo Lake. The installation can be accessed by State Highways 43 and 134.

LHAAP was placed on the National Priorities List (NPL) on August 9, 1990. Activities to remediate contamination began in 1990. After its listing on the NPL, the U.S. Army, the USEPA, and the Texas Water Commission (currently known as the Texas Commission of Environmental Quality [TCEQ]) entered into a CERCLA Section 120 Federal Facilities 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.

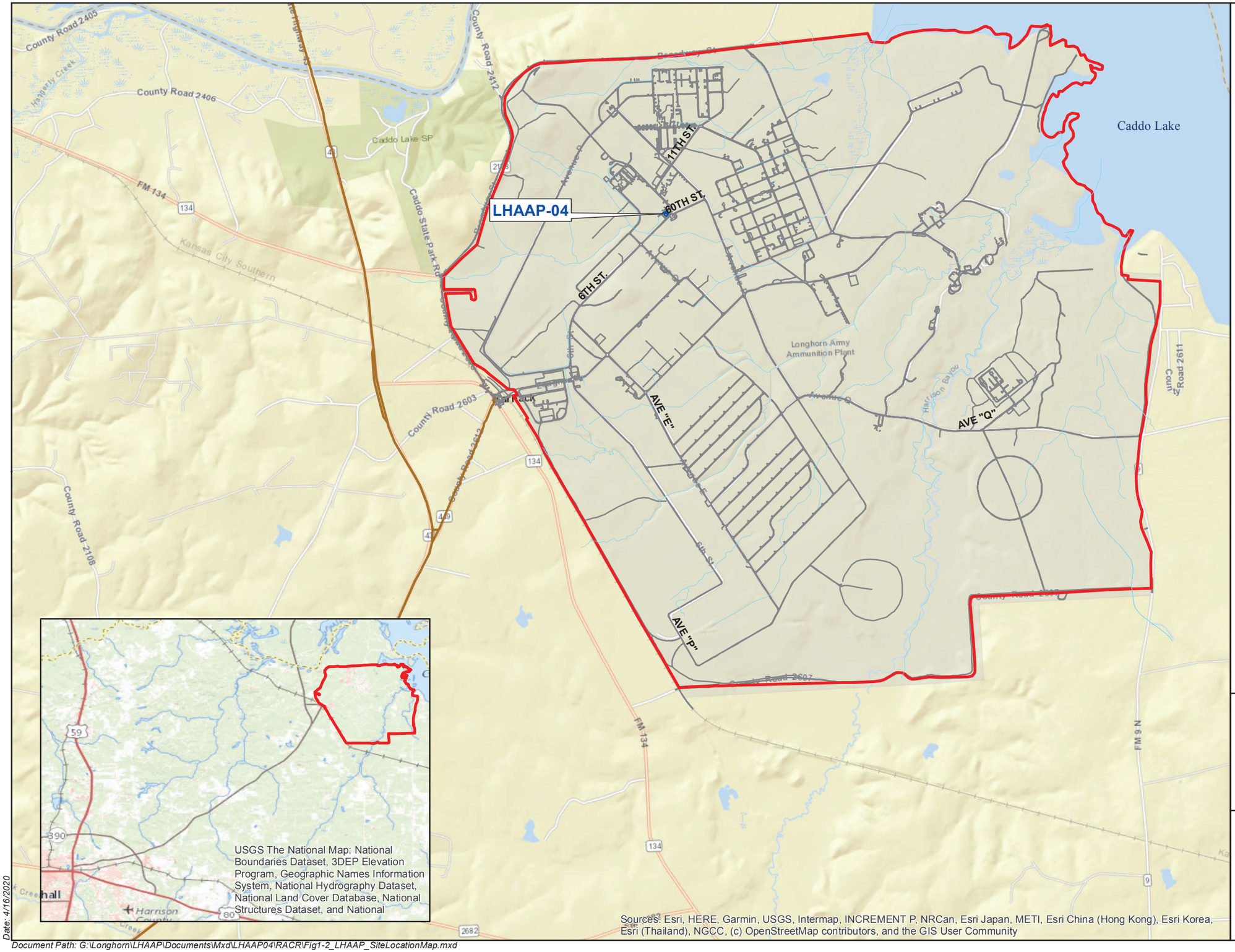
The site addressed in this Final Notice of Land Use Controls is LHAAP-04, which is shown on the attached figures (Figures 1-2 and 1-3 from the Response Action Completion Report) and discussed below. Land Use Controls (LUCs) are applied at LHAAP-04 as part of the remedy in accordance with the LHAAP-04 Record of Decision (ROD) finalized March 30, 2017. The LUCs are necessary because contaminants are present in groundwater at levels that do not support unlimited use and unrestricted exposure. The Final LUC boundary shown is the same as the preliminary boundary that was provided in the Initial Notice of LUCs provided on June 26, 2017.

Contaminants of Concern (COCs)
The only COC identified in the ROD for groundwater at LHAAP-04 was perchlorate, which was found at concentrations exceeding the TCEQ Protective Concentration Levels in the shallow zone.

Land Use Controls

- A LUC prohibiting groundwater use (except for environmental monitoring and testing) shall be implemented and shall remain in place at the site until the levels of COCs in soil and groundwater allow for unlimited use and unrestricted exposure.
- A LUC restricting land use to nonresidential shall be implemented and shall remain in place at the site until the levels of COCs in surface and subsurface soil, and groundwater allow for unlimited use and unrestricted exposure.
- A LUC to maintain the integrity of any current or future remedial or monitoring systems shall remain in place until groundwater cleanup levels of COCs are met.

Further information may be found in the Administrative Record at the Marshall Public Library, at www.longhornaap.com or by contacting Rose M. Zeiler (479-635-0110 or rose.m.zeiler.civ@mail.mil).



Stream
Road
LHAAP Boundary
LHAAP-04 Site Boundary

N

0 1,500 3,000
Feet

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

bhate APTIM

Figure 1-2

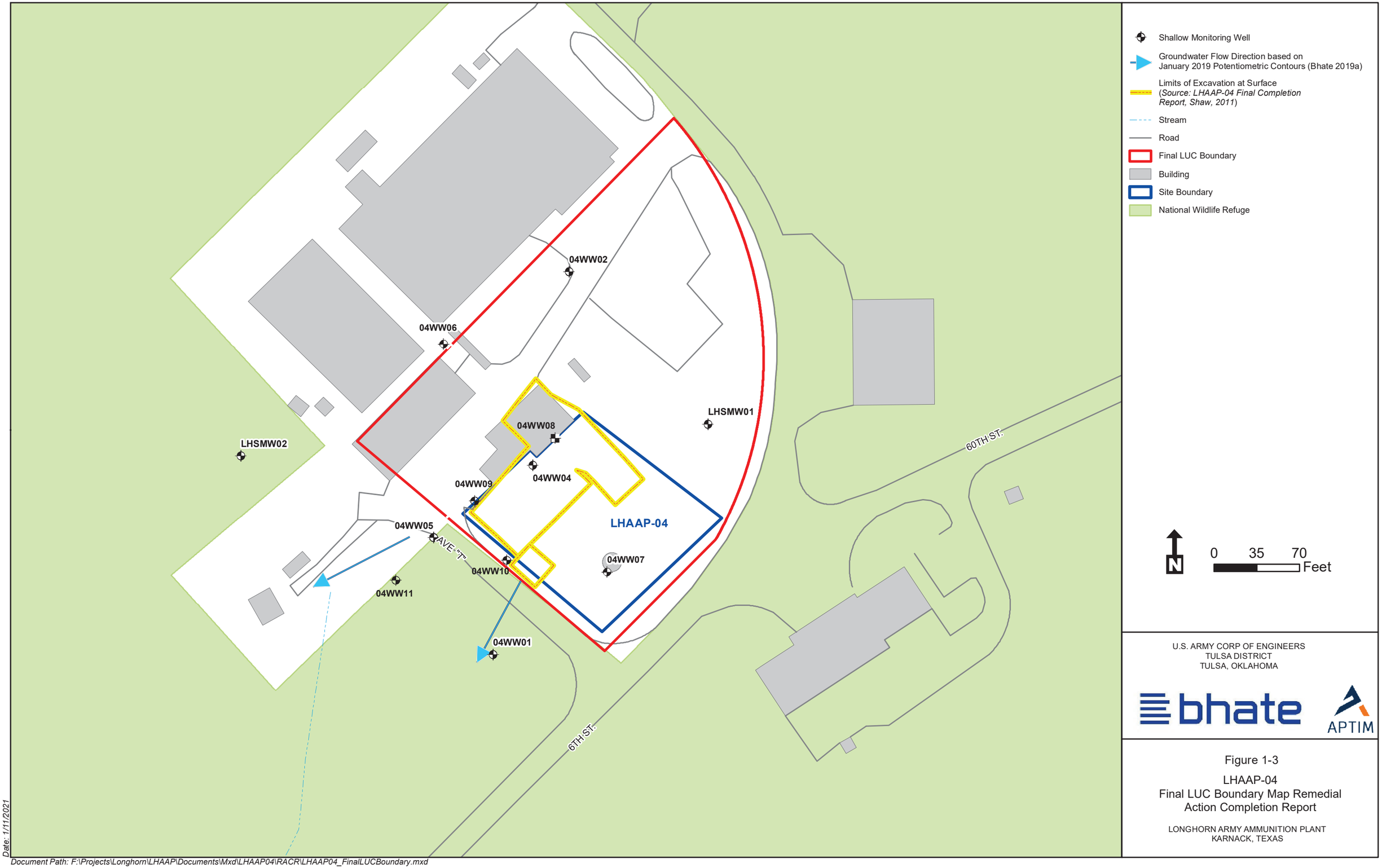
Site Location Map

LHAAP-04
Remedial Action Completion Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/16/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RACR\Fig1-2_LHAAP_SiteLocationMap.mxd



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

bhate APTIM

Figure 1-3

LHAAP-04
Final LUC Boundary Map Remedial Action Completion Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/11/2021

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RACR\LHAAP04_FinalLUCBoundary.mxd

Land Use Controls for Soil and Groundwater Contamination

Landfill 16 (LHAAP-16)

Longhorn Army Ammunition Plant, Karnack, Texas

The former Longhorn Army Ammunition Plant (LHAAP) is an inactive government-owned, formerly contractor-operated and maintained Department of Defense facility located in central east Texas in the northeast corner of Harrison County. LHAAP is approximately 14 miles northeast of Marshall, Texas. The facility is approximately 40 miles west of Shreveport, Louisiana. The former U.S. Army installation occupied nearly 8,416 acres between State Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake and is accessed by State Highways 43 and 134.

LHAAP was placed on the National Priorities List (NPL) on August 9, 1990. Activities to remediate contamination began in 1990. After its listing on the NPL, the U.S. Army, the USEPA, and the Texas Water Commission (currently known as the Texas Commission on Environmental Quality [TCEQ]) entered into a CERCLA Section 120 Federal Facilities 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.

Land Use Controls (LUCs) are applied at LHAAP-16 as part of the remedy in accordance with the LHAAP-16 Record of Decision signed September 13, 2016. The LUCs are necessary because contaminants are present in groundwater at levels that do not support unlimited use and unrestricted exposure and landfill waste remains at the site under the existing landfill cap.

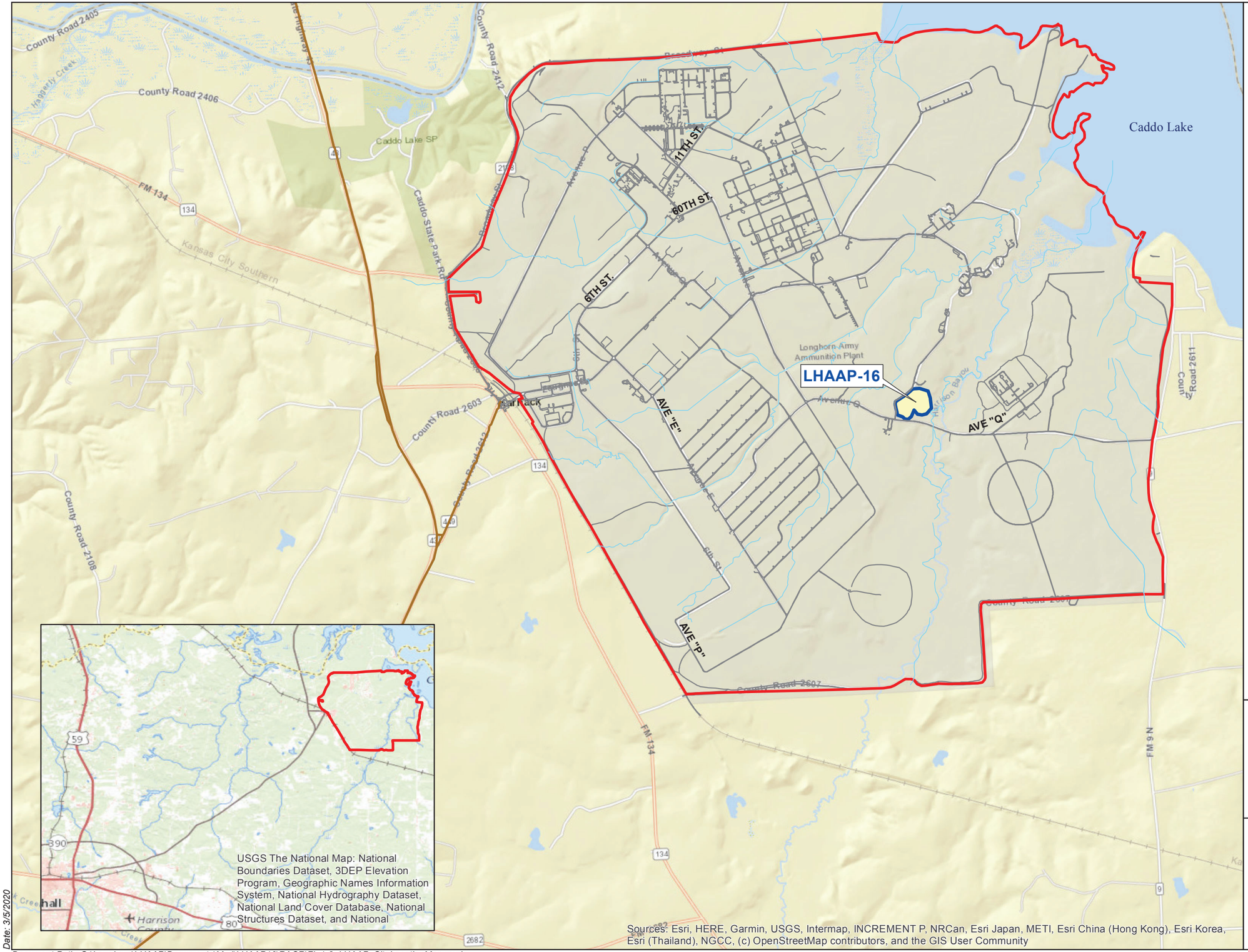
Contaminants of Concern (COCs)

In the shallow and intermediate groundwater zones, the COCs are volatile organic compounds (VOCs) (trichloroethene [TCE], cis-1,2-dichloroethene [DCE], 1,1-DCE, 1,2-dichloroethane, 1,1,2-trichloroethane, methylene chloride, and vinyl chloride [VC]), perchlorate, and five metals (arsenic, chromium, manganese, nickel, and thallium).

Land Use Controls

- The LUC to preserve the integrity of the landfill cap and restrict intrusive activities (e.g., digging) that would degrade or alter the cap shall remain in place as long as the landfill waste remains at the site or until the levels of COCs allow for unlimited use and unrestricted exposure.
- The LUC prohibiting groundwater use (except for environmental monitoring and testing) as a potable source shall be implemented and shall remain in place at the site until the levels of COCs in soil and groundwater allow for unlimited use and unrestricted exposure.
- The LUC restricting land use to nonresidential shall be implemented and shall remain in place at the site until the levels of COCs in surface and subsurface soil and groundwater allow for unlimited use and unrestricted exposure.
- The LUC to maintain the integrity of any current or future remedial or monitoring systems shall remain in place until groundwater cleanup levels of COCs are met.

Further information may be found in the Administrative Record at the Marshall Public Library, at www.longhornaap.com or by contacting Rose M. Zeiler (479-635-0110 or rose.m.zeiler.civ@mail.mil).



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

bhate APTIM

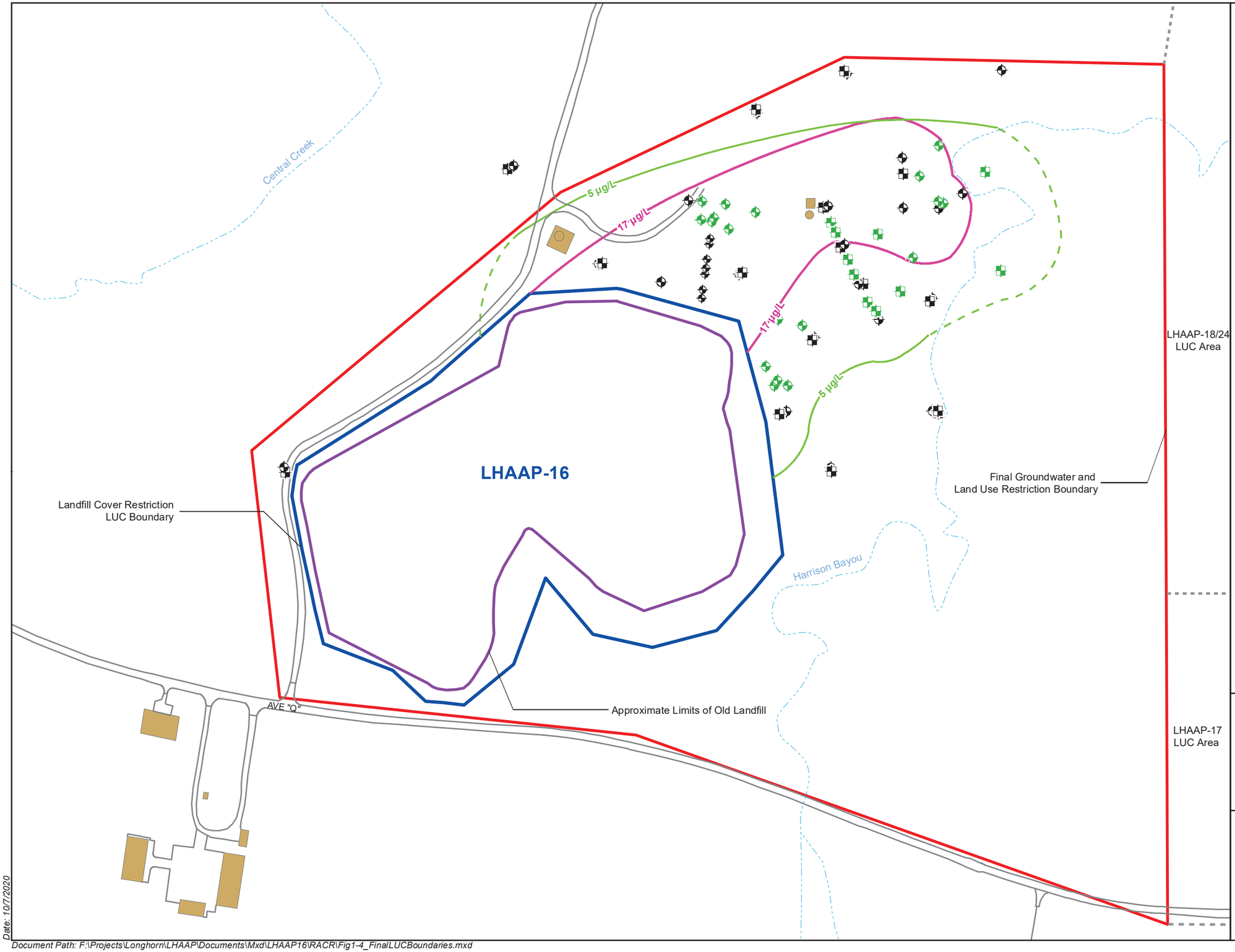
Figure 1-2

LHAAP Site Location Map
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 3/5/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig1-2_LHAAP_SiteLocationMap.mxd



Shallow Well Installed 2018 or 2019

Intermediate Well Installed 2018 or 2019

Existing Shallow Monitoring Well

Existing Intermediate Monitoring Well

Extent of Perchlorate Contamination > 17 µg/L in Intermediate and Shallow Zones (September 2019)

Extent of TCE Contamination > 5 µg/L in Intermediate and Shallow Zones (Dashed Where Inferred) (September 2019)

Stream

Road

Final Groundwater and Land Use Restriction Boundary

Landfill Cover Restriction LUC Boundary

Approximate Limits of Old Landfill

Building or Tank

LHAAP-17 and LHAAP-18/24 LUC Boundaries

Notes:
1. µg/L - micrograms per liter
2. LUC - land use control
3. TCE - trichloroethene
4. The eastern side of the Final Groundwater and Land Use Restriction Boundary is shared with the western edge of a similar land use restriction that will cover LHAAP-17 and LHAAP-18/24 located to the east of LHAAP-16.

N

0 110 220 Feet

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

bhate APTIM

Figure 1-4

Final LUC Boundaries
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 10/7/2020

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig1-4_FinalLUCBoundaries.mxd

Contract No. W9128F-13-D-0012, Task Order No. W9128BV17F0150 • Final • Rev 0 • April 2021

Appendix B

Field Injection and Sample Collection Logs

(Note: The sample collection logs from the November 2019 baseline sampling event have been revised to correct inaccurate screened interval information recorded on the forms in the field. The original monitoring well logs and the surveyed ground surface and top of casing elevations were used to correct the screened interval values, where necessary.)

LHAAP-04 Injection Log

Injection Location	Treatment Interval (ft)	Injection Thickness (ft)	Injection Interval (ft)	Volume per Interval (gallons)	Volume on Flow meter (gallons)	Flow Rate (gpm)	Pressure (psi)	Total Volume Expected (gallons	Volume Injected (gallons)	Comments
04DPT-01	6-14	4	10-14	739	739	7.02	20	1,478 total	739 10/28/19	10-24-19 1455 START
		4	6-10	739	1478	3.36	15		1478	Time Completed: 1405 Finish 10/28/19
04DPT-02	6-14	4	10-14	739	739	3.46	30	1,478	10/28/19 746 1030	10/28/19 1420 start
		4	6-10	739	1478	2.00	15	1485	10/28/19 739 1730	Time Completed: 10/29/19 1730 Finish
04DPT-03	12-20	4	16-20	739	739	2.7	20	1,478	740 10/30/19 0926	start 10/29/19 1540
		4	12-16	739	1478	6.6	15	1490	750 10/30/19 1400	Time Completed: Finish 10/30/19 1400
04DPT-04	6-14	4	10-14	739	739	3.5	15	1,478	740 11/1/19 1030	10/30/19 1400 start
		4	6-10	739	1478	1.5	5	total 1478.34		Time Completed: 11-4-19 1607 Finished
04DPT-05	6-14	4	10-14	739	739	6.86	5	1,478	717.9 10/28/19	10-24-19 1500 START
		4	6-10	739	1478	1.75	5	1478	756.55 stop	Time Completed: 11-6-19 / 1804
04DPT-06	12-20	4	16-20	739	739	2.72	35	1,478	739 10/29/19 0935	10/28/19 1435 start
		4	12-16	739	1478	6.00	10	1478	739 10/29/19 1430	Time Completed: 10/29/19 1430
04DPT-07	12-20	4	16-20	739	739	1.5	15	1,478	779 10/1/19 1010	10/31/19 1215 Start
		4	12-16	739	1478	2.6	5	1478	699 11/1/19 1455	Time Completed: 11/1/19 1455 Finish
04DPT-08	7-15	4	11-15	739	739	0.90	10	1,478	1478.25	11-4-19 1135
		4	7-11	739	1478	1.80	15			Time Completed: 11-5-19 1730
04DPT-09	7-15	4	11-15	739	739	3.38	20	1,478	10/31/19 1215 682 stop	10/30/19 0845 start
		4	7-11	739	1478	0.94	5	total	1478.54	Time Completed: 11-5-19 1735
04DPT-10	7-15	4	11-15	739	739	8.75	10	1,478	Total 1479.2	10/23/19 - 1555 - 1630
		4	7-11	739	1478	4.98	20			Time Completed: 1403 10-24-19
04DPT-11	7-15	4	11-15	739	739	4.96	20	1,478	total 1478.18	10/22/19 1524 - 1700
		4	7-11	739	1478	3.79	20			Time Completed: 10-24-19 1230
04DPT-12	7-15	4	11-15	739	739	1.2	30	1,478	739 10/29/19 0935	10/28/19 - 1525 start
		4	7-11	739	1478	2.05	25	1478	739 10/29/19 1440	Time Completed: 10/29/19 1440

04DPT 10 - Innacurate (Red Sandy Clay) Daylighting at Borehole moved 5ft N

04DPT 05 - Daylighting got progressively worse. Pulled out after 717.9. Moved 5's. for 6-10' push. Still daylighting. Pull off to 04DPT

LHAAP-04 Injection Log

Injection Location	Treatment Interval (ft)	Injection Thickness (ft)	Injection Interval (ft)	Volume per Interval (gallons)	Volume on Flow meter (gallons)	Flow Rate (gpm)	Pressure (psi)	Total Volume Expected (gallons	Volume Injected (gallons)	Comments
04DPT-13	7-15	4	11-15	739	739	0.86	5	✓1,478	234.48 11-4-19	11-4-19 / 1300
		4	7-11	739	1478	1.17	5		1478 11-4-19	Time Completed: 11-6-19 /
04DPT-14	7-15	4	11-15	739	739	1.51	5	✓ 1,478	904.26	11-4-19 0930
		4	7-11	739	1478	1.27	5		1478	Time Completed: 11-5-19 / 1505
04DPT-15	7-15	4	11-15	739	739	3.12	32	✓ 1,478	10/29/19 739 1245 10/30/19 739 0930	10/29/19 1450 start
		4	7-11	739	1478	1.4	20			Time Completed: 10/30/19 0930
04DPT-16	7-15	4	11-15	739	739	8.75	40	✓1,478	1474.0	10/23/19 1133 -
		4	7-11	739	1478	7.65	20			Time Completed: 10/23/19 1505
04DPT-17	7-15	4	11-15	739	739	6.20	30	✓1,478	739 10/28/19 1478	10-24-19 1239 START
		4	7-11	739	1478	3.15	20			Time Completed: 10/28/19 1510 finish
04DPT-18	7-15	4	11-15	739	739	4.8	15	✓1,478	743 10/29/19 1003	start 10/29/19 1550
		4	7-11	739	1478	1.9	15	1478.06		Time Completed: 11-4-19 / 1130
04DPT-19	7-15	4	11-15	739	739	7.41	30	✓1,478	1478.68	10/22/19 0944
		4	7-11	739	1478	20	8-76			Time Completed: ~~10-23-19~~ 10-24-19 0905
04DPT-20	7-15	4	11-15	739	739	2.74	20	✓1,478	Initial 582.42	10/22/19 0955 - 1505 Daylight
		4	7-11	739	1478	5.90	20		1478.25	Time Completed: 10-24-19 1355
04DPT-21	7-15	4	11-15	739	739	1.98	10	✓1,478	739 10/30 11/1/19	start 10/30/19 0940
		4	7-11	739	1478	1.5	20	1478	14	Time Completed: 11-04-19 / 1248
04DPT-22	7-15	4	11-15	739	739	3.83	20	✓1,478	739 10/28/19	10-24-19 1416 START
		4	7-11	739	1478	3.24	25		1478 10/28/19	Time Completed: 1340 10/28/19 finish
04DPT-23	7-15	4	11-15	739	739	8.70	40	✓1,478	1478.05	10/22/19 1455 - 1700
		4	7-11	739	1478	5.20	20			Time Completed: 10/23/19 815 - 1111 Fin
04DPT-24	7-15	4	11-15	739	739	5.62	40	✓1,478	1478.0	10/22/19 0945 - 1700
		4	7-11	739	1478	0.97	5.0			Time Completed: 10/23/19 1610 Fin
04DPT-25	7-15	4	11-15	739	739	4.98	20	✓1,478	Initial 220gal 1478.25	10/22/19 0915 - 1425 daylight
		4	7-11	739	1478	5.87	20			Time Completed: 10-24-19 1400

04DPT-19 - Daylight 4ft S of Bore hole.

04DPT-20 - Daylight in same area as DPT-19

04DPT-06 - Daylighting on upper 1.ft.

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 50032
Client: Army
Site Name: 04

Well ID: 04WW02
Inspection Date: 11/5/19
Well Completion Depth/ Measured Depth: 26.68
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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:

WELL INSPECTION FORM

Job Name: LTAAP
Job No.: 501032
Client: Army
Site Name: 04

Well ID: LHSmw02
Inspection Date: 11/5/19
Well Completion Depth/ Measured Depth: 19.00
Inspector: Scott Beesinger

ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 04

Well ID: 04MW03
Inspection Date: 11/6/19
Well Completion Depth/ Measured Depth: 26.90
Inspector: Scott Bussinger

ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 04

Well ID: 04MW06
Inspection Date: 11/5/19
Well Completion Depth/ Measured Depth: 28.08
Inspector: Scott Bessinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: Metal
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARmy
Site Name: 04

Well ID: 04MW11
Inspection Date: 11/6/19
Well Completion Depth/ Measured Depth: 18.50
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 04

Well ID: 04WW05
Inspection Date: 11/6/19
Well Completion Depth/ Measured Depth:
Inspector: Scott Bressinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 04

Well ID: 04MW05
Inspection Date: 11/6/19
Well Completion Depth/ Measured Depth: 29.62
Inspector: Scott Bressinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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): 2"
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARmy
Site Name: 04

Well ID: 04MW08
Inspection Date: 11/6/14
Well Completion Depth/ Measured Depth: 43.68
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible?				☒ Yes	☐ No
Protective casing?				☒ Yes	☐ No
Material: METAL					
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARmy
Site Name: 04
Well ID: 04MW04
Inspection Date: 11/6/19
Well Completion Depth/ Measured Depth: 21.55
Inspector: Scott Bessinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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): 2"
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:

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: OU

Well ID: LHSMW01
Inspection Date: 11/6/19
Well Completion Depth/ Measured Depth: 17.95
Inspector: Scott Bressinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
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:

EQUIPMENT CALIBRATION DAILY LOG

Date: 11/5/19	Project Name: LHAAP-04
Project Number: 501032	Recorded By: Scott BEESINGER

PID	Model:		Bulb: 10.6 meV		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	(isobutylene)			Value:	Value:	Value:

COMB. GAS/O_2 METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER	Model: U-52 HORIBA				Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time: 0725	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00	04/20	GCJ695	Value: 4.00	Value:	Value:
	Conductivity (mS/cm)	4.49			Value: 4.49	Value:	Value:
	Turbidity (NTU)	0			Value: 0.0	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value: 9.02	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date:	11/6/19	Project Name:	LHAAP-04
Project Number:	501032	Recorded By:	Scott Bassinger

						Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model:		Bulb: 10.6 meV					
	Equipment ID #:							
	Parameter	Standard	Exp. Date	Lot #		Time:	Time:	Time:
						Initials:	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA		Value:	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	(isobutylene)				Value:	Value:	Value:

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
COMB. GAS/O_2 METER	Model:						
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

					Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
WATER QUALITY METER	Model:	U-52 HoRiBA					
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time: 0720	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00	04/20	6CJ695	Value: 4.00	Value:	Value:
	Conductivity (mS/cm)	4.49			Value: 4.49	Value:	Value:
	Turbidity (NTU)	0			Value: 0.0	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value: 9.01	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW02**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: LHSMW02-191105 **DATE/TIME:** 11/5/19 0849 **Pump Inlet Depth:** 16.00

Sampling Method: **Sample Purpose: REG** **Sample Matrix: GW**

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Lowflow/Bladder Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/5/19 0925

Depth to Water - Initial (DTWi) (ft) 15.32

Purge End Date/Time: 11/5/19 0955

Depth to Well Bottom (ft) 19.00

Discharge Tube Length: NA

PID Reading: NA

W Foss 04/10/2020 7.18 - 17.18

Screen Interval (ft): ~~8.50 - 18.50~~

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / (N)

Approximate depth of pump inlet*(ft): 16.00

Pump Start Time: 0925

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DEPTH TO WATER - 15.32

APTIM

Sample Collection Log

Location ID: LHSMW02					Sample No: LHSMW02-1911 05					
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
11/5/19	0930	100	.5	15.40	1.09	20.34	6.05	37.3	55	0.99
	0935	100	1.0	15.46	1.10	20.22	5.94	34.0	46	0.39
	0940	100	1.5	15.50	1.10	20.21	5.81	34.9	50	0.24
	0945	100	2.0	15.53	1.10	20.20	5.80	35.4	51	0.23
	0950	100	2.5	15.55	1.10	20.19	5.79	36.0	51	0.22
↓	0955	100	3.0	15.57	1.10	20.18	5.79	36.5	52	0.22

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **04WW03**

Project No: **501032**

Sampler(s): Scott Bressinger

FIELD CONDITIONS Clear | cool

SAMPLING INFORMATION

Sample No: 04WW03-191106 **DATE/TIME:** 11/6/19 0739 **Pump Inlet Depth:** 21.00

Sampling Method: **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Lowflow/Bladder Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/6/19 0750

Depth to Water - Initial (DTWi) (ft) 11.00

Purge End Date/Time: 11/6/19 0820

Depth to Well Bottom (ft) 26.90

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~16.00 - 26.00~~ W Foss 04/10/2020 16.55 - 26.55

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / N

Approximate depth of pump inlet*(ft): 21.00

Pump Start Time: 0750

Ferrous Iron (Required Y or N) _____ mg/L

2ND DEPTH TO WATER 11.00

APTIM

Sample Collection Log

Location ID: 04WW03					Sample No: 04WW03-191106					
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
11/6/19	0755	100	.5	11.08	0.967	18.74	5.87	12.4	183	1.79
	0800	100	1.0	11.14	0.854	19.43	6.17	7.8	196	1.38
	0805	100	1.5	11.19	0.841	19.47	6.14	7.6	150	1.32
	0810	100	2.0	11.21	0.840	19.53	6.13	7.7	151	1.30
	0815	100	2.5	11.23	0.839	19.58	6.13	7.6	152	1.28
↓	0820	100	3.0	11.24	0.839	19.61	6.13	7.5	153	1.26

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW06**

Sampler(s): Scott Bussinger

FIELD CONDITIONS Clear / Cool

SAMPLING INFORMATION

Sample No: 04WW06-1911**06** **DATE/TIME:** 11/6/19 0829 **Pump Inlet Depth:** 23.00

Sampling Method: **Sample Purpose: REG** **Sample Matrix: GW**

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow / BLADDER Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/6/19 0840

Depth to Water - Initial (DTWi) (ft) 7.05

Purge End Date/Time: 11/6/19 0910

Depth to Well Bottom (ft) 28.03

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~18.00 - 28.00~~

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / (N)

W Foss 04/10/2020 18.11 - 28.11

Approximate depth of pump inlet*(ft): 23.00

Pump Start Time: 0840

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DEPTH TO WATER - 7.05

APTIM

Sample Collection Log

Location ID: 04WW06		Sample No: 04WW06-191106								
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
11/6/19	0845	100	.5	7.12	1.56	20.92	6.48	26.2	65	1.01
	0850	100	1.0	7.17	1.65	21.22	6.59	19.8	12	0.27
	0855	100	1.5	7.21	1.60	21.51	6.63	20.3	3	0.11
	0900	100	2.0	7.23	1.59	21.58	6.64	20.7	3	0.11
	0905	100	2.5	7.25	1.59	21.65	6.65	21.0	2	0.10
↓	0910	100	3.0	7.26	1.59	21.72	6.65	21.3	2	0.10

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW05**

Sampler(s): Scott Beesinger

FIELD CONDITIONS CLEAR

SAMPLING INFORMATION

Sample No: 04WW05-1911 06 **DATE/TIME:** 11/6/19 **Pump Inlet Depth:** 24.00

Sampling Method: **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample **Assoc. QC Samples** **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Alkalinity in Water by SM2320B	1 x 250 mL HDPE	Cool 4C
		ALSHT	Anions (nitrite/nitrate/sulfate) in Water by SW9056	1 x 250 mL HDPE	Cool 4C
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C
		ALSHT	TOC in Water by SM5310C	2 x 40 mL Amber	H2SO4

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 2"

Purge Start Date/Time: 11/6/19 1015

Depth to Water - Initial (DTWi) (ft) 7.88

Purge End Date/Time: 11/6/19 1045

Depth to Well Bottom (ft) 29.62

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): ~~19.00 - 29.00~~ 18.7 - 28.7 W Foss 04/10/2020

Discharge Tube Diameter: 1/4" Immersible Layer: Y / N

Approximate depth of pump inlet*(ft): 24.00

Pump Start Time: 1015

Ferrous Iron (Required Y or N) 0.31 mg/L

2ND DEPTH TO WATER - 7.88

APTIM

Sample Collection Log

Location ID: 04WW05 Sample No: 04WW05-1911 06

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
11/6/19	1020	100	.5	7.95	0.884	21.80	6.47	140	-83	0.93
↓	1025	100	1.0	8.00	0.823	22.25	6.03	119	-45	0.29
	1030	100	1.5	8.04	0.795	22.50	5.95	108	-38	0.19
	1035	100	2.0	8.07	0.794	22.57	5.95	107	-37	0.19
	1040	100	2.5	8.09	0.794	22.65	5.94	106	-37	0.18
↓	1045	100	3.0	8.11	0.794	22.73	5.94	106	-36	0.18

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW08**

Sampler(s): Scott Beesinger

FIELD CONDITIONS CLEAR

SAMPLING INFORMATION

Sample No: 04WW08-1911 06 **DATE/TIME:** 11/6/19 1056 **Pump Inlet Depth:** 36.00

Sampling Method: **Sample Purpose: REG** **Sample Matrix: GW**

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/6/19 1105

Depth to Water - Initial (DTWi) (ft) 16.13

Purge End Date/Time: 11/6/19 1135

Depth to Well Bottom (ft) 43.68

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~31.00 41.00~~ 33.75 - 43.75

W Foss 04/10/2020

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / (N)

Approximate depth of pump inlet*(ft): 36.00

Pump Start Time: 1105

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DEPTH TO WATER - 16.13

APTIM

Sample Collection Log

Location ID: 04WW08				Sample No: 04WW08-191106						
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
11/6/19	1110	100	.5	16.20	2.61	23.88	7.92	77.3	-125	1.09
	1115	100	1.0	16.26	2.53	23.57	8.69	61.5	-145	0.22
	1120	100	1.5	16.30	2.56	23.81	8.67	47.9	-148	0.04
	1125	100	2.0	16.32	2.57	23.89	8.66	47.2	-149	0.04
	1130	100	2.5	16.34	2.57	23.95	8.65	46.5	-150	0.03
↓	1135	100	3.0	16.35	2.57	24.04	8.65	46.0	-151	0.03

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP** Location ID: **04WW04**

Project No: **501032** Sampler(s): Scott Bassinger

FIELD CONDITIONS Clear/ Sunny

SAMPLING INFORMATION

Sample No: 04WW04-191106 **DATE/TIME:** 11/6/19 1144 **Pump Inlet Depth:** 16.00

Sampling Method: **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample **Assoc. QC Samples** **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing Purging Method/Equipment: Low flow/BLADDER Pump

Casing ID (in.): ~~4~~ 2" Purge Start Date/Time: 11/6/19 1150

Depth to Water - Initial (DTWi) (ft) 5.20 Purge End Date/Time: 11/6/19 1226

Depth to Well Bottom (ft) 21.55 Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): ~~11.00 - 21.00~~ Discharge Tube Diameter: 1/4" Immersible Layer: Y (N)

W Foss 04/10/2020 10.80 - 20.80

Approximate depth of pump inlet*(ft): 16.00 Pump Start Time: 1150

Ferrous Iron (Required Y or (N)) _____ mg/L

2ND DEPTH TO WATER - 5.20

APTIM

Sample Collection Log

Location ID: 04WW04					Sample No: 04WW04-191106					
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
11/6/19	1155	100	.5	5.28	0.497	25.09	6.98	159	-63	0.84
	1200	100	1.0	5.33	0.661	25.13	6.45	130	-47	0.20
	1205	100	1.5	5.37	0.790	25.18	6.32	122	-46	0.07
	1210	100	2.0	5.40	0.790	25.20	6.31	121	-45	0.06
	1215	100	2.5	5.42	0.791	25.23	6.30	121	-44	0.06
↓	1220	100	3.0	5.43	0.791	25.25	6.30	120	-43	0.06

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **LHSMW01**

Project No: **501032**

Sampler(s): Scott Beesinger

FIELD CONDITIONS CLEAR/ SUNNY

SAMPLING INFORMATION

Sample No: LHSMW01-1911 06 **DATE/TIME:** 11/6/19 1236 **Pump Inlet Depth:** 12.50

Sampling Method: **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/BLADDER Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/6/19 1245

Depth to Water - Initial (DTWi) (ft) 7.35

Purge End Date/Time: 11/6/19 1315

Depth to Well Bottom (ft) 17.95

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~7.50 - 17.50~~

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / (N)

W Foss 04/10/2020 7.74 - 17.74

Approximate depth of pump inlet*(ft): 12.50

Pump Start Time: 1245

Ferrous Iron (Required Y or (N)) _____ mg/L

2ND DEPTH TO WATER 7.35

APTIM

Sample Collection Log

Location ID: LHSMW01		Sample No: LHSMW01-1911 06								
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
11/6/19	1250	100	.5	7.43	0.271	26.00	6.72	30.3	42	1.21
	1255	100	1.0	7.49	0.248	25.00	6.38	24.7	116	0.54
	1300	100	1.5	7.53	0.247	24.97	6.35	23.1	126	0.50
	1305	100	2.0	7.55	0.247	24.94	6.34	22.7	126	0.49
	1310	100	2.5	7.57	0.247	24.91	6.34	22.2	127	0.48
	1315	100	3.0	7.58	0.247	24.88	6.34	21.8	127	0.48

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW02**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cool / cloudy

SAMPLING INFORMATION

Sample No: 04WW02-191105 **DATE/TIME:** 11/5/19 0745 **Pump Inlet Depth:** 21.00

Sampling Method: **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow / BLADDER PUMP

Casing ID (in.): 4"

Purge Start Date/Time: 11/5/19 0800

Depth to Water - Initial (DTWi) (ft) 7.25

Purge End Date/Time: 11/5/19 0830

Depth to Well Bottom (ft) 26.68

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~16.00 - 26.00~~ 16.9 - 26.9

W Foss 04/10/2020

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / (N)

Approximate depth of pump inlet*(ft): 21.00

Pump Start Time: 0800

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DEPTH TO WATER 7.25

APTIM

Sample Collection Log

Location ID: 04WW02				Sample No: 04WW02-1911 05						
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
11/5/19	0805	100	.5	7.33	0.364	22.74	6.05	26.5	208	1.56
	0810	100	1.0	7.38	0.296	23.49	6.18	13.1	202	1.50
	0815	100	1.5	7.41	0.293	23.60	6.10	9.9	219	1.48
	0820	100	2.0	7.43	0.293	23.68	6.09	9.7	220	1.46
	0825	100	2.5	7.45	0.292	23.75	6.08	9.4	221	1.45
↓	0830	100	3.0	7.46	0.292	23.80	6.08	9.0	221	1.44

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **04WW02**

Project No: **501032**

Sampler(s): Scott Beesinger

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 04WW02-1911**05**-FD **DATE/TIME:** 11/5/19 0745 **Pump Inlet Depth:** 21.00

Sampling Method: **Sample Purpose: FD** **Sample Matrix: GW**

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/BLADDER Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/5/19 0800

Depth to Water - Initial (DTWi) (ft) 7.25

Purge End Date/Time: 11/5/19 0830

Depth to Well Bottom (ft) 26.68

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~16.00 - 26.00~~ 16.9 - 26.9

W Foss 04/10/2020

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / (N)

Approximate depth of pump inlet*(ft): 21.00

Pump Start Time: 0800

Ferrous Iron (Required Y or (N)) _____ mg/L

APTIM

Sample Collection Log

Location ID: 04WW02	Sample No: 04WW02-1911 05 -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
11/5/19	0805	100	.5	7.33	0.364	22.74	6.05	26.5	208	1.56
↓	0810	100	1.0	7.38	0.296	23.49	6.18	13.1	202	1.50
	0815	100	1.5	7.41	0.293	23.60	6.10	9.9	219	1.48
	0820	100	2.0	7.43	0.293	23.68	6.09	9.7	220	1.46
	0825	100	2.5	7.45	0.292	23.75	6.08	9.4	221	1.45
↓	0830	100	3.0	7.46	0.292	23.80	6.08	9.0	221	1.44

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP** Location ID: **04WW11**

Project No: **501032** Sampler(s): Scott Baessinger

FIELD CONDITIONS CLEAR

SAMPLING INFORMATION

Sample No: 04WW11-191106 **DATE/TIME:** 11/6/19 0919 **Pump Inlet Depth:** 13.50

Sampling Method: **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing Purging Method/Equipment: Lowflow / BLADDER Pump

Casing ID (in.): 4" Purge Start Date/Time: 11/6/19 0925

Depth to Water - Initial (DTWi) (ft) 7.72 Purge End Date/Time: 11/6/19 0955

Depth to Well Bottom (ft) 18.50 Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): ~~8.50 - 18.50~~ Discharge Tube Diameter: 1/4" Immersible Layer: Y / (N)

W Foss 04/10/2020 8.2 - 18.2

Approximate depth of pump inlet*(ft): 13.50 Pump Start Time: 0925

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DEPTH TO WATER - 7.72

APTIM

Sample Collection Log

Location ID: 04WW11		Sample No: 04WW11-191106								
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
11/6/19	0930	100	.5	7.80	0.630	20.47	7.12	88.3	139	3.89
	0935	100	1.0	7.86	0.609	20.50	7.11	76.1	152	3.45
	0940	100	1.5	7.90	0.607	20.53	7.12	68.0	156	3.27
	0945	100	2.0	7.93	0.607	20.56	7.13	67.6	157	3.25
	0950	100	2.5	7.95	0.607	20.59	7.13	67.0	158	3.23
	0955	100	3.0	7.96	0.607	20.63	7.13	66.6	158	3.21

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW11**

Sampler(s): Scott Beesinger

FIELD CONDITIONS

CLEAR

SAMPLING INFORMATION

Sample No: 04WW11-191106 -MS **DATE/TIME:** 11/6/19 0919 **Pump Inlet Depth:** 13.50

Sampling Method: **Sample Purpose:** MS **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/6/19 0925

Depth to Water - Initial (DTWi) (ft) 7.72

Purge End Date/Time: 11/6/19 0955

Depth to Well Bottom (ft) 18.50

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~8.50 - 18.50~~

W Foss 04/10/2020 8.2 - 18.2

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / (N)

Approximate depth of pump inlet*(ft): 13.50

Pump Start Time: 0925

Ferrous Iron (Required Y or (N) _____ mg/L

APTIM

Sample Collection Log

Location ID: 04WW11		Sample No: 04WW11-1911**06**-MS								
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
11/6/19	0930	100	.5	7.80	0.630	20.47	7.12	88.3	139	3.89
	0935	100	1.0	7.86	0.609	20.50	7.11	76.1	152	3.45
	0940	100	1.5	7.90	0.607	20.53	7.12	68.0	156	3.27
	0945	100	2.0	7.93	0.607	20.56	7.13	67.6	157	3.25
	0950	100	2.5	7.95	0.607	20.59	7.13	67.0	158	3.23
↓	0955	100	3.0	7.96	0.607	20.63	7.13	66.6	158	3.21

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **04WW11**

Project No: **501032**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Clear

SAMPLING INFORMATION

Sample No: 04WW11-191106-MSD **DATE/TIME:** 11/6/19 0999 **Pump Inlet Depth:** 13.50

Sampling Method: **Sample Purpose: MSD** **Sample Matrix: GW**

Appearance of Sample **Assoc. QC Samples** **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Perchlorate in Water by 6850	1 x 125 mL HDPE	Cool 4C

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4"

Purge Start Date/Time: 11/6/19 0925

Depth to Water - Initial (DTWi) (ft) 7.72

Purge End Date/Time: 11/6/19 0955

Depth to Well Bottom (ft) 18.50

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): ~~8.50 - 18.50~~

W Foss 04/10/2020 8.2 - 18.2

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / N

Approximate depth of pump inlet*(ft): 13.50

Pump Start Time: 0925

Ferrous Iron (Required Y or N) _____ mg/L

APTIM

Sample Collection Log

Location ID: 04WW11 Sample No: 04WW11-191106-MSD

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
11/6/19	0930	100	.5	7.80	0.630	20.47	7.12	88.3	139	3.89
	0935	100	1.0	7.86	0.609	20.50	7.11	76.1	152	3.45
	0940	100	1.5	7.90	0.607	20.53	7.12	68.0	156	3.27
	0945	100	2.0	7.93	0.607	20.56	7.13	67.6	157	3.25
	0950	100	2.5	7.95	0.607	20.59	7.13	67.0	158	3.23
↓	0955	100	3.0	7.96	0.607	20.63	7.13	66.6	158	3.21

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Page 1 of _____

COC ID: LHAAP04 Baseline Nov 2019 **TURNAROUND TIME:** Standard **RUSH:** No

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-50			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, Suite 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**

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Sample Container and Preservatives	1-125ml /Cool to 6 deg C	1-250ml /Cool to 6 deg C	1-250ml /Cool to 6 deg C	2-40ml Amber/H2SO4					
									ANALYSIS	Perchlorate by SW6850	Anions (sulfate/nitrate/Nitrite) by SW9056	Alkalinity by SM2320B	TOC by SM5310C					
04WW02-191105	LHAAP 04				WG	11/5/19	0830	1		X								
04WW02-191105-FB	LHAAP 04				WG	11/5/19	0830	1		X								
LHSMW02-191105	LHAAP 04				WG	11/5/19	0955	1		X								
04WW03-191106	LHAAP 04				WG	11/6/19	0820	1		X								
04WW06-191106	LHAAP 04				WG	11/6/19	0910	1		X								
04WW11-191106	LHAAP 04				WG	11/6/19	0955	1		X								
04WW11-191106-MS	LHAAP 04				WG	11/6/19	0955	1		X								
04WW11-191106-MSD	LHAAP 04				WG	11/6/19	0955	1		X								
04WW05-191106	LHAAP 04				WG	11/6/19	1045	4		X	X	X	X					
04WW08-191106	LHAAP 04				WG	11/6/19	1135	1		X								
04WW04-191106	LHAAP 04				WG	11/6/19	1220	1		X								
LHSMW01-191106	LHAAP 04				WG	11/6/19	1315	1		X								
Fire Station well-191106	LHAAP 04				WG	11/6/19	1335	1		X								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	BHATE	11/6/19 1400		

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW05**

Sampler(s): MBM

FIELD CONDITIONS O/C 46°F

SAMPLING INFORMATION

Sample No: 04WW05-1911**13 Post-Inj** **DATE/TIME:** 11-13-19/ **Pump Inlet Depth:** 23.70'

Sampling Method: LF **Sample Purpose: REG** **Sample Matrix: GW**

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures
Transparent / Clear 47°F	N/A	N/A

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	TOC in Water by SM5310C	2 x 40 mL Amber	H2SO4

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: LF/PP

Casing ID (in.): 2"

Purge Start Date/Time: 11-13-19/1352

Depth to Water - Initial (DTWi) (ft) 7.65

Purge End Date/Time: 11-13-19/1433

Depth to Well Bottom (ft) 29.55'

Discharge Tube Length: N/A

PID Reading: 0.0

Screen Interval (ft): 18.70' - 28.70

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / N

Approximate depth of pump inlet*(ft): 23.70'

Pump Start Time: 1352

Ferrous Iron (Required Y or N) N mg/L

APTIM

Sample Collection Log

Location ID: 04WW05				Sample No: 04WW05-1911/3 Post-Inj						
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
11-13-19	1400	100	1.0	7.85	0.958	18.36	5.51	4.4	-102.4	0.85
11-13-19	1405	100	1.5	7.85	0.991	19.03	5.00	4.4	-116.4	0.64
11-13-19	1410	100	2.0	7.85	1.004	19.29	5.63	3.4	-122.8	0.54
11-13-19	1415	100	2.5	7.85	1.015	19.30	5.64	3.0	-126.7	0.51
11-13-19	1420	100	3.0	7.83	1.035	19.27	5.66	4.0	-129.1	0.49
11-13-19	1425	100	3.5	7.83	1.036	19.25	5.68	3.6	-133.1	0.47
11-13-19	1430	100	4.0	7.83	1.037	19.25	5.68	3.1	-135.1	0.46
11-13-19	Sample									

Logged by: _____ Date: 11-13-19

QC'd by: _____ Date: _____

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW07**

Sampler(s): MSM

FIELD CONDITIONS O/C 46°F

SAMPLING INFORMATION

Sample No: 04WW07-1911 13 Post-Inj **DATE/TIME:** 11-13-19 **Pump Inlet Depth:** 17.98'

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures
Opaque / Cloudy 47°F	N/A	N/A

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	TOC in Water by SM5310C	2 x 40 mL Amber	H2SO4

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: LF/PP

Casing ID (in.): 4"

Purge Start Date/Time: 11-13-19/1443

Depth to Water - Initial (DTWi) (ft) 8.85'

Purge End Date/Time: 11-13-19/1524

Depth to Well Bottom (ft) 22.61'

Discharge Tube Length: N4

PID Reading: 0.6

Screen Interval (ft): 12.98'-22.98'

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / N

Approximate depth of pump inlet*(ft): 17.98'

Pump Start Time: 1443

Ferrous Iron (Required Y or N) N mg/L

APTIM

Sample Collection Log

Location ID: 04WW07		Sample No: 04WW07-1911[13]Post-Inj								
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
11-13-19	1450	100	1.0	9.15	6.440	20.07	5.98	115.4	-303.8	0.25
11-13-19	1455	100	1.5	9.20	6.593	19.35	6.06	122.3	-340.1	0.11
11-13-19	1500	100	2.0	9.26	6.562	19.10	6.04	172.1	-340.3	0.10
11-13-19	1505	100	2.5	9.26	6.479	18.76	6.02	115.4	-338.3	0.09
11-13-19	1510	100	3.0	9.26	6.409	18.79	5.98	133.1	-336.3	0.08
11-13-19	1515	100	3.5	9.26	6.400	18.77	5.97	131.6	-333.1	0.08
11-13-19	1520	100	4.0	9.26	6.399	18.75	5.96	139.1	-333.1	0.08
		Sample								

Logged by: _____ Date: 11-13-19

QC'd by: _____ Date: _____

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **04WW09**

Sampler(s): [illegible]

FIELD CONDITIONS O/C 46°F

SAMPLING INFORMATION

Sample No: 04WW09-1911/3 Post-Inj **DATE/TIME:** 11-13-19/1335 **Pump Inlet Depth:** 18.14'

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures
Clear / Heavy Cloud 47°F	NA	NA

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	TOC in Water by SM5310C	2 x 40 mL Amber	H2SO4

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: LF/AP

Casing ID (in.): 4"

Purge Start Date/Time: 11-13-19 / 1300

Depth to Water - Initial (DTWi) (ft) 3.81'

Purge End Date/Time: 11-13-19 / 1338

Depth to Well Bottom (ft) 23.42'

Discharge Tube Length: NA

PID Reading: 0.0

Screen Interval (ft): 13.14'-23.14'

Discharge Tube Diameter: 1/4"

Immersible Layer: Y / N

Approximate depth of pump inlet*(ft): 18.14'

Pump Start Time: 1300

Ferrous Iron (Required Y or N) N mg/L

APTIM

Sample Collection Log

Location ID: 04WW09		Sample No: 04WW09-1911/3 Post-Inj								
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
11-13-19	1305	200	1	4.10	1.963	18.29	4.25	776	-0.2	1.97
11-13-19	1310	200	2	4.10	1.999	18.03	4.32	721.1	-13.0	0.95
11-13-19	1315	200	3	4.10	1.995	17.58	4.34	911.5	-16.3	0.67
11-13-19	1320	200	4	4.10	1.991	17.57	4.35	986.5	-18.2	0.49
11-13-19	1325	200	5	4.10	1.984	17.16	4.35	989.3	-20.8	0.35
11-13-19	1330	200	6	4.10	1.980	17.16	4.36	991.1	-25.4	0.34
11-13-19	1335	200	7	4.10	1.981	17.17	4.36	996.3	-27.5	0.33
11-13-19	Sample									

Logged by: _____ Date: 11-13-19

QC'd by: _____ Date: _____

Sample Collection Log

APTIM

Project Name: **Longhorn AAP** Location ID: **04WW10**

Project No: **501032** Sampler(s): MBM

FIELD CONDITIONS O/C 46°F

SAMPLING INFORMATION

Sample No: 04WW10-1911 B Post-Inj **DATE/TIME:** 11-13-19 **Pump Inlet Depth:** 17.27'

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures
Orange / Slightly Cloudy 47°F	NA	NA

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	TOC in Water by SM5310C	2 x 40 mL Amber	H2SO4

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: LF/AP

Casing ID (in.): 4"

Purge Start Date/Time: 11-13-19 / 1545

Depth to Water - Initial (DTWi) (ft) 4.75

Purge End Date/Time: 11-13-19 / 1627

Depth to Well Bottom (ft) 22.46

Discharge Tube Length: NA

PID Reading: 0.0

Screen Interval (ft): 12.27' - 22.27'

Discharge Tube Diameter: 1/4

Immersible Layer: Y / N

Approximate depth of pump inlet*(ft): 17.27

Pump Start Time: 1545

Ferrous Iron (Required Y or N) N mg/L

APTIM

Sample Collection Log

Location ID: 04WW10		Sample No: 04WW10-1911 LS Post-Inj								
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
11-13-19	1550	100	1.0	5.21	1.858	17.36	5.72	51.7	-288.4	0.20
11-13-19	1555	100	1.5	5.28	1.849	17.18	5.66	34.9	-290.7	0.18
11-13-19	1600	100	2.0	5.33	1.820	16.91	5.64	35.9	-291.4	0.12
11-13-19	1605	100	2.5	5.39	1.796	16.62	5.64	31.7	-292.1	0.10
11-13-19	1610	100	3.0	5.44	1.786	16.48	5.63	32.4	-292.1	0.09
11-13-19	1615	100	3.5	5.48	1.779	16.48	5.61	31.8	-291.1	0.09
11-13-19	1620	100	4.0	5.50	1.776	16.46	5.61	35.8	-291.8	0.08
11-13-19		Sample								

Logged by: _____ Date: 11-13-19

QC'd by: _____ Date: _____

Contract No. W9128F-13-D-0012, Task Order No. W9128BV17F0150 • Final • Rev 0 • April 2021

Appendix C

Site Photographs

SITE PHOTOGRAPHS

Photo No.	Date	Task and Description
1	10/28/19	Injection Trailer and Mobile 4,000-gallon Tank at LHAAP-04
2	10/28/19	Injection Hoses Connected to 04DPT01 and 04DPT05
3	10/28/19	DPT Rig Setting Up to Push 04DPT17 North of Ditch and Culvert
4	10/29/19	Grouting Completed DPT Locations

PHOTO 1: Injection Trailer and Mobile 4,000-gallon Tank at LHAAP-04
DATE: October 28, 2019

PHOTO 2: Injection Hoses Connected to 04DPT01 and 04DPT05
DATE: October 28, 2019

PHOTO 3: DPT Rig Setting Up to Push 04DPT17 North of Ditch and Culvert
DATE: October 28, 2019

PHOTO 4: Grouting Completed DPT Locations
DATE: October 29, 2019

Contract No. W9128F-13-D-0012, Task Order No. W9128BV17F0150 • Final • Rev 0 • April 2021

Appendix D

Laboratory Analytical Reports

(Provided electronically on CD and Portal)

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

WorkOrder: HS19011046

LHAAP-04

Aptim Environmental & Infrastucture, Inc.

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

29-Jan-2019

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

January 29, 2019

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

Work Order: **HS19011046**

Laboratory Results for: **LHAAP-04**

Dear Susan,

ALS Environmental received 7 sample(s) on Jan 23, 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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Work Order: HS19011046

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19011046-01	04WW11_190122	Groundwater		22-Jan-2019 08:20	23-Jan-2019 08:00	☐
HS19011046-02	04WW09_190122	Groundwater		22-Jan-2019 09:05	23-Jan-2019 08:00	☐
HS19011046-03	04WW09_190122-FD	Groundwater		22-Jan-2019 09:05	23-Jan-2019 08:00	☐
HS19011046-04	04WW10_190122	Groundwater		22-Jan-2019 09:55	23-Jan-2019 08:00	☐
HS19011046-05	LHSMW01_190122	Groundwater		22-Jan-2019 10:50	23-Jan-2019 08:00	☐
HS19011046-06	04WW07_190122	Groundwater		22-Jan-2019 11:40	23-Jan-2019 08:00	☐
HS19011046-07	04WW01_190122	Groundwater		22-Jan-2019 12:30	23-Jan-2019 08:00	☐

Client: Aptim Environmental & Infrastucture, Inc. **CASE NARRATIVE**
Project: LHAAP-04
Work Order:

Work Order Comments

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Sample ID: 04WW11_190122
Collection Date: 22-Jan-2019 08:20

ANALYTICAL REPORT
WorkOrder:HS19011046
Lab ID:HS19011046-01
Matrix:Groundwater

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	29-Jan-2019 15:59

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Sample ID: 04WW09_190122
Collection Date: 22-Jan-2019 09:05

ANALYTICAL REPORT
WorkOrder:HS19011046
Lab ID:HS19011046-02
Matrix:Groundwater

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	29-Jan-2019 15:59

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Sample ID: 04WW09_190122-FD
Collection Date: 22-Jan-2019 09:05

ANALYTICAL REPORT
WorkOrder:HS19011046
Lab ID:HS19011046-03
Matrix:Groundwater

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	29-Jan-2019 15:59

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Sample ID: 04WW10_190122
Collection Date: 22-Jan-2019 09:55

ANALYTICAL REPORT
WorkOrder:HS19011046
Lab ID:HS19011046-04
Matrix:Groundwater

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	29-Jan-2019 15:59

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Sample ID: LHSMW01_190122
Collection Date: 22-Jan-2019 10:50

ANALYTICAL REPORT
WorkOrder:HS19011046
Lab ID:HS19011046-05
Matrix:Groundwater

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	29-Jan-2019 15:59

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Sample ID: 04WW07_190122
Collection Date: 22-Jan-2019 11:40

ANALYTICAL REPORT
WorkOrder:HS19011046
Lab ID:HS19011046-06
Matrix:Groundwater

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	29-Jan-2019 15:59

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Sample ID: 04WW01_190122
Collection Date: 22-Jan-2019 12:30

ANALYTICAL REPORT
WorkOrder:HS19011046
Lab ID:HS19011046-07
Matrix:Groundwater

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	29-Jan-2019 15:59

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
WorkOrder: HS19011046

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R331887	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)	**Matrix:** Groundwater				
HS19011046-01	04WW11_190122	22 Jan 2019 08:20			29 Jan 2019 15:59	1
HS19011046-02	04WW09_190122	22 Jan 2019 09:05			29 Jan 2019 15:59	1
HS19011046-03	04WW09_190122-FD	22 Jan 2019 09:05			29 Jan 2019 15:59	1
HS19011046-04	04WW10_190122	22 Jan 2019 09:55			29 Jan 2019 15:59	1
HS19011046-05	LHSMW01_190122	22 Jan 2019 10:50			29 Jan 2019 15:59	1
HS19011046-06	04WW07_190122	22 Jan 2019 11:40			29 Jan 2019 15:59	1
HS19011046-07	04WW01_190122	22 Jan 2019 12:30			29 Jan 2019 15:59	1

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
WorkOrder: **HS19011046**

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
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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-04
Work Order: HS19011046

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS19011046-01	04WW11_190122	Login	1/22/2019 8:24:25 PM	JRM	Sub
HS19011046-02	04WW09_190122	Login	1/22/2019 8:24:25 PM	JRM	Sub
HS19011046-03	04WW09_190122-FD	Login	1/22/2019 8:24:25 PM	JRM	Sub
HS19011046-04	04WW10_190122	Login	1/22/2019 8:24:25 PM	JRM	Sub
HS19011046-05	LHSMW01_190122	Login	1/22/2019 8:24:25 PM	JRM	Sub
HS19011046-06	04WW07_190122	Login	1/22/2019 8:24:25 PM	JRM	Sub
HS19011046-07	04WW01_190122	Login	1/22/2019 8:24:25 PM	JRM	Sub

APTIM

COC ID: LHAAP04-JAN2019-ALSsaltLake-1901-22

TURNAROUND TIME: 5 BUSINESS DAYS

RUSH: YES Page 1 of 1

PROJECT/CLIENT INFO

Facility Name	Longhorn AAP
Project Number	501032
	LHAAP-04
Address	1203-B East Grand Avenue
	PMB 202
City	Marshall
State	TX
Postal Code	75670
Country	USA
Phone Number	713.243.7264
Project Manager	Praveen Srivastav

LABORATORY

Lab Name	ALS Laboratories
Lab Contact	RJ Modashia
Email	RJ.Modashia@alsglobal.com
Address	960 W. LeVoy Drive
City	Salt Lake
State	UTAH
Postal Code	84123
Country	USA
Phone Number	281.575.2779 or 281.530.5656

OTHER INFO

Email Invoice To	FedInvoices@aptim.com
Email Report To	Susan.Huang@aptim.com
Mail Reports To	Susan Huang
Address	4005 Port Chicago Highway, Suite 200
City	Concord
State	CA
Postal Code	94520
Country	USA
Shipping Company	

SAMPLE DETAILS

ANALYSIS REQUESTED

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Sample Container and Preservatives: 1x125 ml HDPE, Ice — ANALYSIS: Perchlorate in Water by 6850
04mw11-190122	LHAAP04	5.13	5.36		WG	1/22/19	0820	1	X
04mw06-190122	LHAAP04	6.50	6.74		WG	1/22/19	0905	1	X
04mw09-190122-FD	LHAAP04	6.50	6.74		WG	1/22/19	0905	1	X
04mw10-190122	LHAAP04	6.79	7.01		WG	1/22/19	0955	1	X
LHSmw01-190122	LHAAP04	4.45	4.63		WG	1/22/19	1050	1	X
LHSmw01-190122-MS	LHAAP04	4.45	4.63		WG	1/22/19	1050	1	X
LHSmw01-190122-MSD	LHAAP04	4.45	4.63		WG	1/22/19	1050	1	X
04mw07-190122	LHAAP04	6.63	6.84		WG	1/22/19	1140	1	X
04mw01-190122	LHAAP04	7.33	7.56		WG	1/22/19	1230	1	X

HS19011046

Aptim Environmental & Infrastructure, Inc.

LHAAP-04

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Justin Beesinger/BHATT	1/22/19 1400		

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1902253; 1902392

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2212 (231797)

General Set Information: There were fourteen field samples in this Work Order. 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 1902253007 and 1902392008 were analyzed and reported from 1:10 dilutions. Field samples 1902392002/03 were analyzed and reported from 1:100 dilutions. Field sample 1902392004 was analyzed and reported from a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 637599) was less than 1/2 the CRDL. The recovery for the LCS (637600) was within acceptable parameters.

MS/MSD Analysis: MS/MSD was performed on samples 1902392006/07 (Client ID's: LHSMW01-190122). 5.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 5.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 – 637597) is reported from the analysis of the Laboratory Control Sample (LCS – 637600) at a level 4.0µg/L. . Samples 1902253007 and 1902392002 failed the 50-150% method requirement for ISTD recovery. These samples were re-prepped, re-analyzed and reported.

Thomas Bosch January 29, 2019
Analyst Date

ANALYTICAL REPORT

Report Date: January 29, 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: **34-1902392**
Project ID: HS19011046
Purchase Order: HS19011046
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
04WW11-190122	1902392001	01/22/19	01/23/19	LHAAP-04
04WW09-190122	1902392002	01/22/19	01/23/19	LHAAP-04
04WW09-190122-FD	1902392003	01/22/19	01/23/19	LHAAP-04
04WW10-190122	1902392004	01/22/19	01/23/19	LHAAP-04
LHSMW01-190122	1902392005	01/22/19	01/23/19	LHAAP-04
04WW07-190122	1902392008	01/22/19	01/23/19	LHAAP-04
04WW01-190122	1902392009	01/22/19	01/23/19	LHAAP-04

Client QC ID *	Lab ID	Collect Date	Receive Date	Sampling Site
LHSMW01-190122-MS	1902392006	01/22/19	01/23/19	LHAAP-04
LHSMW01-190122-MSD	1902392007	01/22/19	01/23/19	LHAAP-04

***Client QC is reported as part of the Quality Control results report, if requested.**

ANALYTICAL REPORT

Workorder: 34-1902392
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **04WW11-190122** | Sampling Site: LHAAP-04 | Collected: 01/22/2019
Lab ID: 1902392001 | Media: 125 mL Nalgene | Received: 01/23/2019
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/2212 (HBN: 231797) | **Percent Solid:** NA
Analyzed: 01/28/2019 11:39 | **Report Basis:** Wet

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

Sample ID: **04WW09-190122** | Sampling Site: LHAAP-04 | Collected: 01/22/2019
Lab ID: 1902392002 | Media: 125 mL Nalgene | Received: 01/23/2019
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/2212 (HBN: 231797) | **Percent Solid:** NA
Analyzed: 01/28/2019 14:11 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**2100**	100	200	400	100	

Sample ID: **04WW09-190122-FD** | Sampling Site: LHAAP-04 | Collected: 01/22/2019
Lab ID: 1902392003 | Media: 125 mL Nalgene | Received: 01/23/2019
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/2212 (HBN: 231797) | **Percent Solid:** NA
Analyzed: 01/28/2019 12:07 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**2300**	100	200	400	100	

Sample ID: **04WW10-190122** | Sampling Site: LHAAP-04 | Collected: 01/22/2019
Lab ID: 1902392004 | Media: 125 mL Nalgene | Received: 01/23/2019
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/2212 (HBN: 231797) | **Percent Solid:** NA
Analyzed: 01/28/2019 14:25 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**10000**	1000	2000	4000	1000	

ANALYTICAL REPORT

Workorder: 34-1902392
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LHSMW01-190122** | Sampling Site: LHAAP-04 | Collected: 01/22/2019
Lab ID: 1902392005 | Media: 125 mL Nalgene | Received: 01/23/2019
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/2212 (HBN: 231797) | **Percent Solid:** NA
Analyzed: 01/28/2019 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

Sample ID: **04WW07-190122** | Sampling Site: LHAAP-04 | Collected: 01/22/2019
Lab ID: 1902392008 | Media: 125 mL Nalgene | Received: 01/23/2019
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/2212 (HBN: 231797) | **Percent Solid:** NA
Analyzed: 01/28/2019 13:30 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**110**	10	20	40	10	

Sample ID: **04WW01-190122** | Sampling Site: LHAAP-04 | Collected: 01/22/2019
Lab ID: 1902392009 | Media: 125 mL Nalgene | Received: 01/23/2019
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/2212 (HBN: 231797) | **Percent Solid:** NA
Analyzed: 01/28/2019 13:44 | **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: 231797)**

Field samples 1902253007 and 1902392008 were analyzed and reported from 1:10 dilutions. Field samples 1902392002/03 were analyzed and reported from 1:100 dilutions. Field sample 1902392004 was analyzed and reported from a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

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

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 01/29/2019 08:13	/S/ Stephen Brose 01/29/2019 13:52

ANALYTICAL REPORT

Workorder: 34-1902392
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

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

General Lab Comments

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

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

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

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

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Workorder: 34-1902392
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Result Symbol Definitions

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

Qualifier Symbol Definitions

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

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1902392

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2212 (HBN: 231797)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 637599
Analyzed: 01/28/2019 09:49
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 637600
Analyzed: 01/28/2019 09:21
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	3.81	4.00	95.3	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample:	1902392005	**MS:**	1902392006				**MSD:**	1902392007			
Analyzed:	01/28/2019 12:49	**Analyzed:**	01/28/2019 14:39				**Analyzed:**	01/28/2019 13:16			
Dilution:	1	**Dilution:**	1				**Dilution:**	1			
Units:	ug/L	**Units:**	ug/L				**Units:**	ug/L			

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	4.18	4	105	78.8	123.8	3.76	94.0	10.7	0.0	20.0

Continuing Calibration Verification

CCV:	637596			**CCV:**	637601			**CCV:**	637602		
Analyzed:	01/28/2019 09:06			**Analyzed:**	01/28/2019 12:21			**Analyzed:**	01/28/2019 14:53		
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	26.0	25.0	104	26.5	25.0	106	26.9	25.0	108

Interference Check Sample

ICSA: 637598
Analyzed: 01/28/2019 09:35
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	3.84	4.00	95.9

Comments

Field samples 1902253007 and 1902392008 were analyzed and reported from 1:10 dilutions. Field samples 1902392002/03 were analyzed and reported from 1:100 dilutions. Field sample 1902392004 was analyzed and reported from a 1:1,000 dilution. The reporting limits have been adjusted accordingly.

Quality Control Sample
Batch Report

Analysis Information

Workorder: **1902392**

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2212 (HBN: 231797)
		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
01/29/2019 10:02	01/29/2019 13:48

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

1902392

18698/#5

1902392

W

.P04-JAN2019-ALSsaltLake-1901-22

TURNAROUND TIME: 5 BUSINESS DAYS

RUSH: YES Page 1 of 1

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-04			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	960 W. LeVoy Drive			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suite 200		
City	Marshall	State	TX	City	Salt Lake	State	UTAH	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	84123	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

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Sample Container and Preservatives: 1x125 ml HDPE, Ice — ANALYSIS: Perchlorate in Water by 6850
04MW11-190122	LHAAP04	5.13	5.36		WG	1/22/19	0820	1	X
04MW08-190122	LHAAP04	6.50	6.74		WG	1/22/19	0905	1	X
04MW09-190122-FD	LHAAP04	6.50	6.74		WG	1/22/19	0905	1	X
04MW10-190122	LHAAP04	6.79	7.01		WG	1/22/19	0955	1	X
LHSMW01-190122	LHAAP04	4.45	4.63		WG	1/22/19	1050	1	X
LHSMW01-190122-MS	LHAAP04	4.45	4.63		WG	1/22/19	1050	1	X
LHSMW01-190122-MSD	LHAAP04	4.45	4.63		WG	1/22/19	1050	1	X
04MW07-190122	LHAAP04	6.63	6.84		WG	1/22/19	1140	1	X
04MW01-190122	LHAAP04	7.33	7.56		WG	1/22/19	1230	1	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Justin Beesinger / BHATT	1/22/19 1400	M Delmatto	01/23/2019 9:05

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: 501032	Split:	Workorder ID: 1902392	Level: ENV_LVL4	Requested Analysis
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly	
Comments:			Preservatives: COOL	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	EPA 6850, DoD QSM
1	01/22/2019 08:20	04WW11-190122/LHAAP04	1902392001		Water	A	1	A
2	01/22/2019 09:05	04WW09-190122/LHAAP04	1902392002		Water	A	1	A
3	01/22/2019 09:05	04WW09-190122-FD/LHAAP04	1902392003		Water	A	1	A
4	01/22/2019 09:55	04WW10-190122/LHAAP04	1902392004		Water	A	1	A
5	01/22/2019 10:50	LHSMW01-190122/LHAAP04	1902392005		Water	A	1	A
6	01/22/2019 10:50	LHSMW01-190122-MS/LHAAP04	1902392006	MS	Water	A	1	A
7	01/22/2019 10:50	LHSMW01-190122-MSD/LHAAP04	1902392007	MSD	Water	A	1	A
8	01/22/2019 11:40	04WW07-190122/LHAAP04	1902392008		Water	A	1	A
9	01/22/2019 12:30	04WW01-190122/LHAAP04	1902392009		Water	A	1	A
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Schmith, Marianne	01/23/2019 09:45	ALS Sample Receiving	Sample Login
[signature]	01/23/2019 13:24	R.33.1 SB	Storage
R.33.1	01/24/19 13:30	T. Bosch	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

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

Prepared / Analyzed by: _____ Date / Time: _____

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

1902392

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: 10639

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:	HS19011046
TSR:	Sonia West

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19011046-01**	**04WW11_190122**	**Groundwater**	**22 Jan 2019 08:20**
	SUB_Perch-6850			06 Feb 2019
2.	**HS19011046-02**	**04WW09_190122**	**Groundwater**	**22 Jan 2019 09:05**
	SUB_Perch-6850			06 Feb 2019
3.	**HS19011046-03**	**04WW09_190122-FD**	**Groundwater**	**22 Jan 2019 09:05**
	SUB_Perch-6850			06 Feb 2019
4.	**HS19011046-04**	**04WW10_190122**	**Groundwater**	**22 Jan 2019 09:55**
	SUB_Perch-6850			06 Feb 2019
5.	**HS19011046-05**	**LHSMW01_190122**	**Groundwater**	**22 Jan 2019 10:50**
	SUB_Perch-6850			06 Feb 2019
6.	**HS19011046-06**	**04WW07_190122**	**Groundwater**	**22 Jan 2019 11:40**
	SUB_Perch-6850			06 Feb 2019
7.	**HS19011046-07**	**04WW01_190122**	**Groundwater**	**22 Jan 2019 12:30**
	SUB_Perch-6850			06 Feb 2019

Comments:

Subcontract Chain of Custody

COC ID: 10639

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

HS19011046-05 MS/MSD

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: _____

Received By: _____ Date/Time: _____

Cooler ID(s): _____ Temperature(s): _____

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: APTIM

Project/Task/Site: _____

Date/Time of Receipt: 01/23/2019 09:45

Number of Coolers Received: 1

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

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C19 9111	5 °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) M Schmith (Printed Name) 01/23/2019 (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:

125

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

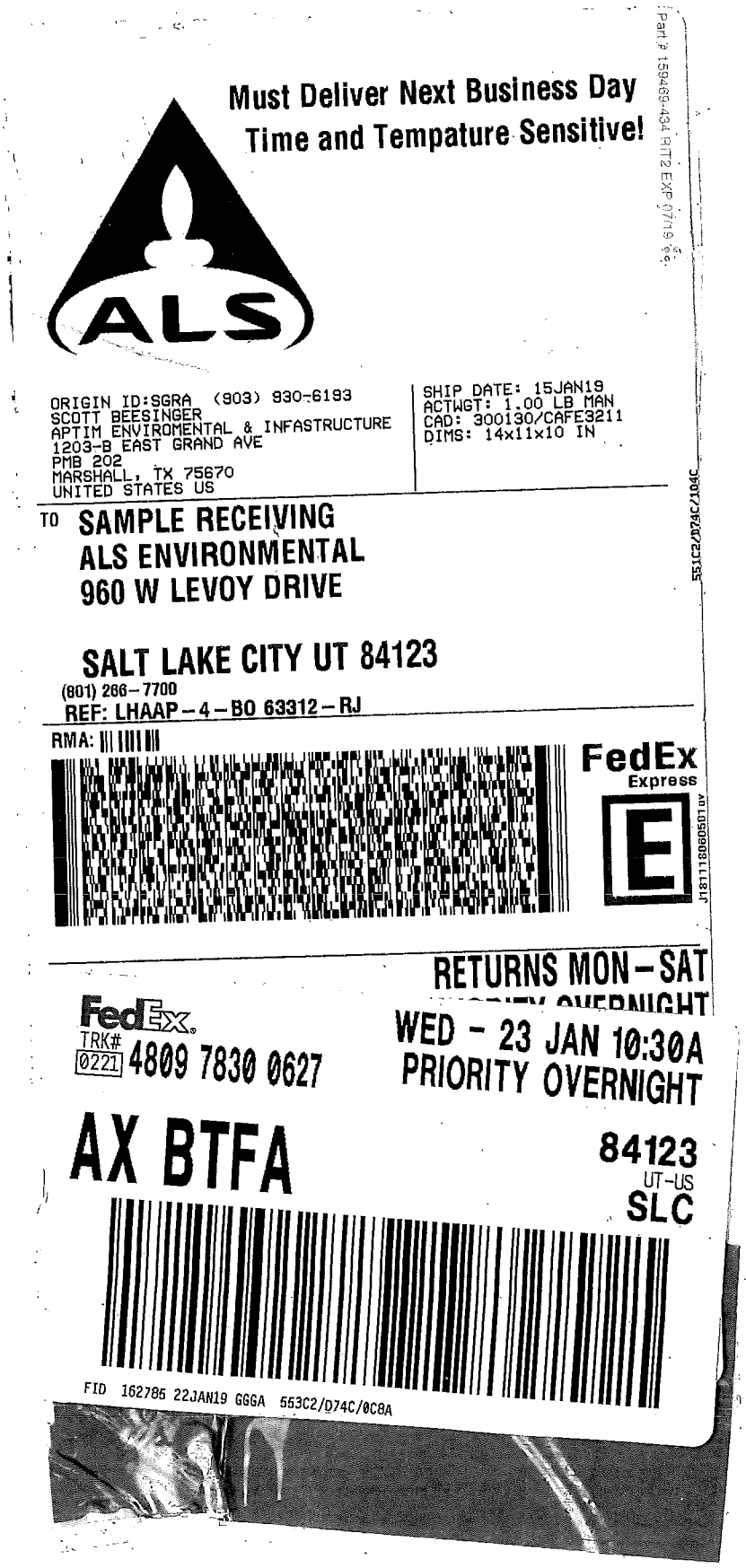
PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

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

CRIR.doc

Revised 01/01/2018



:h Worklist

Batch: ELMS/ 2212 **Created:** 1/28/2019 08:41 **Instrument:** **HBN:** 231797

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

Workorder: 1902253 [ENV_LVL4]
Workorder: 1902392 [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	637596	CCV for HBN 231797 [ELMS/2212]				CCV	3		E685041C3Q	5311		1/29/2019	
2	637597	RLVS for HBN 231797 [ELMS/2212				RLVS	3		E685041C3Q	5311		1/29/2019	
3	637598	ICS for HBN 231797 [ELMS/2212]				ICS	3		E6850..D3Q	5311		1/29/2019	
4	637599	LMB for HBN 231797 [ELMS/2212]				LMB	3		E6850Q413Q	5311		1/29/2019	
5	637600	LCS for HBN 231797 [ELMS/2212]				LCS	3		E6850Q413Q	5311		1/29/2019	
6	1902253001	04WW03_190121				SAMPLE	3	1902253001-A	E6850Q41.3	5480	2/18/2019	1/29/2019	
7	1902253002	04WW02_190121				SAMPLE	3	1902253002-A	E6850Q41.3	5480	2/18/2019	1/29/2019	
8	1902253003	04WW02_190121-FD				SAMPLE	3	1902253003-A	E6850Q41.3	5480	2/18/2019	1/29/2019	
9	1902253004	04WW06_190121				SAMPLE	3	1902253004-A	E6850Q41.3	5480	2/18/2019	1/29/2019	
10	1902253005	LHSMW02_190121				SAMPLE	3	1902253005-A	E6850Q41.3	5480	2/18/2019	1/29/2019	
11	1902253006	04WW04_190121				SAMPLE	3	1902253006-A	E6850Q41.3	5480	2/18/2019	1/29/2019	
12	1902253007	04WW05_190121				SAMPLE	3	1902253007-A	E6850Q41.3	5480	2/18/2019	1/29/2019	
13	1902392001	04WW11-190122				SAMPLE	3	1902392001-A	E6850Q41.3	5480	2/19/2019	1/30/2019	
14	1902392002	04WW09-190122				SAMPLE	3	1902392002-A	E6850Q41.3	5480	2/19/2019	1/30/2019	
15	1902392003	04WW09-190122-FD				SAMPLE	3	1902392003-A	E6850Q41.3	5480	2/19/2019	1/30/2019	
16	637601	CCV for HBN 231797 [ELMS/2212]				CCV	3		E685041C3Q	5311		1/29/2019	
17	1902392004	04WW10-190122				SAMPLE	3	1902392004-A	E6850Q41.3	5480	2/19/2019	1/30/2019	
18	1902392005	LHSMW01-190122				SAMPLE	3	1902392005-A	E6850Q41.3	5480	2/19/2019	1/30/2019	
19	1902392006	LHSMW01-190122-MS				MS	3	1902392006-A	E6850Q413Q	5480		1/29/2019	
20	1902392007	LHSMW01-190122-MSD				MSD	3	1902392007-A	E6850Q413Q	5480		1/29/2019	
21	1902392008	04WW07-190122				SAMPLE	3	1902392008-A	E6850Q41.3	5480	2/19/2019	1/30/2019	
22	1902392009	04WW01-190122				SAMPLE	3	1902392009-A	E6850Q41.3	5480	2/19/2019	1/30/2019	
23	637602	CCV for HBN 231797 [ELMS/2212]				CCV	3		E685041C3Q	5311		1/29/2019	

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1902253 (001-07); 1902392 (001-09)
ELMS Batch/HBN ID: 2212 (231797)
Prep Date: 01/27/2019 Analysis Date: 01/27/2019 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2019\JAN\15JAN19D.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 10/08/2018, sequence 08OCT18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: **LCMS04** Online Acquisition Method: CLO4-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	0.50
5.0	0.50
5.3	0.25
10.0	0.25
10.5	0.50
12.0	0.50

QC DATA: 5.0µL of QC Solution Horizon ID 41830 was used for LCS 637600; Target = 5.0µg/L. ASTM type II water was used for LMB 637599.

MS/MSD: MS/MSD were performed on samples 1902392006/07 (Client ID's: LHSMW01-190122). 5.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:
1) Results reported in µg/L. Field samples 1902253007 and 1902392008 were analyzed and reported from 1:10 dilutions. Field samples 1902392002/03 were analyzed and reported from 1:100 dilutions. Field sample 1902392004 was analyzed and reported from a 1:1,000 dilution. The reporting limits have been adjusted accordingly. Samples 1902253007 and 1902392002 failed the 50-150% method requirement for ISTD recovery. These samples were re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2019\JAN\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2019\231797-DoD-ALS-Hstn LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#
5) The Reporting Limit Verification Standard (RLVS – 637597) is reported from the analysis of the Laboratory Control Sample (LCS – 637600) at a level 4.0µg/L.

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: 2212 HBN: 231797 Sample Set IDs if Applicable: 190253 / 190392	Analyst Initials	Reviewer Initials
Calibration standards analyzed and meets criteria	TB	SK
Standards traceability checked and meets criteria	TB	SK
Standard curve coefficients evaluated and meet criteria	TB	SK
ICVs analyzed and meet acceptance criteria	TB	SK
CCVs analyzed and meet acceptance criteria	TB	SK
Method Blanks analyzed and meet acceptance criteria	TB	SK
Retention Time Windows checked	TB	SK
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	SK
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SK
RLVS analyzed	TB	SK
Preparation and analysis hold times met	TB	SK
Preparation deviations and re-preparations noted when performed	TB	SK
Analysis deviations and re-analyses noted when performed	TB	SK
Sample dilution factors noted on reports	TB	SK
Electronic records in HBN transcription accuracy and completeness checked	TB	SK
Preparation and analysis calculations checked	TB	SK
NCRs are completed as necessary NC/CAR# _____	—	—
Report forms are complete and accurate	TB	SK
Manual integrations checked	TB	SK

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

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

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			

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

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

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

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

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 L 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)

Raw Data

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

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

#	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorat RT	Perchlorate Amount	
*	637596 CCV@25	Vial 71	1	Control	1	3.12100e6	9.015	25.95102	
*	637600 QC@4.0	Vial 72	1	Control	2	4.13390e5	8.849	3.81271	
*	637598 ICS@4.0	Vial 73	1	Control	3	4.96412e5	9.081	3.83557	
*	637599 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000	
*	1902253001	Vial 75	1	Sample	5	0.00000	0.000	0.00000	
*	1902253002	Vial 76	1	Sample	6	0.00000	0.000	0.00000	
*	1902253003	Vial 77	1	Sample	7	0.00000	0.000	0.00000	
*	1902253004	Vial 78	1	Sample	8	0.00000	0.000	0.00000	
*	1902253005	Vial 79	1	Sample	9	0.00000	0.000	0.00000	
*	1902253006	Vial 80	1	Sample	10	0.00000	0.000	0.00000	
*	1902253007 10X	Vial 81	1	Sample	11	1.57986e6	8.971	79.67959	RE
*	1902392001	Vial 82	1	Sample	12	4.27875e4	8.564	5.29415e-1	
*	1902392002 100	Vial 83	1	Sample	13	4.30851e6	9.025	2083.70176	RE
*	1902392003 100	Vial 84	1	Sample	14	3.95123e6	9.042	2283.02829	
*	637601 CCV@25	Vial 71	1	Control	15	3.78068e6	9.018	26.51174	
*	1902392004 100	Vial 85	1	Sample	16	1.38682e7	9.019	1.01848e4	
*	1902392005	Vial 86	1	Sample	17	5.14429e4	8.580	6.81182e-1	
*	1902392007 MSD	Vial 88	1	Sample	19	3.89106e5	8.606	3.75866	
*	1902392008 10X	Vial 89	1	Sample	20	1.26964e6	8.800	112.54970	
*	1902392009	Vial 90	1	Sample	21	0.00000	0.000	0.00000	
*	1902253007 10X	Vial 81	1	Sample	22	9.77785e5	8.973	77.80146	
*	1902392002 100	Vial 83	1	Sample	23	3.10068e6	9.026	2101.46339	
*	1902392004 1K	Vial 91	1	Sample	24	1.68105e6	9.042	1.02454e4	
*	1902392006 MS	Vial 87	1	Sample	25	6.94066e5	9.071	4.18291	
*	637602 CCV@25	Vial 71	1	Control	26	3.49567e6	9.030	26.89841	

#	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	637596 CCV@25	Vial 71	1	Control	1	9.02235e5	9.029	24.89900
*	637600 QC@4.0	Vial 72	1	Control	2	1.60136e5	8.861	4.78853
*	637598 ICS@4.0	Vial 73	1	Control	3	1.66004e5	9.100	4.17764
*	637599 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1902253001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1902253002	Vial 76	1	Sample	6	0.00000	0.000	0.00000
*	1902253003	Vial 77	1	Sample	7	0.00000	0.000	0.00000
*	1902253004	Vial 78	1	Sample	8	0.00000	0.000	0.00000
*	1902253005	Vial 79	1	Sample	9	0.00000	0.000	0.00000
*	1902253006	Vial 80	1	Sample	10	0.00000	0.000	0.00000
*	1902253007 10X	Vial 81	1	Sample	11	4.64346e5	8.989	77.67649
*	1902392001	Vial 82	1	Sample	12	1.74136e4	8.594	5.27632e-1
*	1902392002 100	Vial 83	1	Sample	13	1.24153e6	9.041	1996.47343
*	1902392003 100	Vial 84	1	Sample	14	1.14330e6	9.057	2194.74179
*	637601 CCV@25	Vial 71	1	Control	15	1.08432e6	9.034	25.24310
*	1902392004 100	Vial 85	1	Sample	16	4.16084e6	9.034	9801.36420
*	1902392005	Vial 86	1	Sample	17	2.26997e4	8.597	7.91263e-1
*	1902392007 MSD	Vial 88	1	Sample	19	1.31669e5	8.620	4.13838
*	1902392008 10X	Vial 89	1	Sample	20	3.91954e5	8.817	115.32711
*	1902392009	Vial 90	1	Sample	21	0.00000	0.000	0.00000
*	1902253007 10X	Vial 81	1	Sample	22	3.04113e5	8.985	80.10603
*	1902392002 100	Vial 83	1	Sample	23	8.94469e5	9.042	2015.49432
*	1902392004 1K	Vial 91	1	Sample	24	4.99807e5	9.055	1.01195e4
*	1902392006 MS	Vial 87	1	Sample	25	2.15905e5	9.083	4.25837
*	637602 CCV@25	Vial 71	1	Control	26	9.92722e5	9.046	25.37122

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
*	637596 CCV@25	Vial 71	1	Control	1	3.58268e5	9.038	5.00000
*	637600 QC@4.0	Vial 72	1	Control	2	3.52345e5	8.868	5.00000
*	637598 ICS@4.0	Vial 73	1	Control	3	4.20424e5	9.104	5.00000
*	637599 LMB	Vial 74	1	Control	4	4.30750e5	9.078	5.00000
*	1902253001	Vial 75	1	Sample	5	4.04683e5	8.623	5.00000
*	1902253002	Vial 76	1	Sample	6	4.72599e5	8.800	5.00000
*	1902253003	Vial 77	1	Sample	7	4.74255e5	8.815	5.00000
*	1902253004	Vial 78	1	Sample	8	3.82664e5	8.517	5.00000
*	1902253005	Vial 79	1	Sample	9	4.90120e5	8.870	5.00000
*	1902253006	Vial 80	1	Sample	10	4.95621e5	8.809	5.00000
*	1902253007 10X	Vial 81	1	Sample	11	6.20862e5	8.993	50.00000
*	1902392001	Vial 82	1	Sample	12	4.11974e5	8.590	5.00000
*	1902392002 100	Vial 83	1	Sample	13	6.22673e5	9.047	500.00000
*	1902392003 100	Vial 84	1	Sample	14	5.18929e5	9.060	500.00000
*	637601 CCV@25	Vial 71	1	Control	15	4.24334e5	9.040	5.00000
*	1902392004 100	Vial 85	1	Sample	16	3.56653e5	9.034	500.00000
*	1902392005	Vial 86	1	Sample	17	3.36196e5	8.605	5.00000
*	1902392007 MSD	Vial 88	1	Sample	19	3.36729e5	8.630	5.00000
*	1902392008 10X	Vial 89	1	Sample	20	3.48447e5	8.824	50.00000
*	1902392009	Vial 90	1	Sample	21	3.02558e5	8.511	5.00000
*	1902253007 10X	Vial 81	1	Sample	22	3.93917e5	8.994	50.00000
*	1902392002 100	Vial 83	1	Sample	23	4.44153e5	9.044	500.00000
*	1902392004 1K	Vial 91	1	Sample	24	5.08672e5	9.062	5000.00000
*	1902392006 MS	Vial 87	1	Sample	25	5.36117e5	9.092	5.00000
*	637602 CCV@25	Vial 71	1	Control	26	3.86404e5	9.053	5.00000

*** End of Report ***

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2019\JAN\28JAN19D.S

Sequence Table:

Method and Injection Info Part:

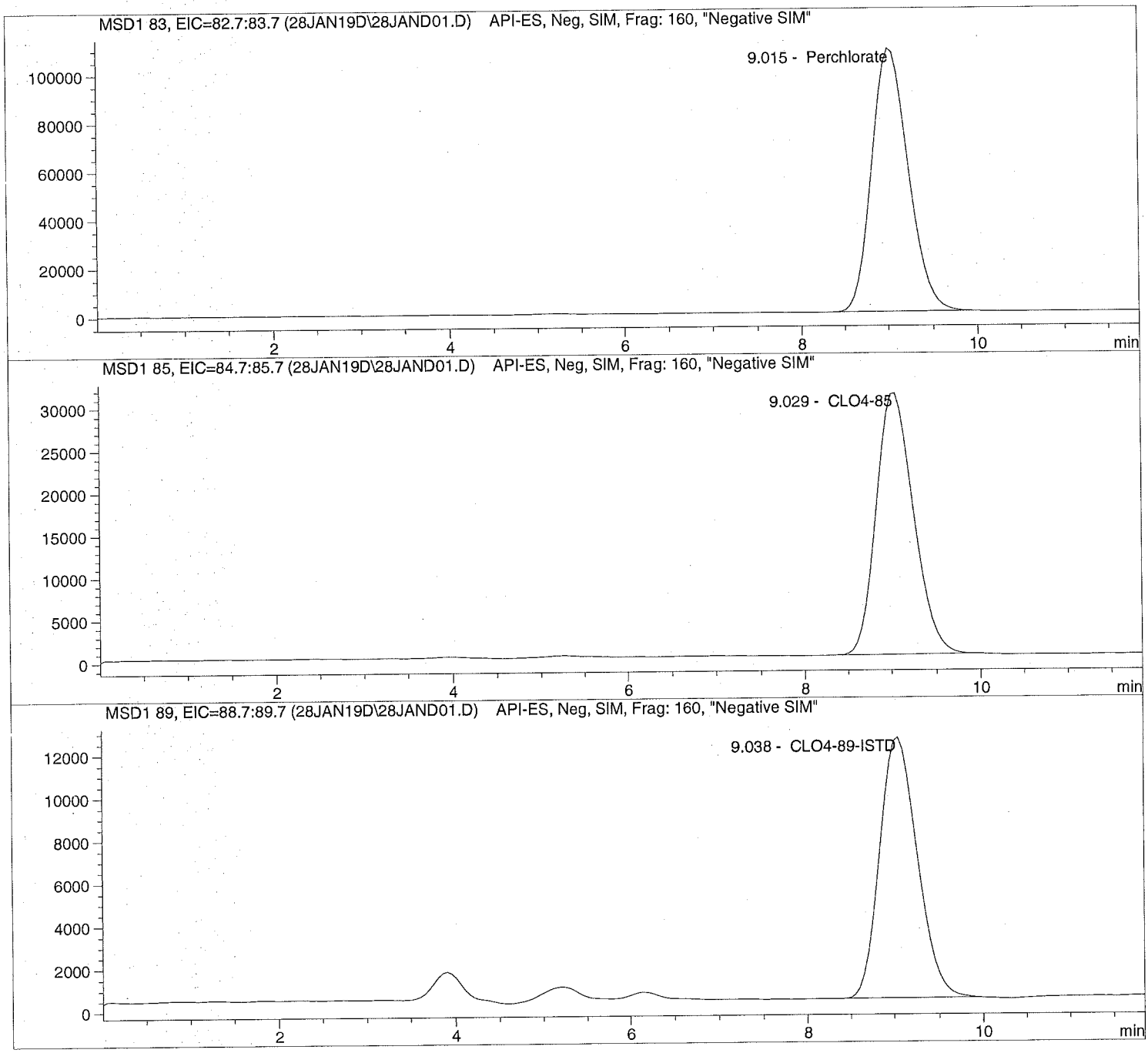
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	637596	CCV@25	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	637600	QC@4.0	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	637598	ICS@4.0	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	637599	LMB	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	1902253001		CLO4-AQN	1	Sample		
6	Vial 76	1902253002		CLO4-AQN	1	Sample		
7	Vial 77	1902253003		CLO4-AQN	1	Sample		
8	Vial 78	1902253004		CLO4-AQN	1	Sample		
9	Vial 79	1902253005		CLO4-AQN	1	Sample		
10	Vial 80	1902253006		CLO4-AQN	1	Sample		
11	Vial 81	1902253007	10X	CLO4-AQN	1	Sample		
12	Vial 82	1902392001		CLO4-AQN	1	Sample		
13	Vial 83	1902392002	100	CLO4-AQN	1	Sample		
14	Vial 84	1902392003	100	CLO4-AQN	1	Sample		
15	Vial 71	637601	CCV@25	CLO4-AQN	1	Ctrl Samp		
16	Vial 85	1902392004	100	CLO4-AQN	1	Sample		
17	Vial 86	1902392005		CLO4-AQN	1	Sample		
18	Vial 87	1902392006	MS	CLO4-AQN	1	Sample		
19	Vial 88	1902392007	MSD	CLO4-AQN	1	Sample		
20	Vial 89	1902392008	10X	CLO4-AQN	1	Sample		
21	Vial 90	1902392009		CLO4-AQN	1	Sample		
22	Vial 81	1902253007	10X	CLO4-AQN	1	Sample		
23	Vial 83	1902392002	100	CLO4-AQN	1	Sample		
24	Vial 91	1902392004	1K	CLO4-AQN	1	Sample		
25	Vial 87	1902392006	MS	CLO4-AQN	1	Sample		
26	Vial 71	637602	CCV@25	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND01.D Sample Name: 637596 CCV@25

Injection Date:	1/28/2019 09:06:47	Seq Line:	1
Sample Name:	637596 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND01.D Sample Name: 637596 CCV@25

Injection Date:	1/28/2019 09:06:47	Seq Line:	1
Sample Name:	637596 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.015	PBA	3120997.8	25.9510	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.029	PBA	902234.6	24.8990	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.038	BBA	358267.7	5.0000	CLO4-89-ISTD

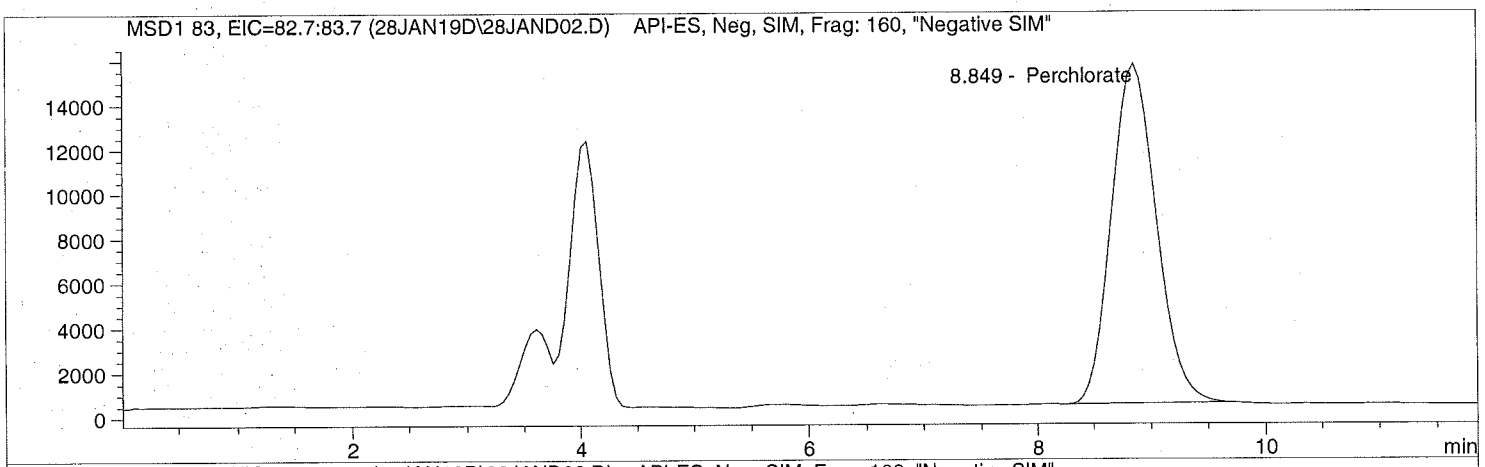
*** End of Report ***

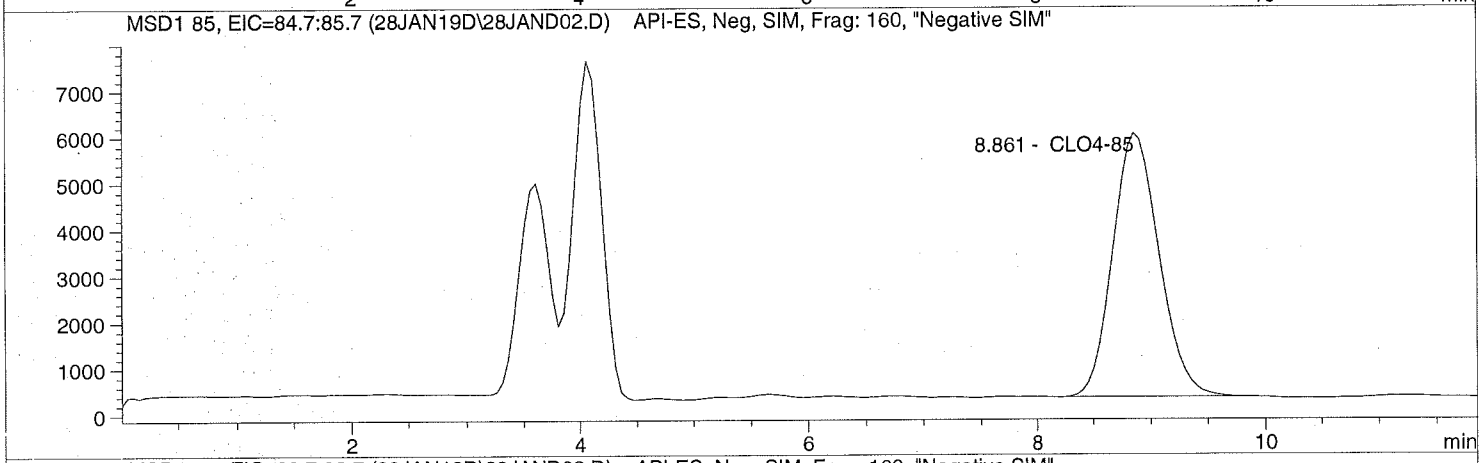
Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND02.D Sample Name: 637600 QC@4.0

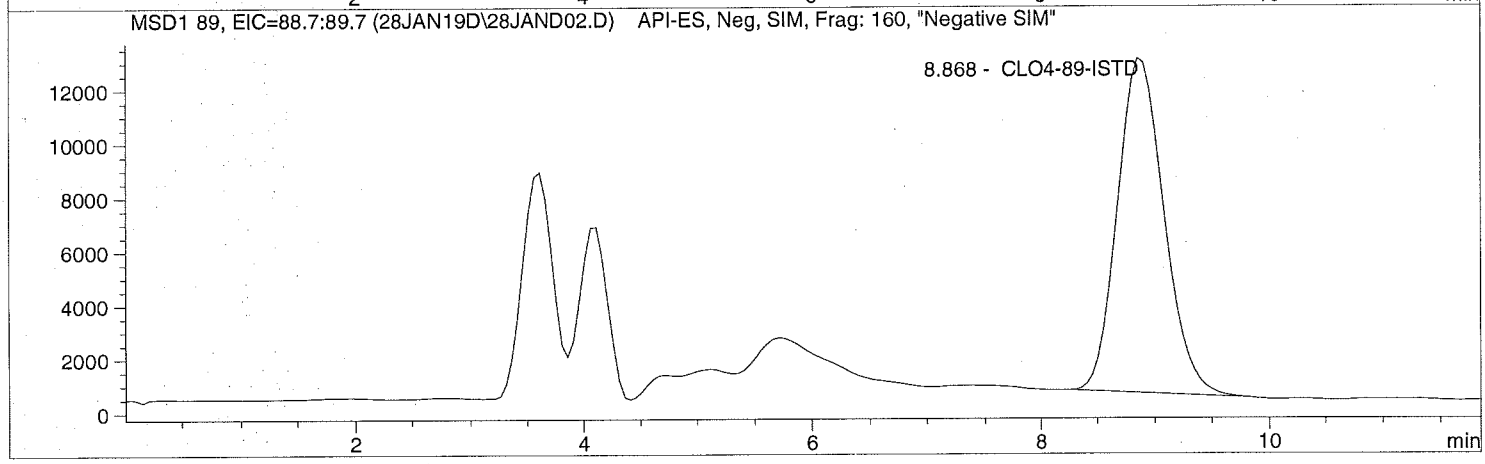
Injection Date:	1/28/2019 09:21:26	Seq Line:	2
Sample Name:	637600 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND02.D Sample Name: 637600 QC@4.0

Injection Date:	1/28/2019 09:21:26	Seq Line:	2
Sample Name:	637600 QC@4.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.849	PBA	413389.9	3.8127	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.861	PBA	160136.1	4.7885	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.868	PBA	352344.9	5.0000	CLO4-89-ISTD

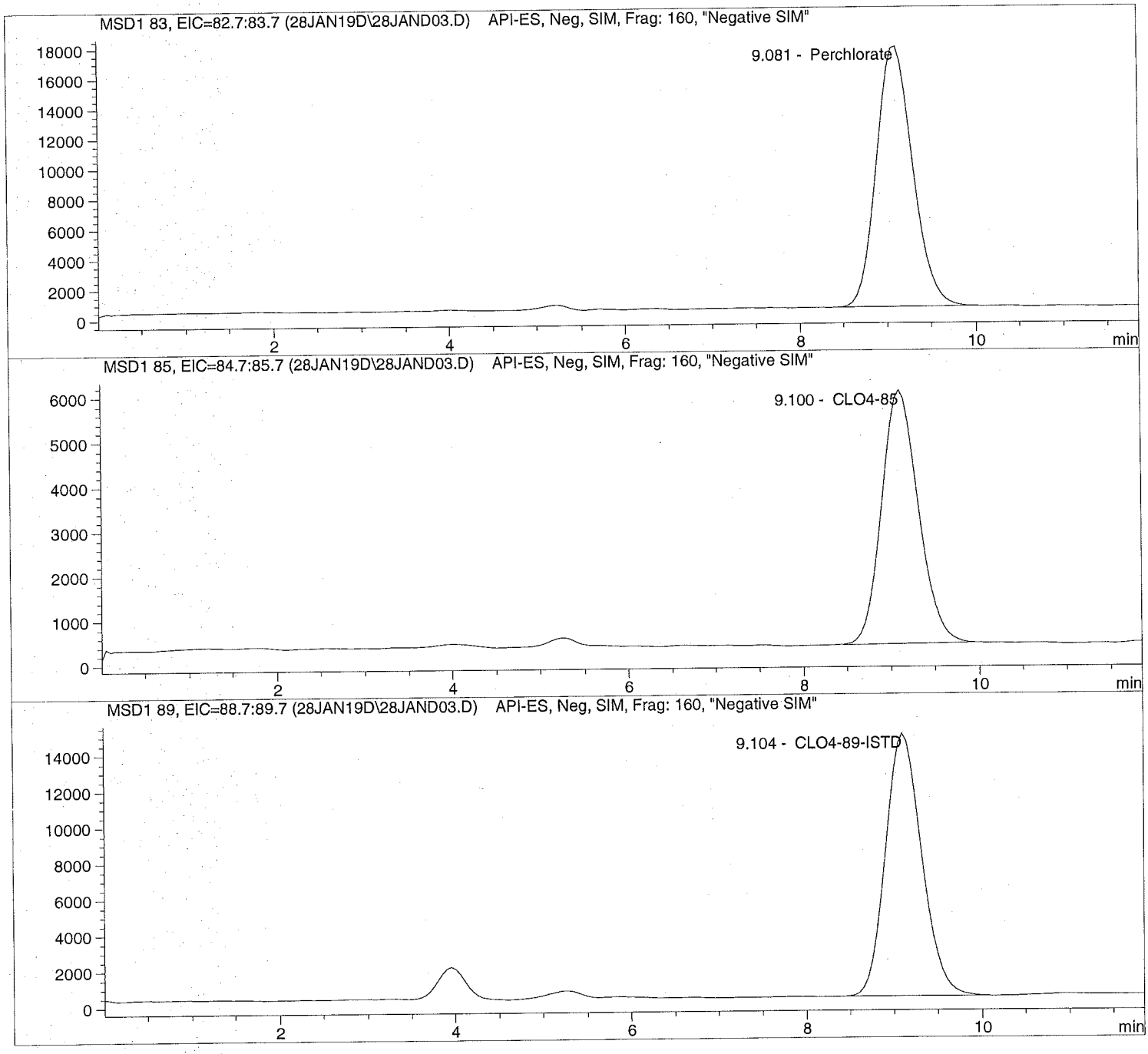
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND03.D Sample Name: 637598 ICS@4.0

Injection Date:	1/28/2019 09:35:13	Seq Line:	3
Sample Name:	637598 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND03.D Sample Name: 637598 ICS@4.0

Injection Date:	1/28/2019 09:35:13	Seq Line:	3
Sample Name:	637598 ICS@4.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
9.081	PBA	496412.4	3.8356	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.100	BBA	166003.7	4.1776	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.104	PBA	420423.8	5.0000	CLO4-89-ISTD

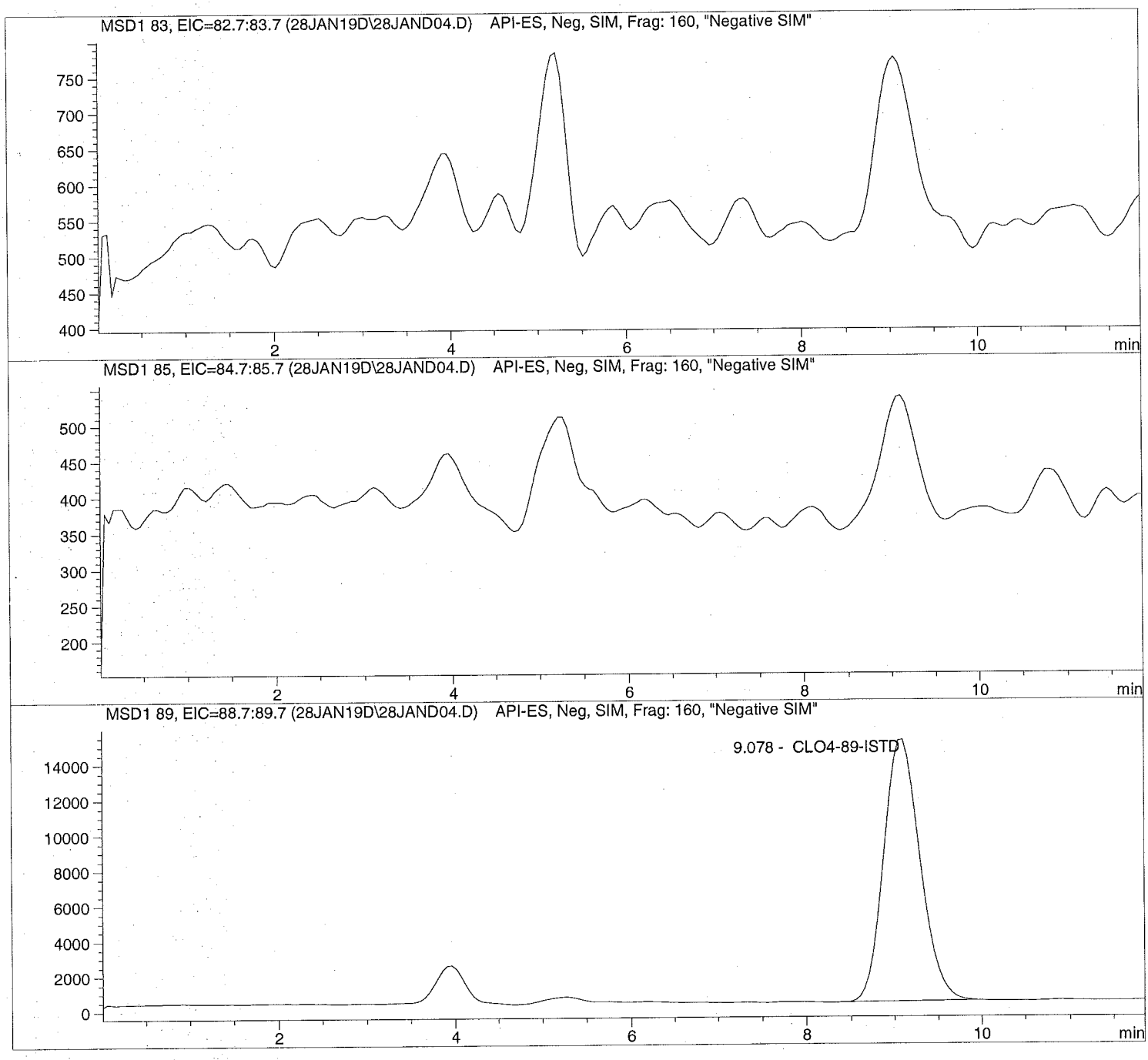
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND04.D Sample Name: 637599 LMB

Injection Date:	1/28/2019 09:49:03	Seq Line:	4
Sample Name:	637599 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND04.D Sample Name: 637599 LMB

Injection Date:	1/28/2019 09:49:03	Seq Line:	4
Sample Name:	637599 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

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

Signal2: MSD1 85, EIC=84.7:85.7

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

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.078	PBA	430750.0	5.0000	CLO4-89-ISTD

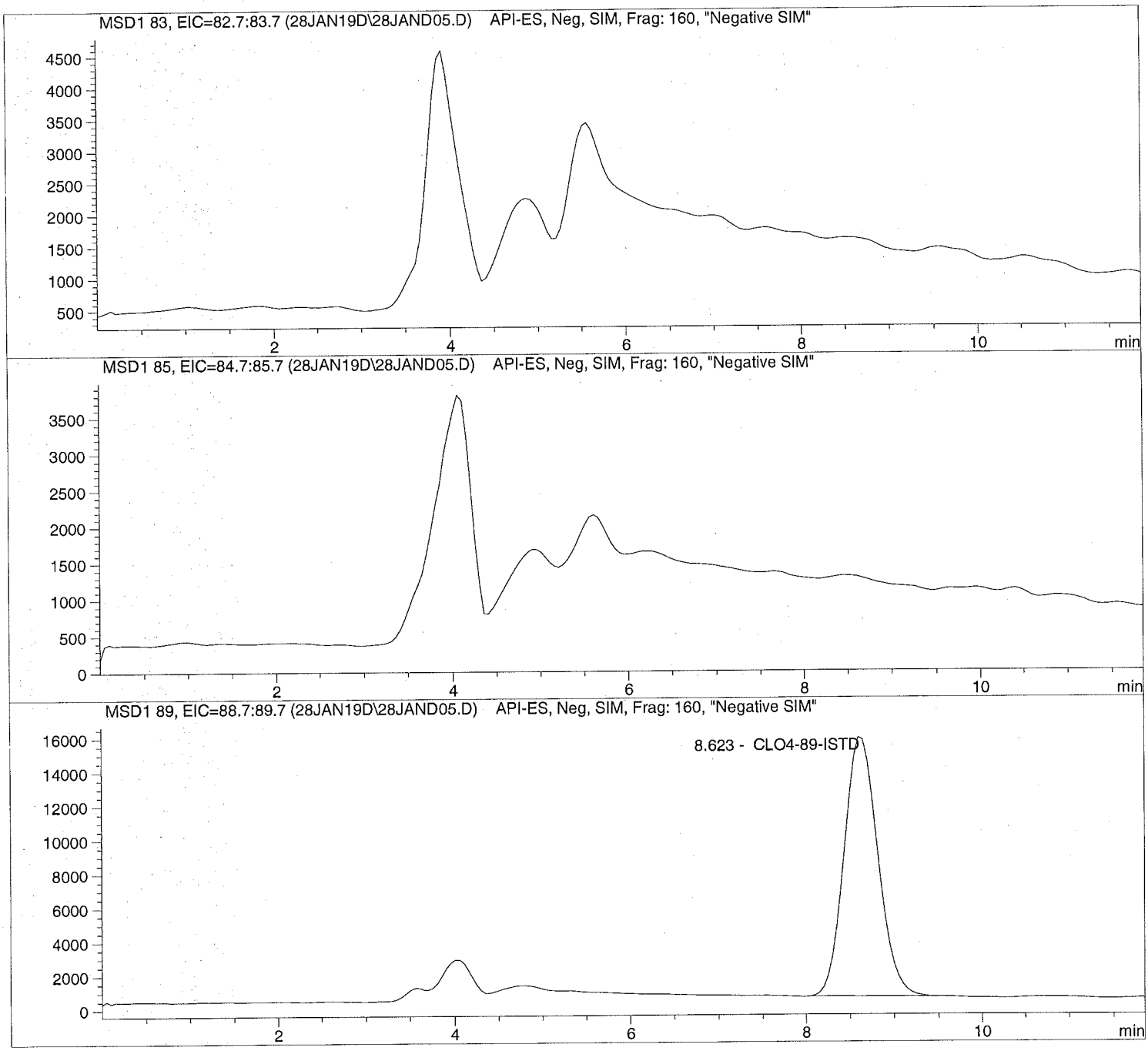
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND05.D Sample Name: 1902253001

Injection Date:	1/28/2019 10:02:50	Seq Line:	5
Sample Name:	1902253001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND05.D Sample Name: 1902253001

Injection Date:	1/28/2019 10:02:50	Seq Line:	5
Sample Name:	1902253001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.623	PBA	404682.6	5.0000	CLO4-89-ISTD

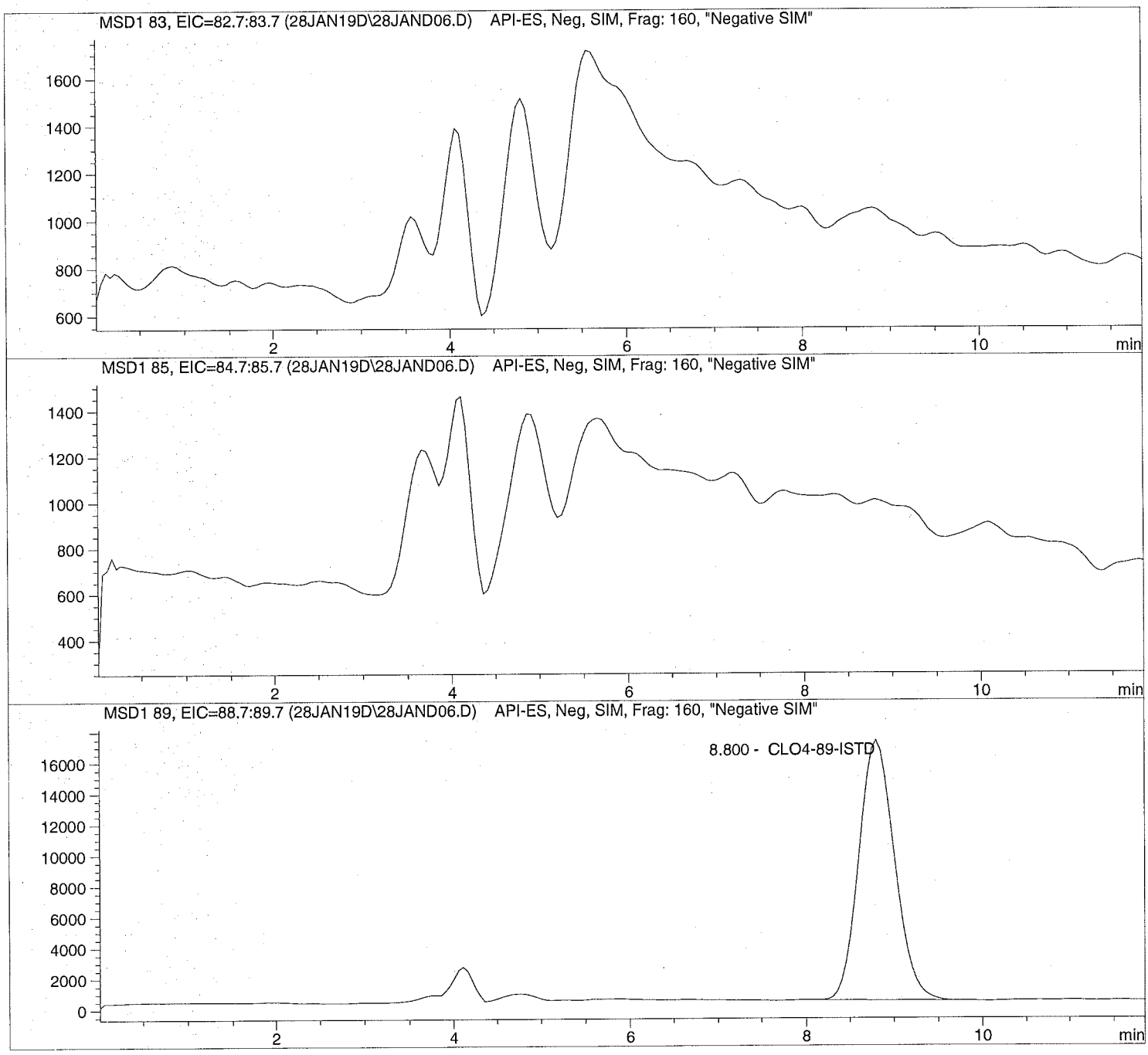
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND06.D Sample Name: 1902253002

Injection Date:	1/28/2019 10:16:43	Seq Line:	6
Sample Name:	1902253002	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND06.D Sample Name: 1902253002

Injection Date:	1/28/2019 10:16:43	Seq Line:	6
Sample Name:	1902253002	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.800	BBA	472598.8	5.0000	CLO4-89-ISTD

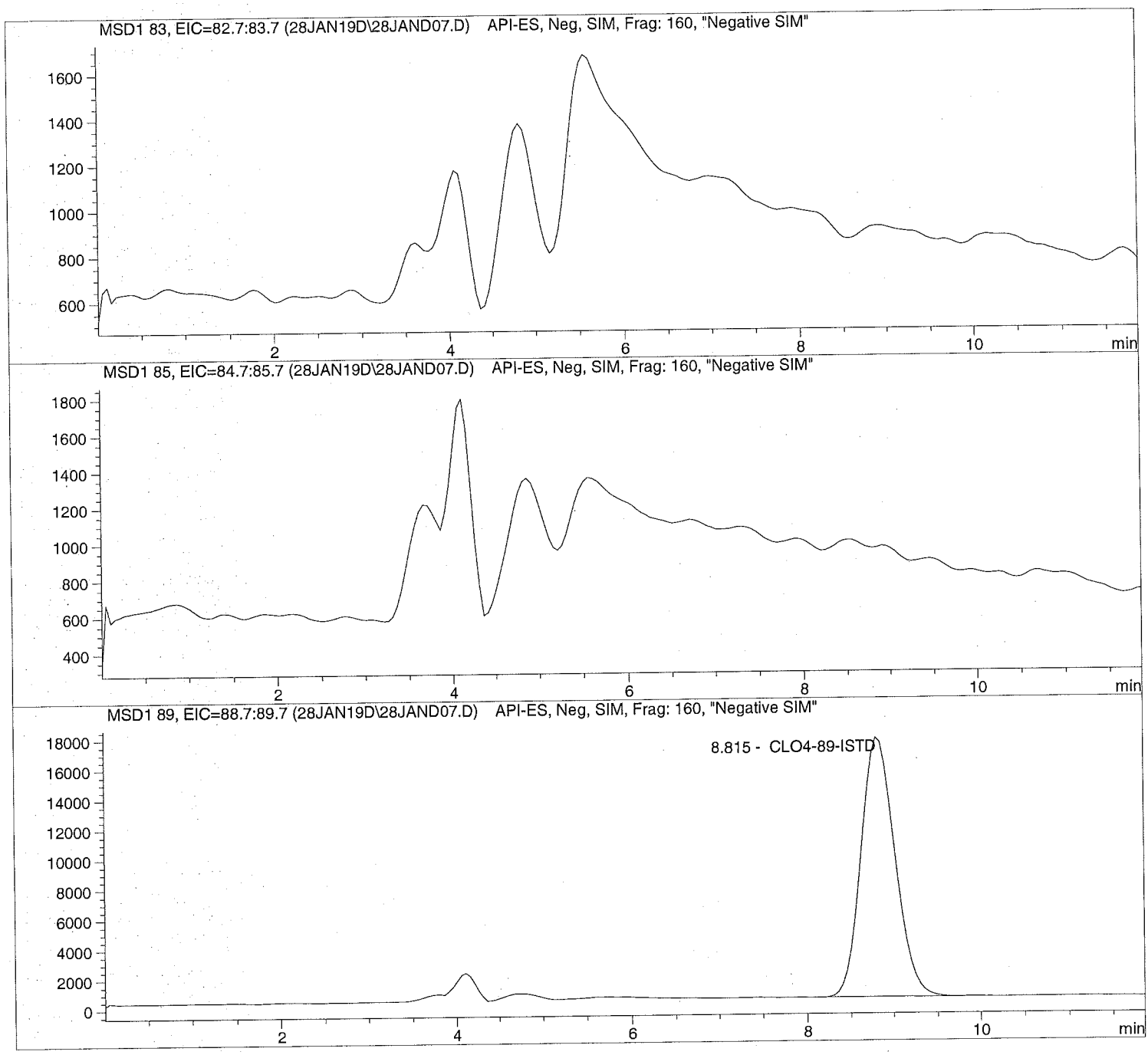
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND07.D Sample Name: 1902253003

Injection Date:	1/28/2019 10:30:41	Seq Line:	7
Sample Name:	1902253003	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND07.D Sample Name: 1902253003

Injection Date:	1/28/2019 10:30:41	Seq Line:	7
Sample Name:	1902253003	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.815	PBA	474255.2	5.0000	CLO4-89-ISTD

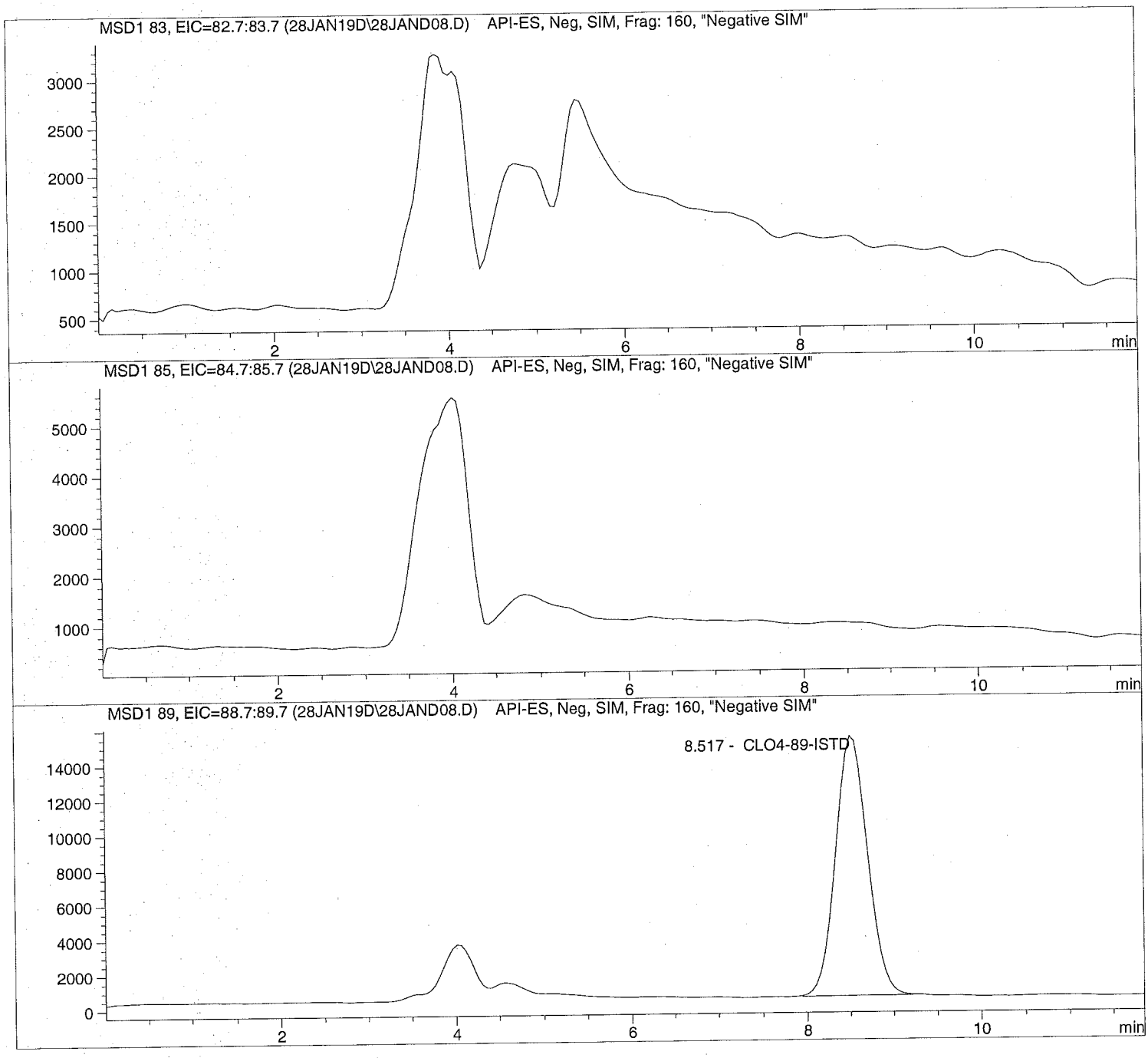
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND08.D Sample Name: 1902253004

Injection Date:	1/28/2019 10:44:28	Seq Line:	8
Sample Name:	1902253004	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND08.D Sample Name: 1902253004

Injection Date:	1/28/2019 10:44:28	Seq Line:	8
Sample Name:	1902253004	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.517	BBA	382663.6	5.0000	CLO4-89-ISTD

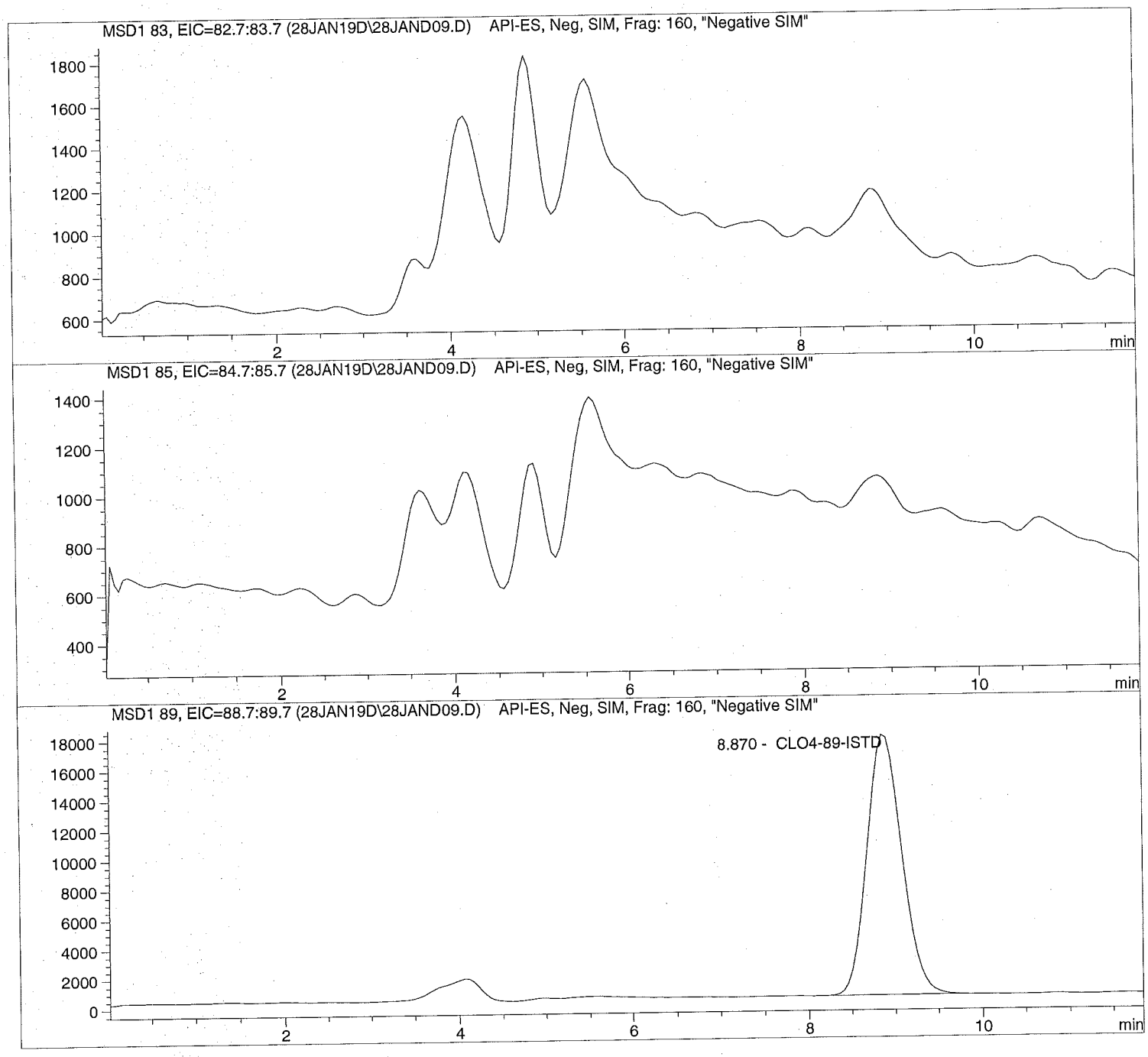
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND09.D Sample Name: 1902253005

Injection Date:	1/28/2019 10:58:22	Seq Line:	9
Sample Name:	1902253005	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND09.D Sample Name: 1902253005

Injection Date:	1/28/2019 10:58:22	Seq Line:	9
Sample Name:	1902253005	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.870	PBA	490120.0	5.0000	CLO4-89-ISTD

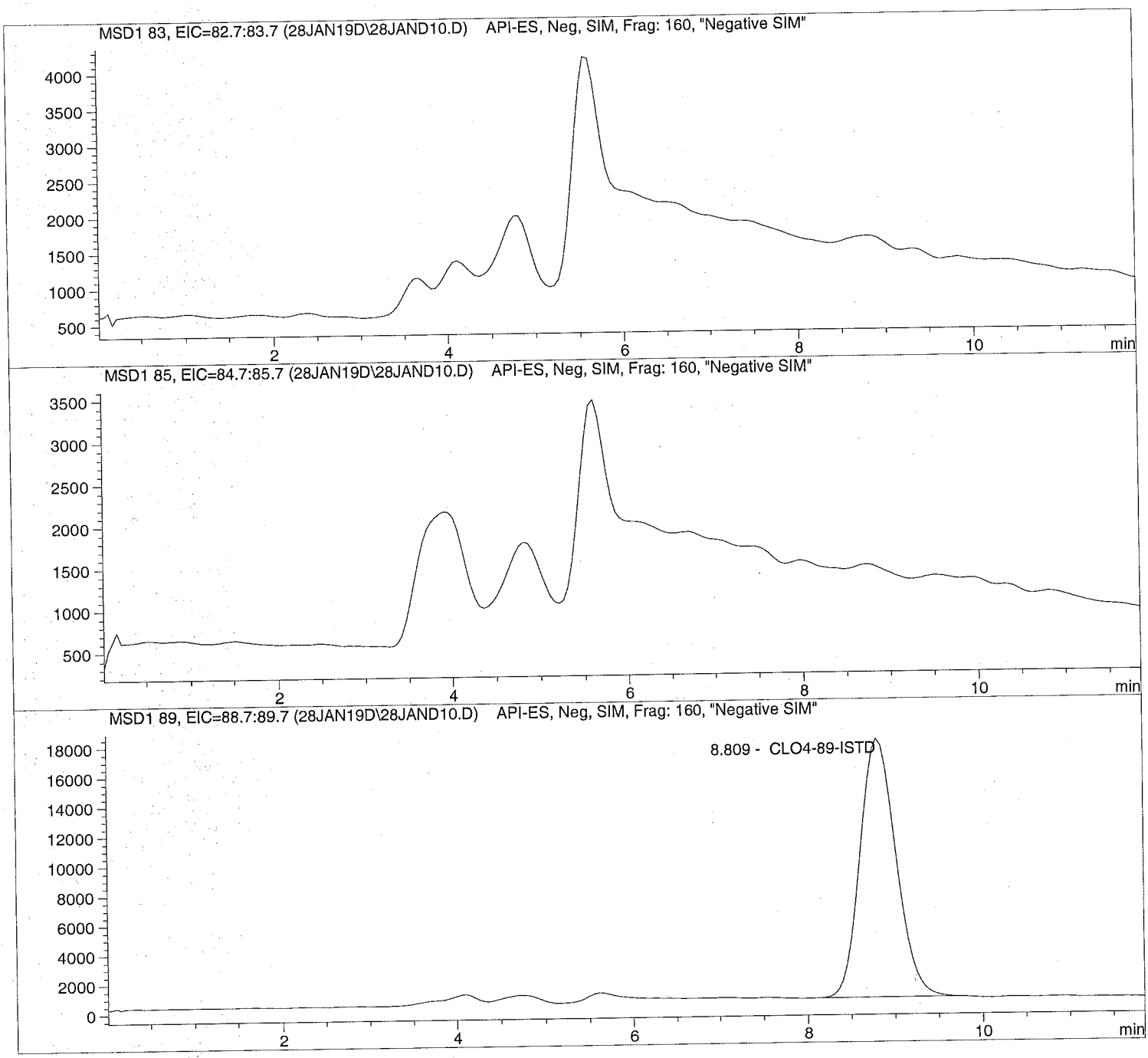
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND10.D Sample Name: 1902253006

Injection Date:	1/28/2019 11:12:12	Seq Line:	10
Sample Name:	1902253006	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND10.D Sample Name: 1902253006

Injection Date:	1/28/2019 11:12:12	Seq Line:	10
Sample Name:	1902253006	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.809	PBA	495621.1	5.0000	CLO4-89-ISTD

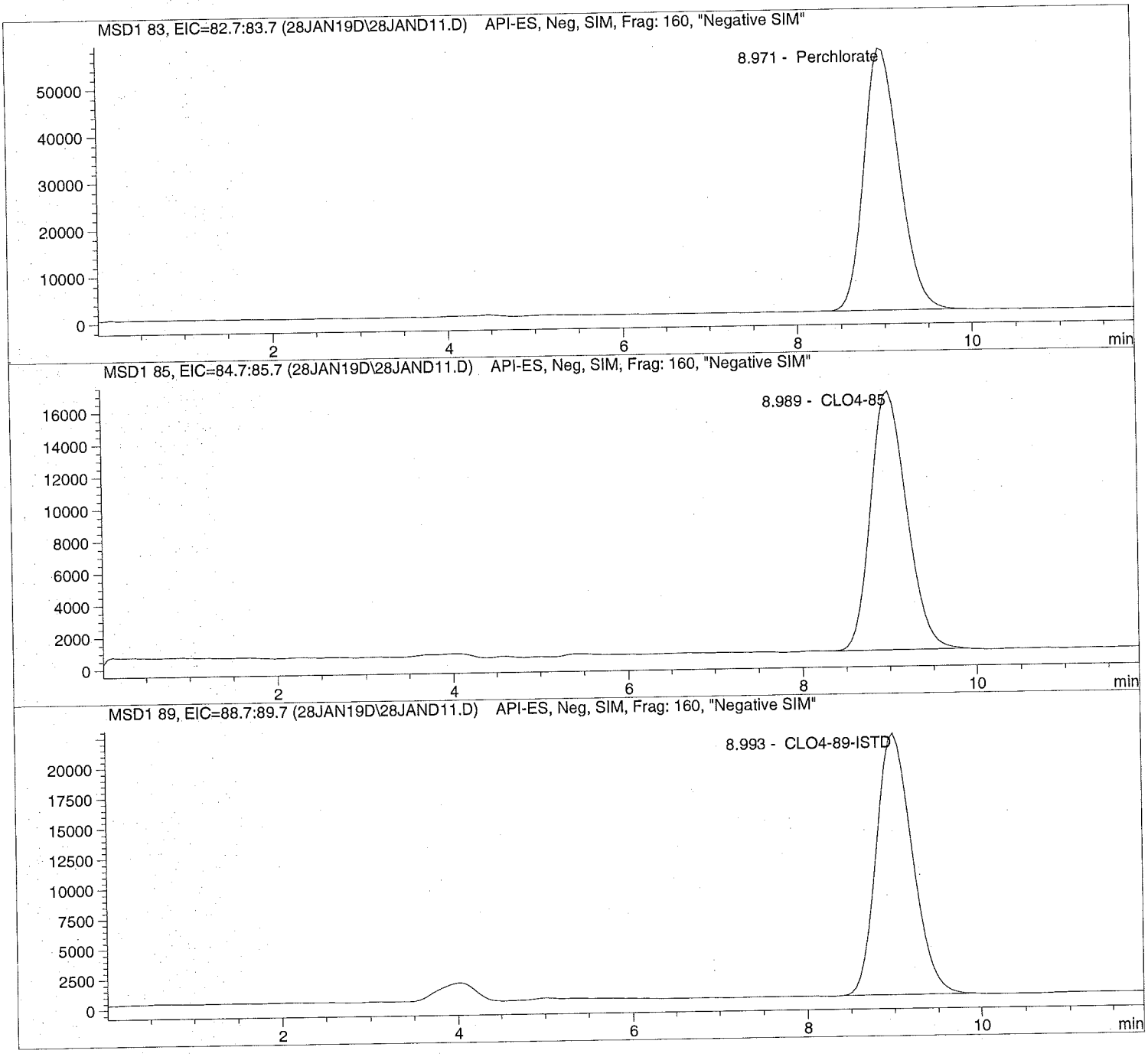
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND11.D Sample Name: 1902253007 10X

Injection Date:	1/28/2019 11:26:10	Seq Line:	11
Sample Name:	1902253007 10X	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND11.D Sample Name: 1902253007 10X

Injection Date:	1/28/2019 11:26:10	Seq Line:	11
Sample Name:	1902253007 10X	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	10.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.971	BBA	1579865.0	79.6796	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.989	BBA	464345.6	77.6765	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.993	PBA	620861.9	50.0000	CLO4-89-ISTD

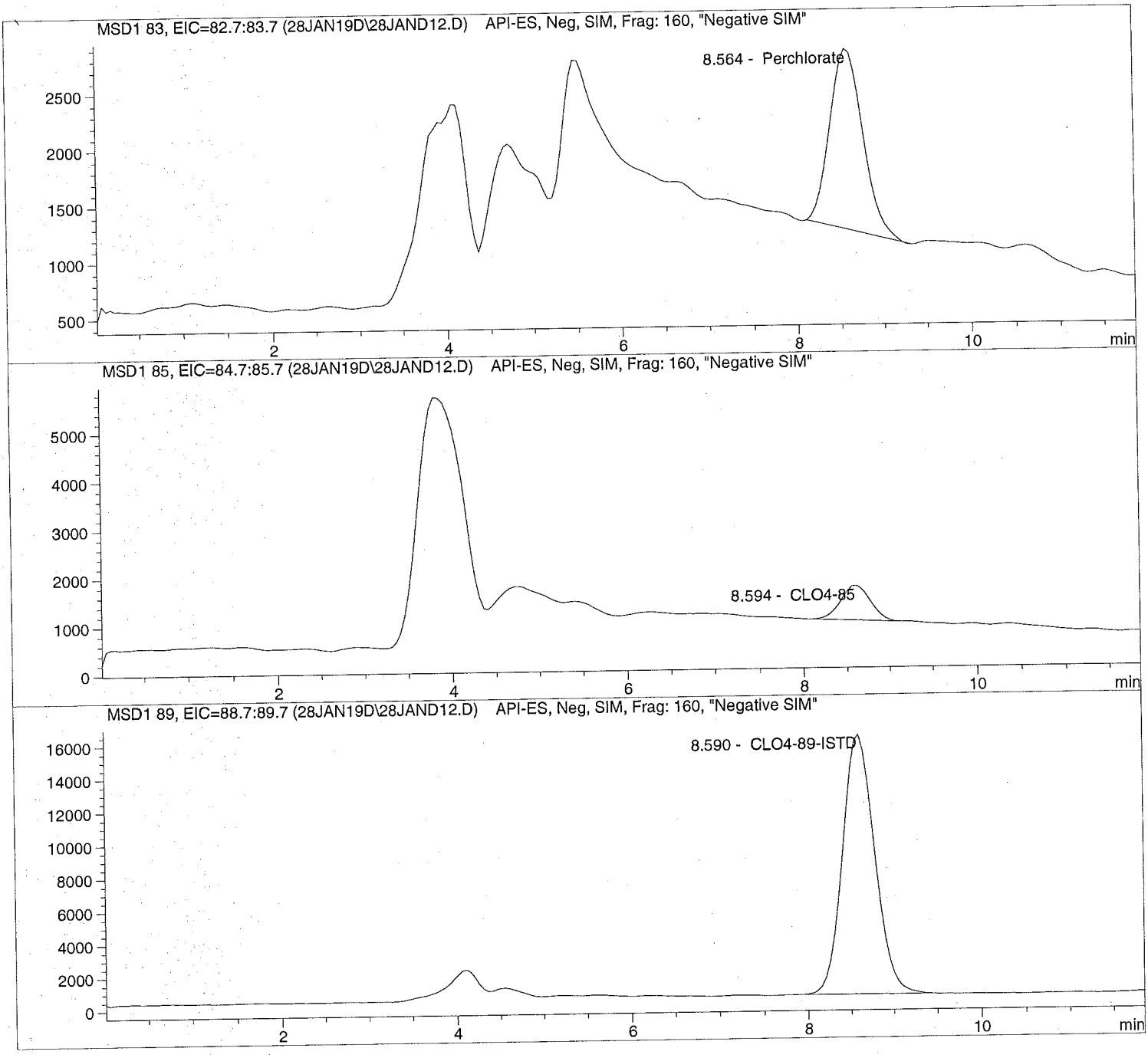
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND12.D Sample Name: 1902392001

Injection Date:	1/28/2019 11:39:55	Seq Line:	12
Sample Name:	1902392001	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND12.D Sample Name: 1902392001

Injection Date:	1/28/2019 11:39:55	Seq Line:	12
Sample Name:	1902392001	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.564	PBA	42787.5	0.5294	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.594	PBA	17413.6	0.5276	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.590	BBA	411974.2	5.0000	CLO4-89-ISTD

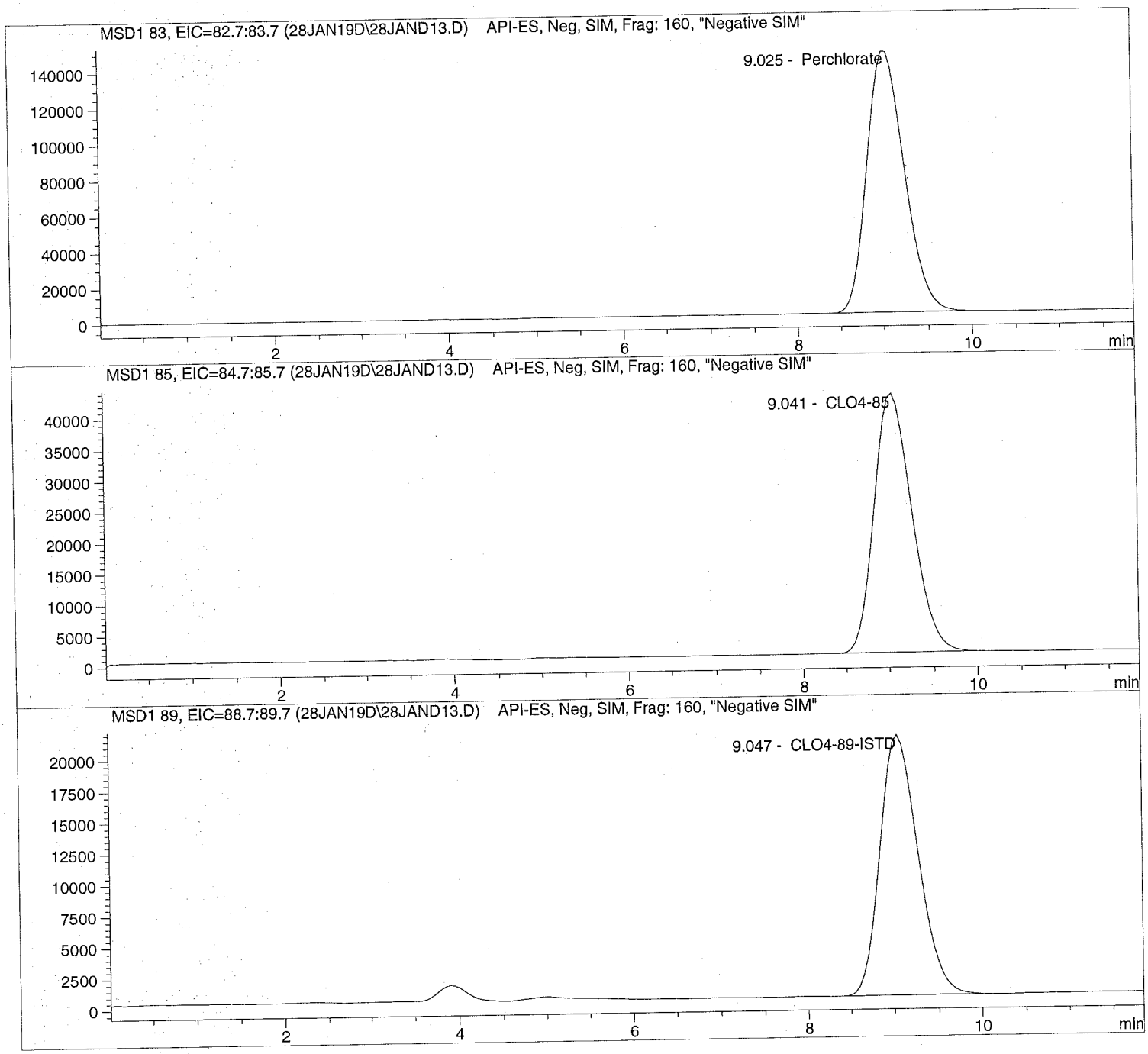
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND13.D Sample Name: 1902392002 100

Injection Date:	1/28/2019 11:53:40	Seq Line:	13
Sample Name:	1902392002 100	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND13.D Sample Name: 1902392002 100

Injection Date:	1/28/2019 11:53:40	Seq Line:	13
Sample Name:	1902392002 100	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
9.025	BBA	4308506.0	2083.7018	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.041	PBA	1241533.1	1996.4734	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.047	PBA	622672.9	500.0000	CLO4-89-ISTD

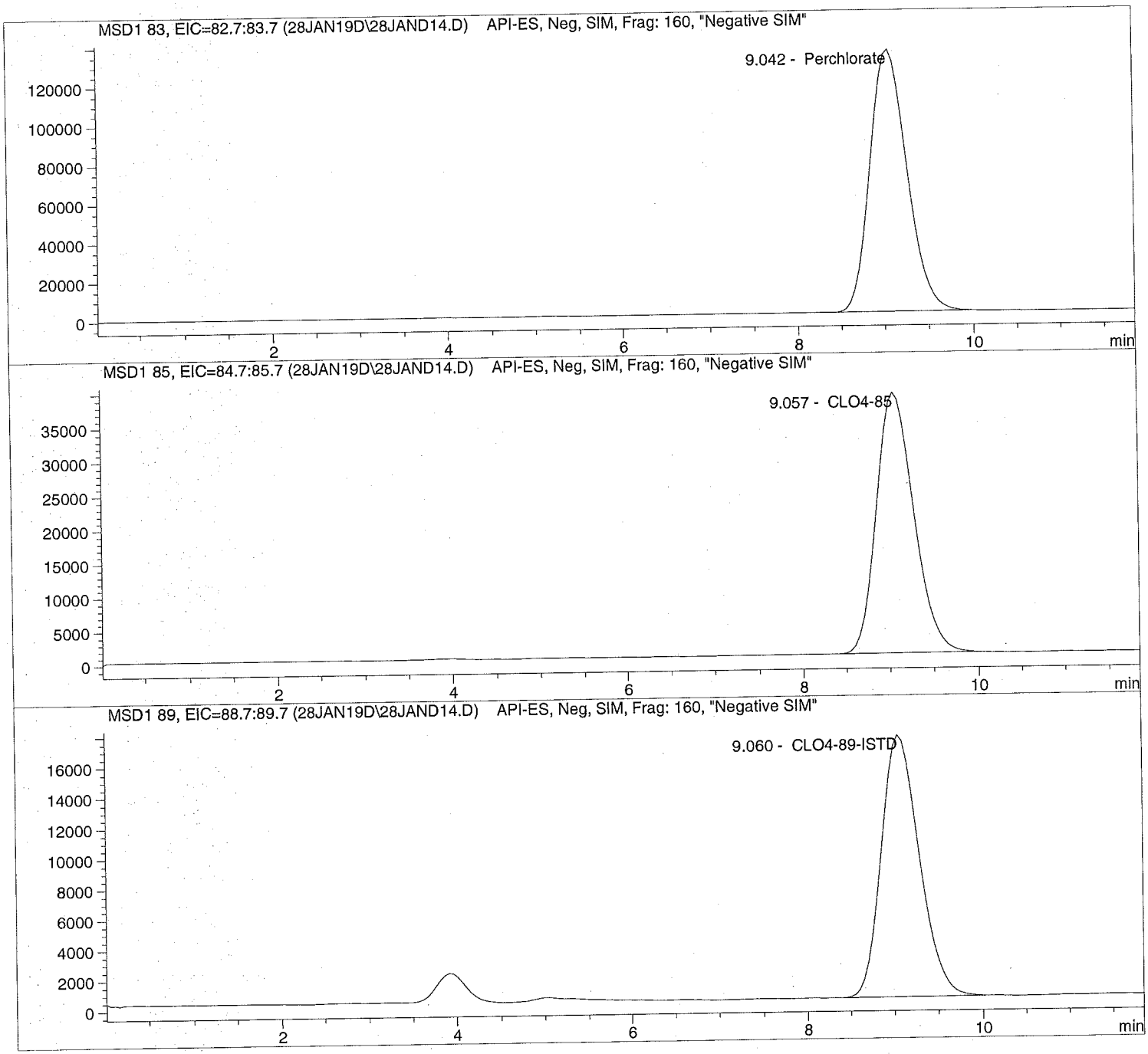
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND14.D Sample Name: 1902392003 100

Injection Date:	1/28/2019 12:07:33	Seq Line:	14
Sample Name:	1902392003 100	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND14.D Sample Name: 1902392003 100

Injection Date:	1/28/2019 12:07:33	Seq Line:	14
Sample Name:	1902392003 100	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
9.042	PBA	3951233.8	2283.0283	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.057	PBA	1143303.5	2194.7418	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.060	PBA	518929.0	500.0000	CLO4-89-ISTD

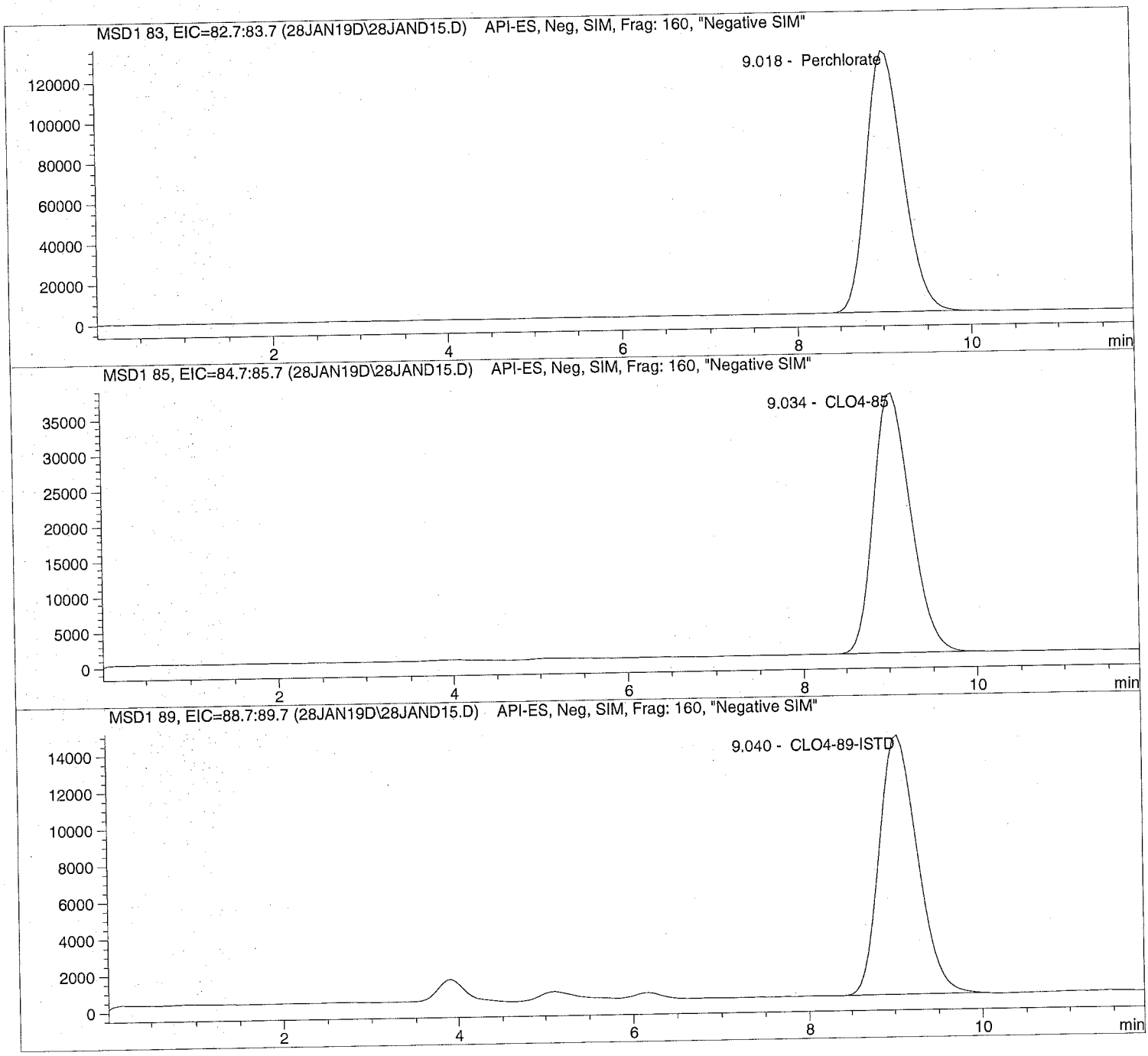
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND15.D Sample Name: 637601 CCV@25

Injection Date:	1/28/2019 12:21:18	Seq Line:	15
Sample Name:	637601 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND15.D Sample Name: 637601 CCV@25

Injection Date:	1/28/2019 12:21:18	Seq Line:	15
Sample Name:	637601 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.018	PBA	3780684.7	26.5117	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.034	PBA	1084316.3	25.2431	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.040	BBA	424334.0	5.0000	CLO4-89-ISTD

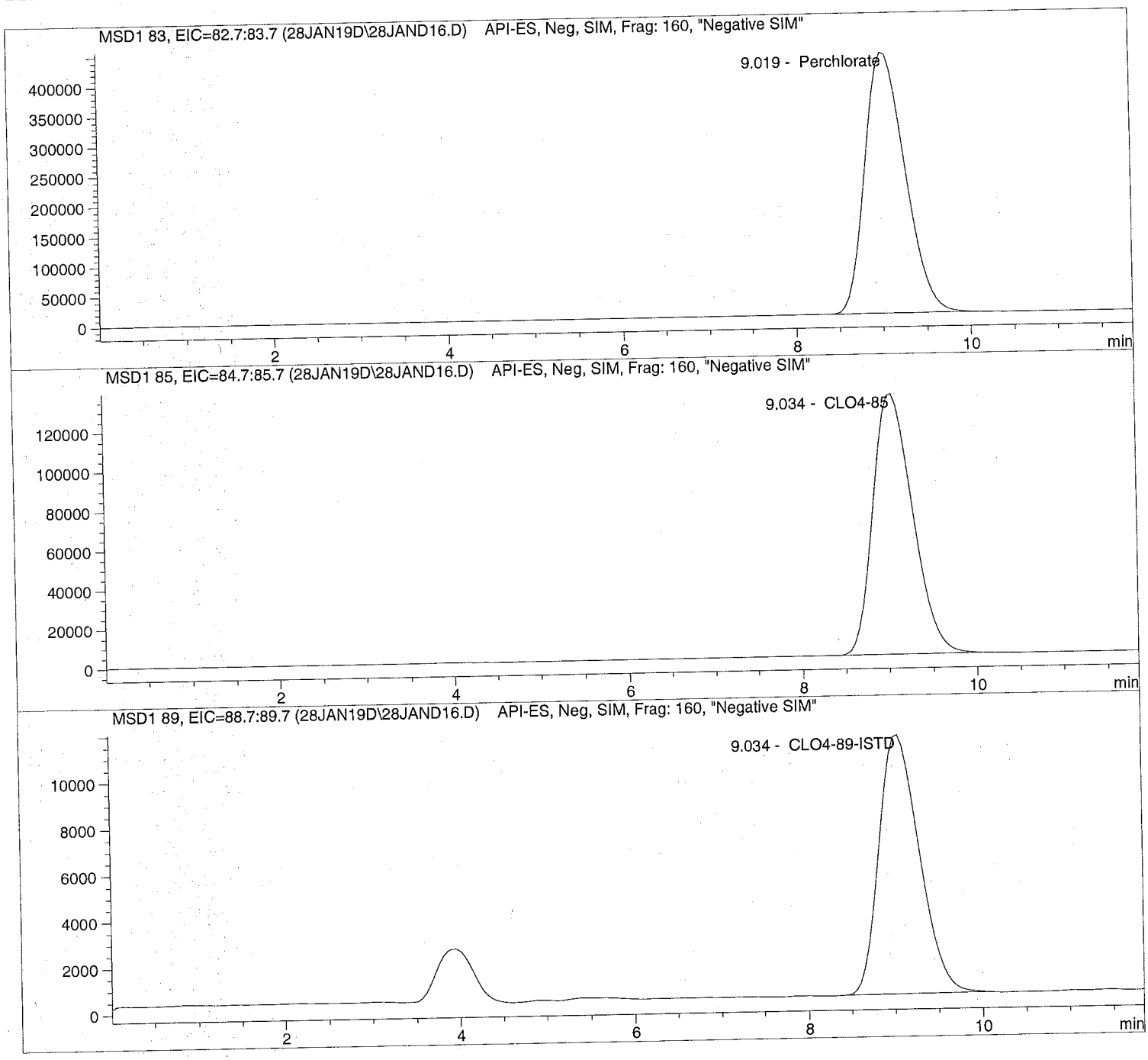
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND16.D Sample Name: 1902392004 100

Injection Date:	1/28/2019 12:35:04	Seq Line:	16
Sample Name:	1902392004 100	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND16.D Sample Name: 1902392004 100

Injection Date:	1/28/2019 12:35:04	Seq Line:	16
Sample Name:	1902392004 100	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
9.019	PBA	13868192.0	10184.8136	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.034	PBA	4160845.0	9801.3642	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.034	PBA	356653.1	500.0000	CLO4-89-ISTD

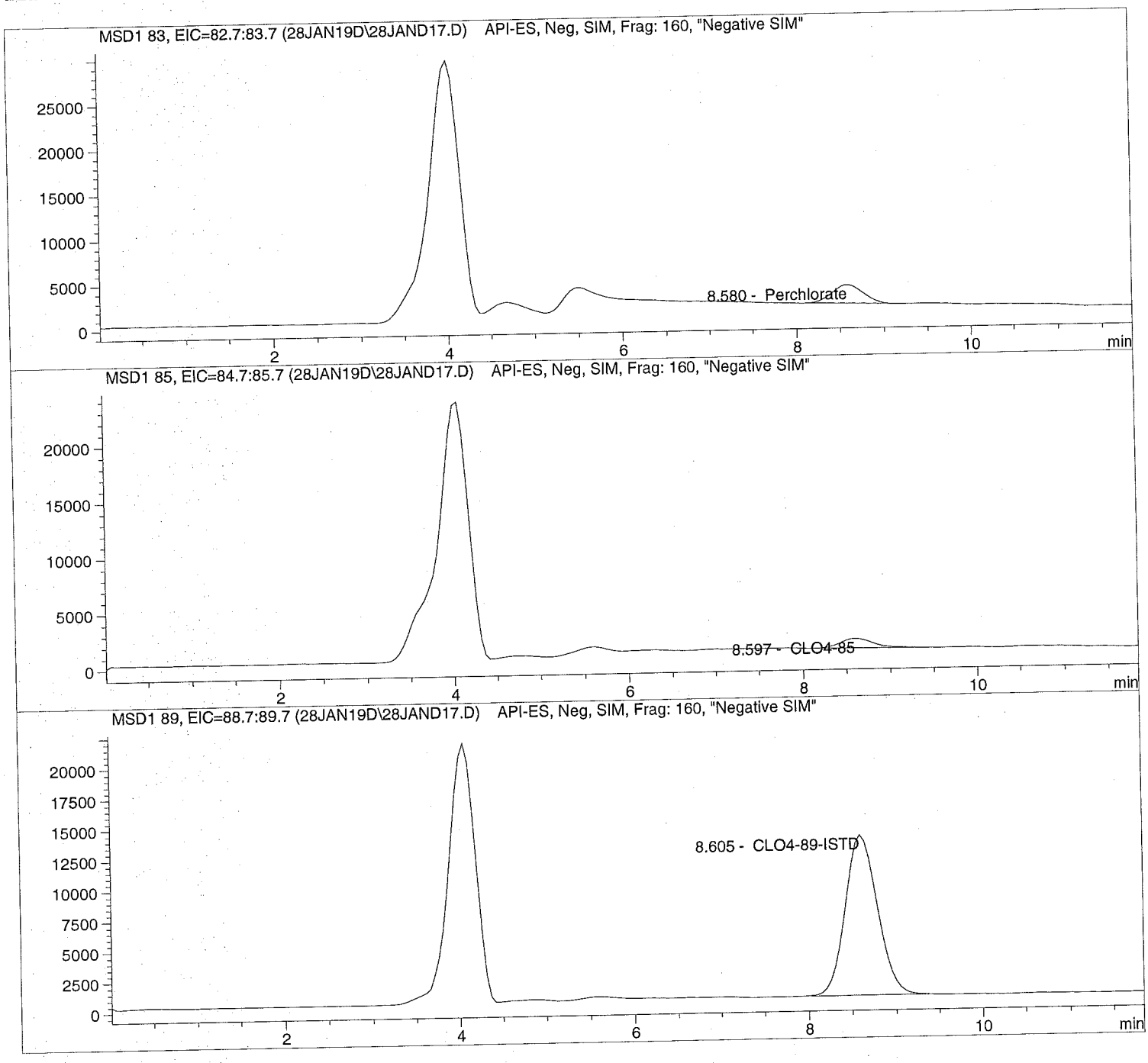
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND17.D Sample Name: 1902392005

Injection Date:	1/28/2019 12:49:00	Seq Line:	17
Sample Name:	1902392005	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND17.D Sample Name: 1902392005

Injection Date:	1/28/2019 12:49:00	Seq Line:	17
Sample Name:	1902392005	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.580	PBA	51442.9	0.6812	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.597	PBA	22699.7	0.7913	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.605	BBA	336195.9	5.0000	CLO4-89-ISTD

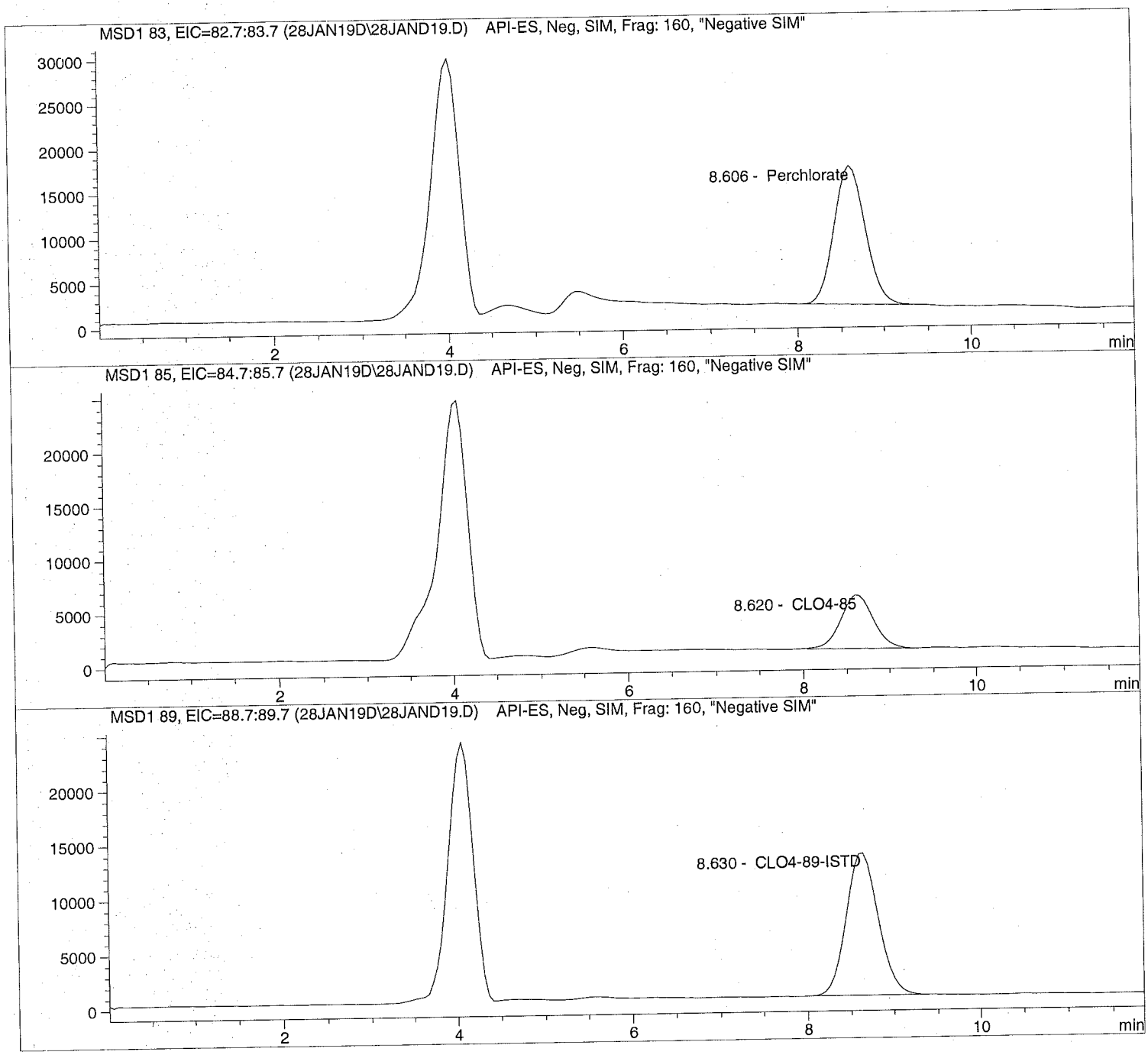
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND19.D Sample Name: 1902392007 MSD

Injection Date:	1/28/2019 13:16:32	Seq Line:	19
Sample Name:	1902392007 MSD	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND19.D Sample Name: 1902392007 MSD

Injection Date:	1/28/2019 13:16:32	Seq Line:	19
Sample Name:	1902392007 MSD	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.606	PBA	389105.6	3.7587	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.620	BBA	131668.6	4.1384	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.630	BBA	336729.2	5.0000	CLO4-89-ISTD

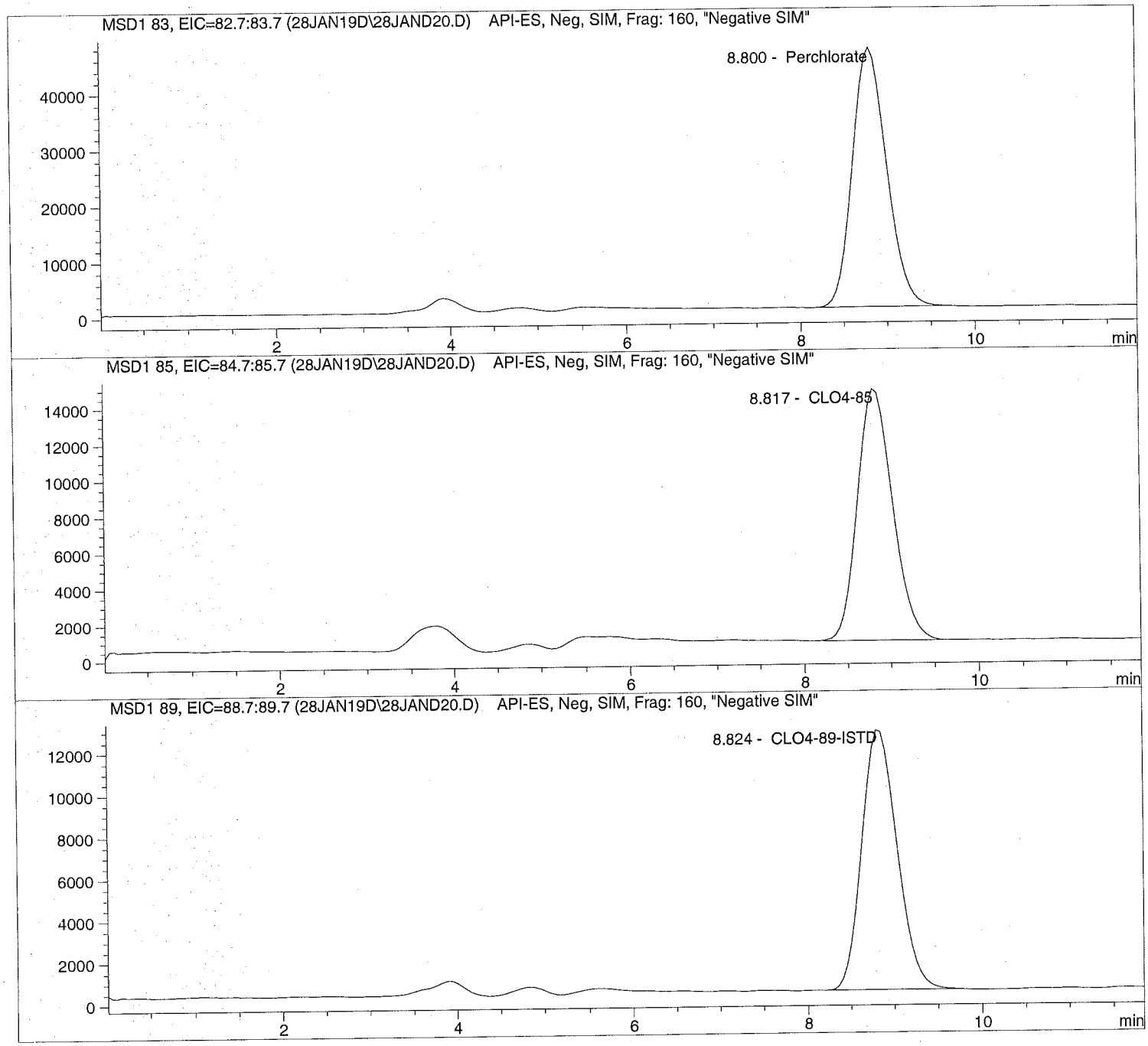
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND20.D Sample Name: 1902392008 10X

Injection Date:	1/28/2019 13:30:27	Seq Line:	20
Sample Name:	1902392008 10X	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND20.D Sample Name: 1902392008 10X

Injection Date:	1/28/2019 13:30:27	Seq Line:	20
Sample Name:	1902392008 10X	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	10.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.800	PBA	1269636.9	112.5497	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.817	PBA	391953.7	115.3271	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.824	PBA	348447.3	50.0000	CLO4-89-ISTD

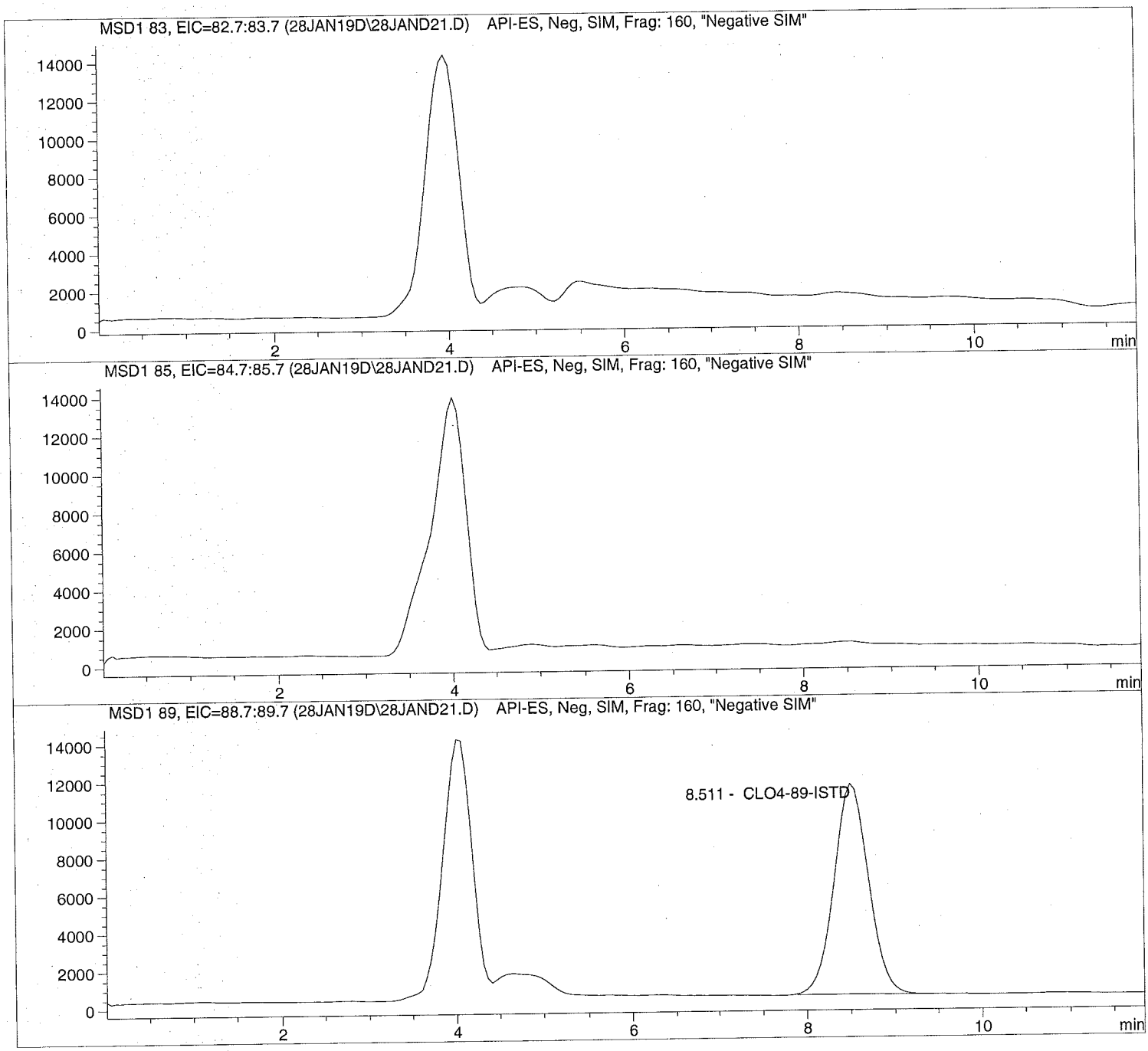
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND21.D Sample Name: 1902392009

Injection Date:	1/28/2019 13:44:15	Seq Line:	21
Sample Name:	1902392009	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND21.D Sample Name: 1902392009

Injection Date:	1/28/2019 13:44:15	Seq Line:	21
Sample Name:	1902392009	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
8.511	BBA	302558.0	5.0000	CLO4-89-ISTD

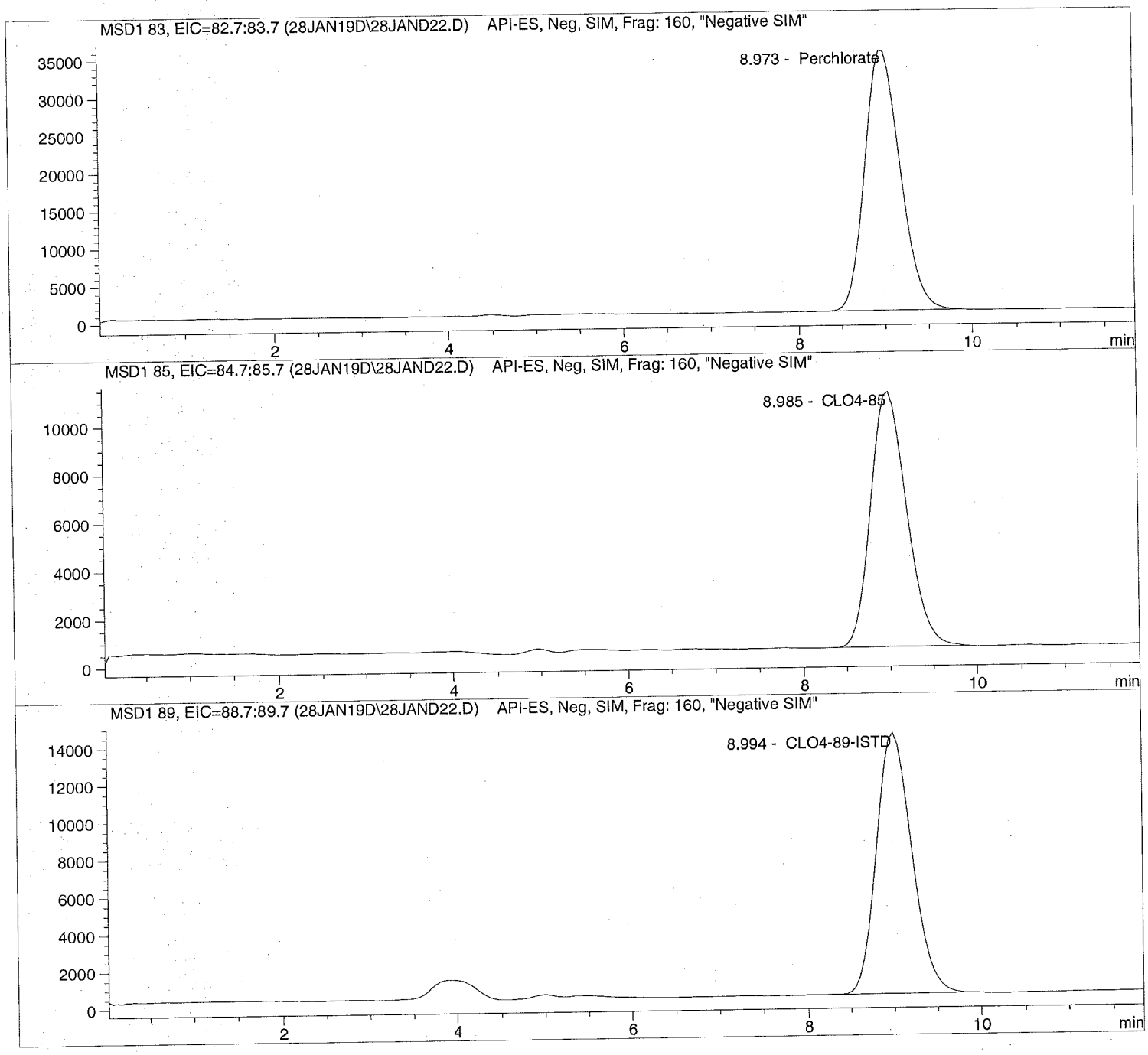
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND22.D Sample Name: 1902253007 10X

Injection Date:	1/28/2019 13:58:01	Seq Line:	22
Sample Name:	1902253007 10X	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND22.D Sample Name: 1902253007 10X

Injection Date:	1/28/2019 13:58:01	Seq Line:	22
Sample Name:	1902253007 10X	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	10.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.973	BBA	977785.3	77.8015	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.985	PBA	304112.6	80.1060	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.994	BBA	393916.7	50.0000	CLO4-89-ISTD

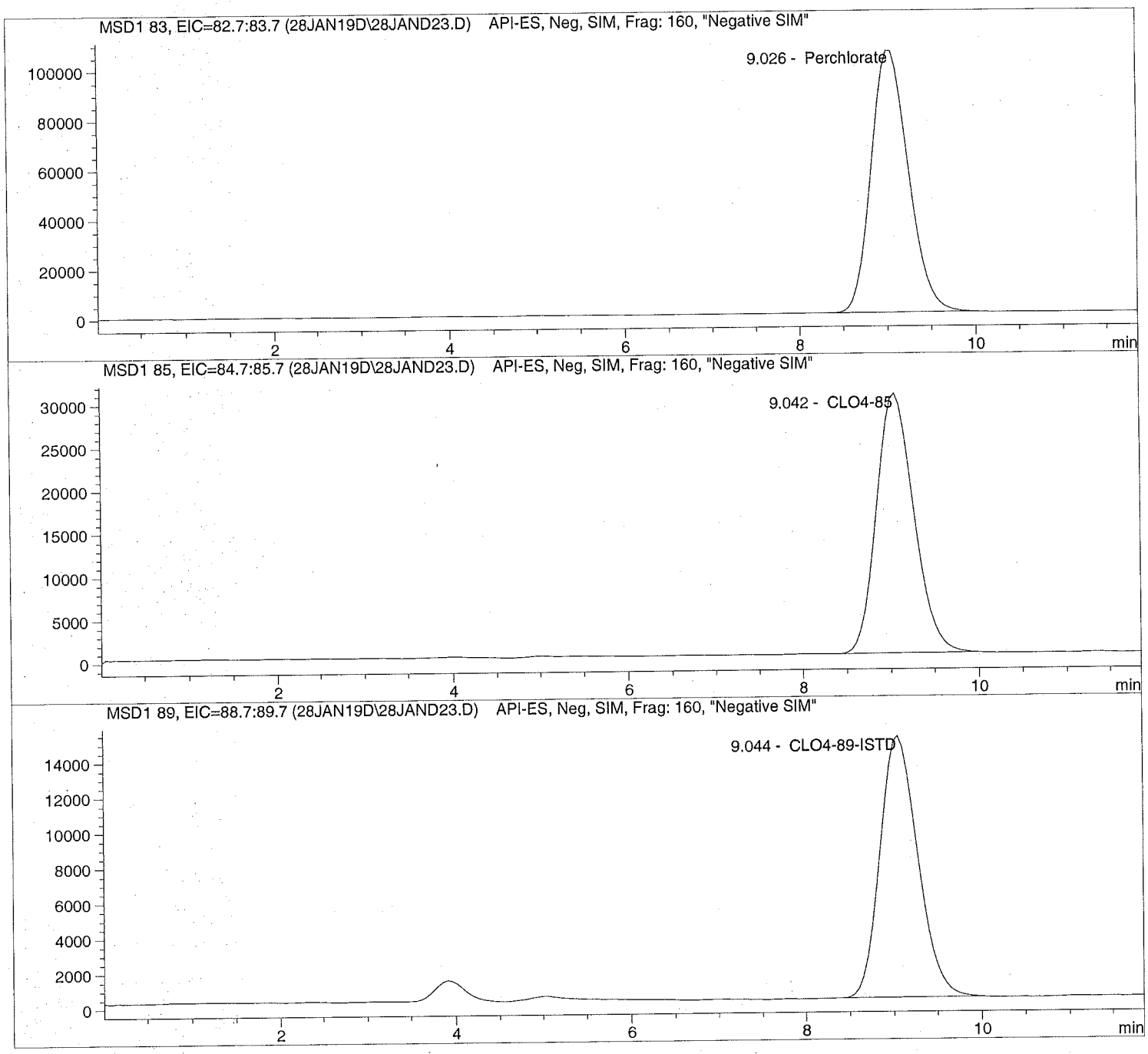
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND23.D Sample Name: 1902392002 100

Injection Date:	1/28/2019 14:11:46	Seq Line:	23
Sample Name:	1902392002 100	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND23.D Sample Name: 1902392002 100

Injection Date:	1/28/2019 14:11:46	Seq Line:	23
Sample Name:	1902392002 100	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
9.026	PBA	3100678.5	2101.4634	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.042	PBA	894469.5	2015.4943	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.044	PBA	444153.2	500.0000	CLO4-89-ISTD

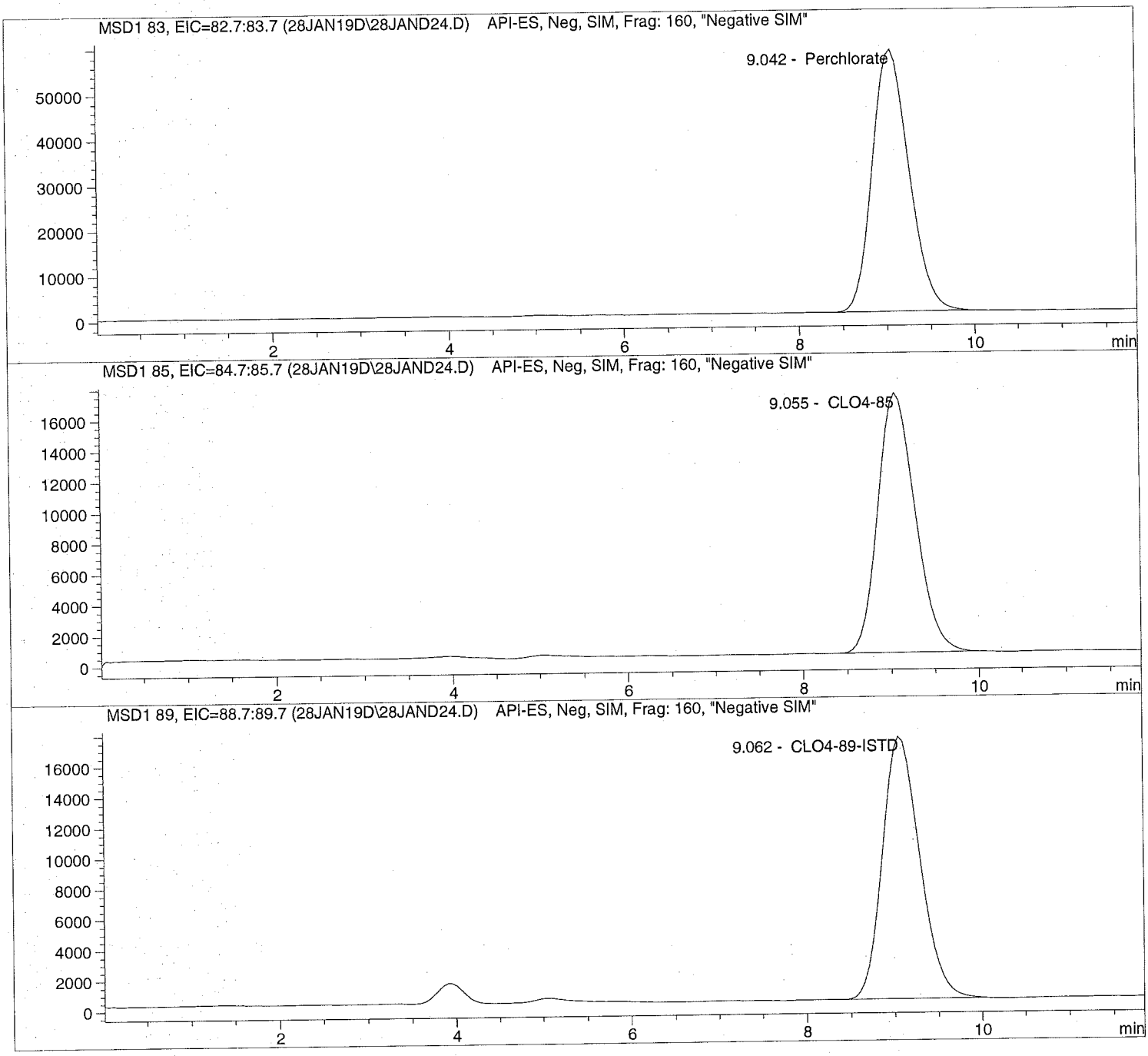
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND24.D Sample Name: 1902392004 1K

Injection Date:	1/28/2019 14:25:34	Seq Line:	24
Sample Name:	1902392004 1K	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND24.D Sample Name: 1902392004 1K

Injection Date:	1/28/2019 14:25:34	Seq Line:	24
Sample Name:	1902392004 1K	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1000.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.042	PBA	1681054.9	10245.3827	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.055	PBA	499806.8	10119.5370	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.062	PBA	508672.5	5000.0000	CLO4-89-ISTD

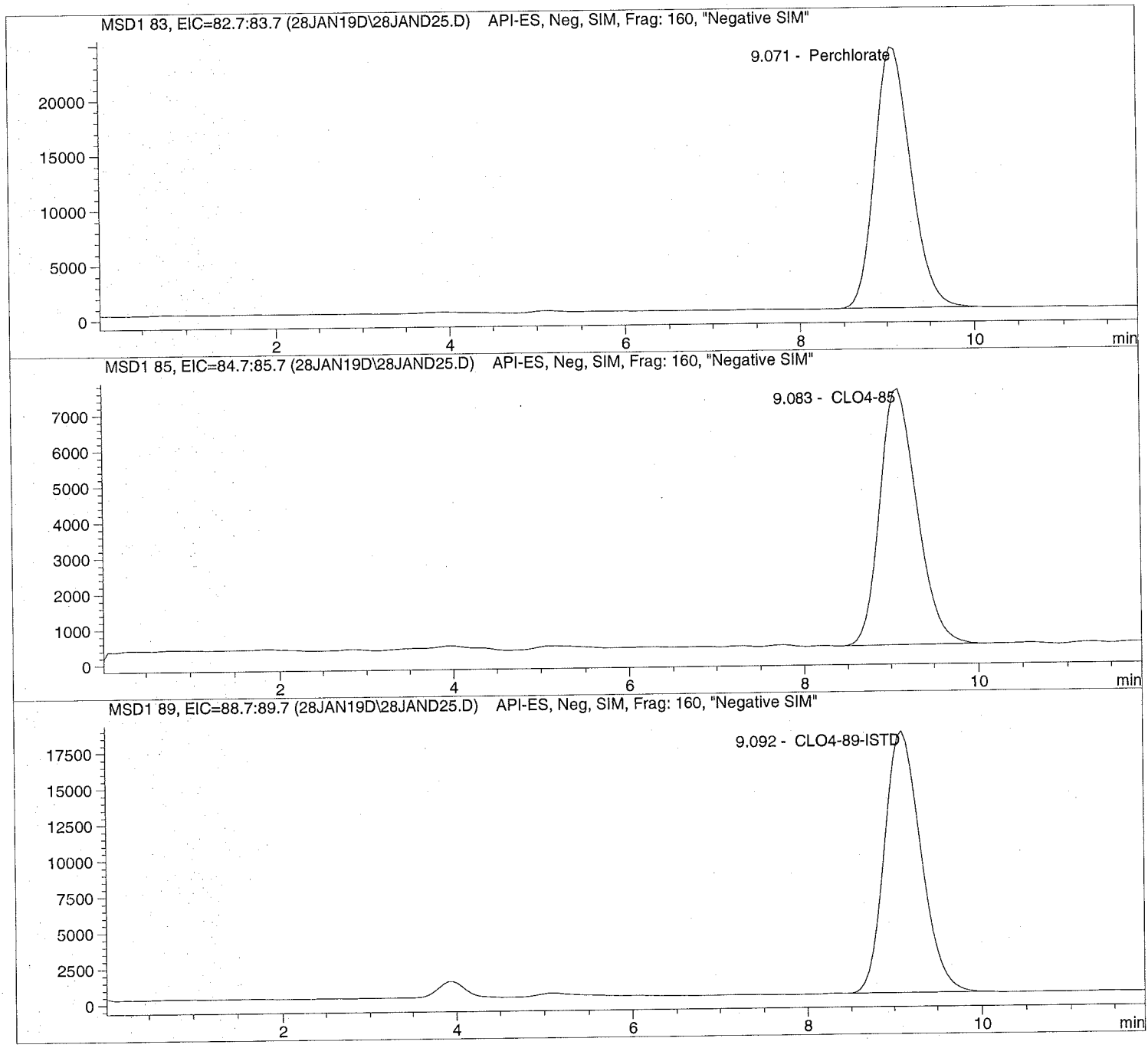
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND25.D Sample Name: 1902392006 MS

Injection Date:	1/28/2019 14:39:20	Seq Line:	25
Sample Name:	1902392006 MS	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND25.D Sample Name: 1902392006 MS

Injection Date:	1/28/2019 14:39:20	Seq Line:	25
Sample Name:	1902392006 MS	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
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
9.071	BBA	694065.9	4.1829	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.083	PBA	215904.9	4.2584	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.092	BBA	536116.9	5.0000	CLO4-89-ISTD

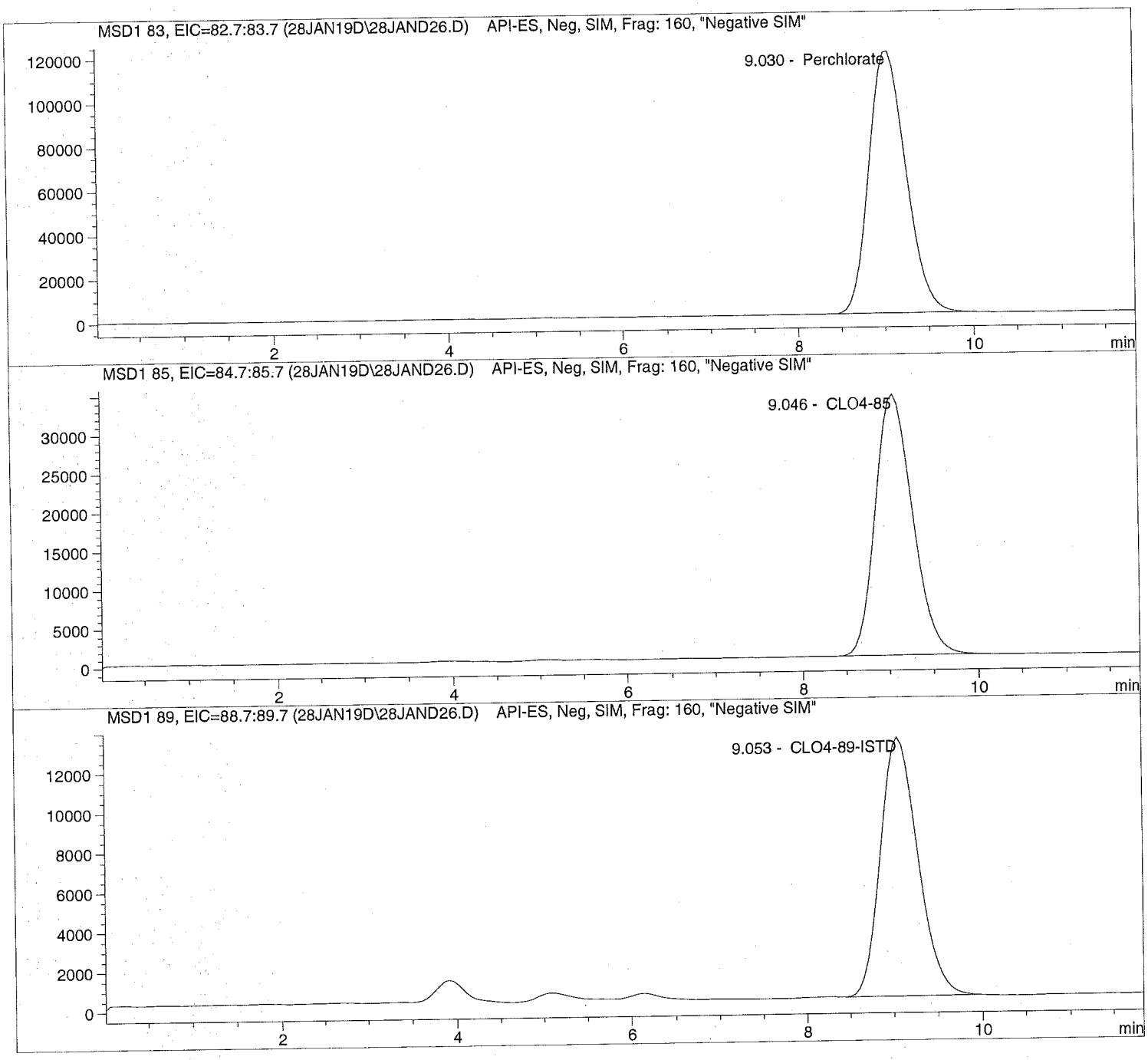
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND26.D Sample Name: 637602 CCV@25

Injection Date:	1/28/2019 14:53:57	Seq Line:	26
Sample Name:	637602 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28JAN19D\28JAND26.D Sample Name: 637602 CCV@25

Injection Date:	1/28/2019 14:53:57	Seq Line:	26
Sample Name:	637602 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/3/2018 12:46:06

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 3. Dec. 2018, 00:29:27 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.030	PBA	3495668.0	26.8984	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.046	PBA	992722.0	25.3712	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.053	PBA	386403.7	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\08OCT18I\08OCT18D.B

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

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

#	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
#*	CLO4@ 1.0u	Vial 74	1	Control	4	9.40790e4	9.287	9.73826e-1
#*	CLO4@ 2.0u	Vial 75	1	Control	5	2.26957e5	9.259	2.19167
#*	CLO4@ 5.0u	Vial 76	1	Control	6	5.50307e5	9.208	4.80912
#*	CLO4@ 10.u	Vial 77	1	Control	7	1.07623e6	9.246	9.38291
#*	CLO4@ 25.u	Vial 78	1	Control	8	2.88097e6	9.175	25.83039
#*	CLO4@ 50.u	Vial 79	1	Control	9	6.29507e6	9.261	49.91981
#*	CLO4@ 75.u	Vial 80	1	Control	10	9.45737e6	9.236	74.88523
*	ICAL Verf@	Vial 81	1	Control	11	1.10069e6	9.244	9.38952

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
#*	CLO4@ 1.0u	Vial 74	1	Control	4	3.79545e5	9.314	5.00000
#*	CLO4@ 2.0u	Vial 75	1	Control	5	3.52582e5	9.297	5.00000
#*	CLO4@ 5.0u	Vial 76	1	Control	6	3.66805e5	9.223	5.00000
#*	CLO4@ 10.u	Vial 77	1	Control	7	3.56815e5	9.266	5.00000
#*	CLO4@ 25.u	Vial 78	1	Control	8	3.32340e5	9.196	5.00000
#*	CLO4@ 50.u	Vial 79	1	Control	9	3.59393e5	9.277	5.00000
#*	CLO4@ 75.u	Vial 80	1	Control	10	3.45193e5	9.253	5.00000
*	ICAL Verf@	Vial 81	1	Control	11	3.64657e5	9.264	5.00000

#	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
#*	CLO4@ 1.0u	Vial 74	1	Control	4	3.17987e4	9.316	9.60861e-1
#*	CLO4@ 2.0u	Vial 75	1	Control	5	7.05436e4	9.273	2.16955
#*	CLO4@ 5.0u	Vial 76	1	Control	6	1.69833e5	9.217	4.87565
#*	CLO4@ 10.u	Vial 77	1	Control	7	3.31565e5	9.259	9.58732
#*	CLO4@ 25.u	Vial 78	1	Control	8	8.62978e5	9.187	25.62680
#*	CLO4@ 50.u	Vial 79	1	Control	9	1.91847e6	9.278	49.74848
#*	CLO4@ 75.u	Vial 80	1	Control	10	2.93835e6	9.251	75.02646
*	ICAL Verf@	Vial 81	1	Control	11	3.27974e5	9.261	9.28908

*** End of Report ***

Calibration Table

Perchlorate

Calib. Data Modified : 10/9/2018 8:01:57 AM

Calculate : Internal Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : No recalibration if peaks missing

Curve Type : Quadratic (some peaks differ, see below)
Origin : Ignored (some peaks differ, see below)
Weight : Linear (Amnt) (some peaks differ, see below)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

Default Sample ISTD Information (if not set in sample table):

ISTD #	ISTD Amount	Name
1	5.00000	CLO4-89-ISTD

Signal 1: MSD1 83, EIC=82.7:83.7
Signal 2: MSD1 85, EIC=84.7:85.7
Signal 3: MSD1 89, EIC=88.7:89.7

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
9.287	1	1	1.00000	9.40790e4	1.06294e-5	1		Perchlorate
		2	2.00000	2.26957e5	8.81224e-6			
		3	5.00000	5.50307e5	9.08584e-6			
		4	10.00000	1.07623e6	9.29172e-6			
		5	25.00000	2.88097e6	8.67764e-6			
		6	50.00000	6.29507e6	7.94272e-6			
		7	75.00000	9.45737e6	7.93033e-6			
9.314	3	1	5.00000	3.79545e5	1.31737e-5	+I1		CLO4-89-ISTD
		2	5.00000	3.52582e5	1.41811e-5			
		3	5.00000	3.66805e5	1.36312e-5			
		4	5.00000	3.56815e5	1.40129e-5			
		5	5.00000	3.32340e5	1.50448e-5			
		6	5.00000	3.59393e5	1.39124e-5			
		7	5.00000	3.45193e5	1.44847e-5			
9.316	2	1	1.00000	3.17987e4	3.14479e-5	1		CLO4-85
		2	2.00000	7.05436e4	2.83513e-5			
		3	5.00000	1.69833e5	2.94406e-5			
		4	10.00000	3.31565e5	3.01600e-5			
		5	25.00000	8.62978e5	2.89695e-5			
		6	50.00000	1.91847e6	2.60625e-5			

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

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
		7	75.00000	2.93835e6	2.55246e-5			

More compound-specific settings:

Compound: Perchlorate
- Time Window : From 7.196 min To 11.196 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

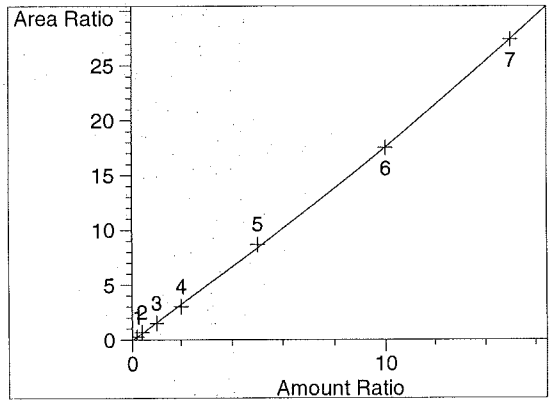
Compound: CLO4-89-ISTD
- Time Window : From 7.207 min To 11.192 min
- Curve Type : Linear
- Origin : Included
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 1
  - Level 3 : 1
  - Level 4 : 1
  - Level 5 : 1
  - Level 6 : 1
  - Level 7 : 1

Compound: CLO4-85
- Time Window : From 7.211 min To 11.211 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

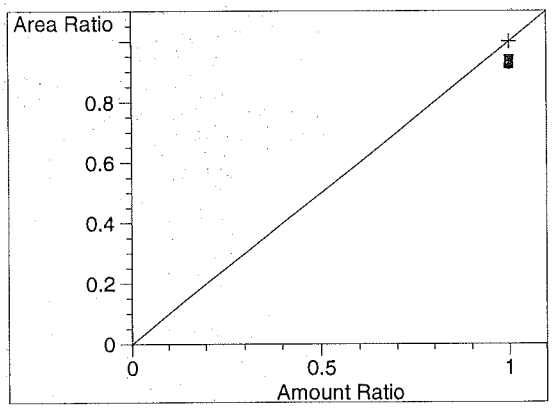
Peak Sum Table

No Entries in table

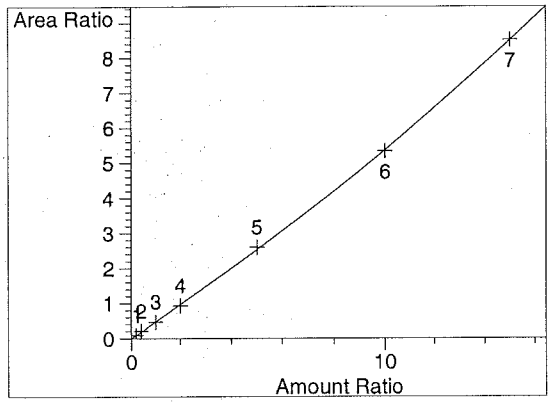
Calibration Curves



Perchlorate at exp. RT: 9.287
MSD1 83, EIC=82.7:83.7
Correlation: 0.99971
Residual Std. Dev.: 0.16701
Formula: $y = ax^2 + bx + c$
a: 1.45482e-2
b: 1.61590
c: -6.73998e-2
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-89-ISTD at exp. RT: 9.314
MSD1 89, EIC=88.7:89.7
Correlation: 1.00000
Residual Std. Dev.: 0.00000
Formula: $y = mx + b$
m: 1.00000
b: 0.00000
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 1
Level 3 : 1
Level 4 : 1
Level 5 : 1
Level 6 : 1
Level 7 : 1



CLO4-85 at exp. RT: 9.316
MSD1 85, EIC=84.7:85.7
Correlation: 0.99984
Residual Std. Dev.: 0.03901
Formula: $y = ax^2 + bx + c$
a: 6.03220e-3
b: 4.77309e-1
c: -8.16718e-3
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333

Sequence Table:

Method and Injection Info Part:

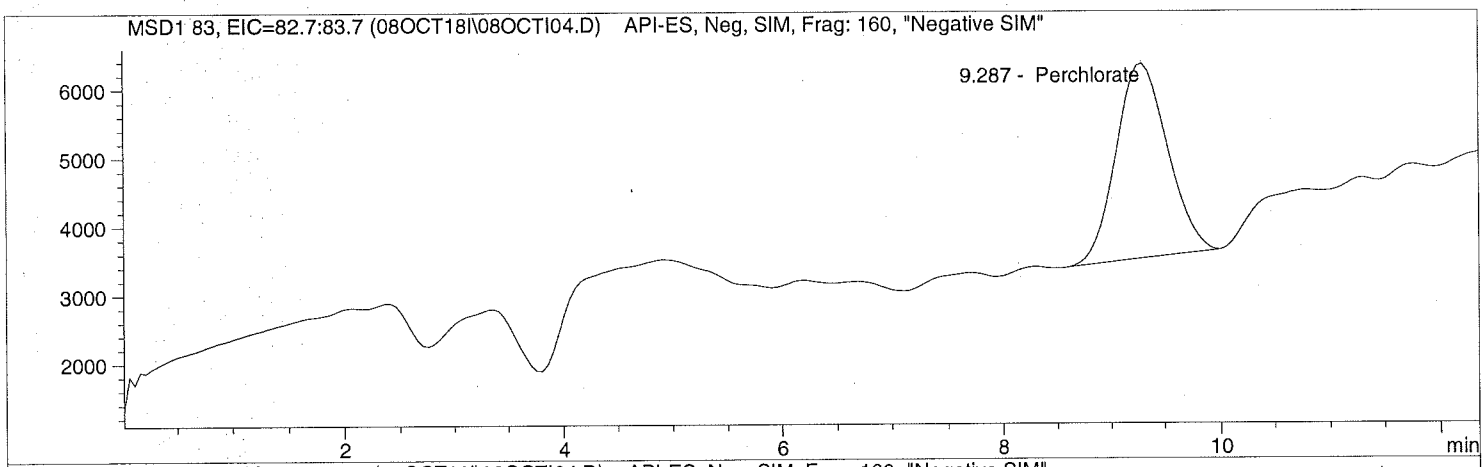
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	CLO4@ .10ug/L	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	CLO4@ .20ug/L	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	CLO4@ 0.5ug/L	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	CLO4@ 1.0ug/L	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	CLO4@ 2.0ug/L	CLO4-AQN	1	Ctrl Samp		
6	Vial 76	CLO4@ 5.0ug/L	CLO4-AQN	1	Ctrl Samp		
7	Vial 77	CLO4@ 10.ug/L	CLO4-AQN	1	Ctrl Samp		
8	Vial 78	CLO4@ 25.ug/L	CLO4-AQN	1	Ctrl Samp		
9	Vial 79	CLO4@ 50.ug/L	CLO4-AQN	1	Ctrl Samp		
10	Vial 80	CLO4@ 75.ug/L	CLO4-AQN	1	Ctrl Samp		
11	Vial 81	ICAL Verf@10ug/L	CLO4-AQN	1	Ctrl Samp		

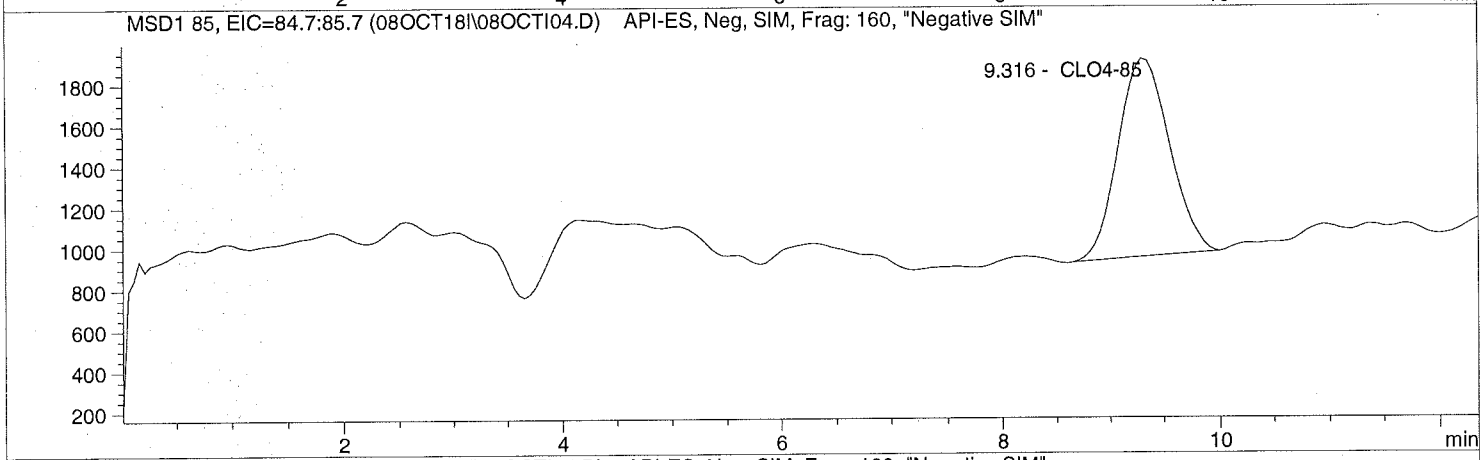
Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI04.D Sample Name: CLO4@ 1.0ug/L

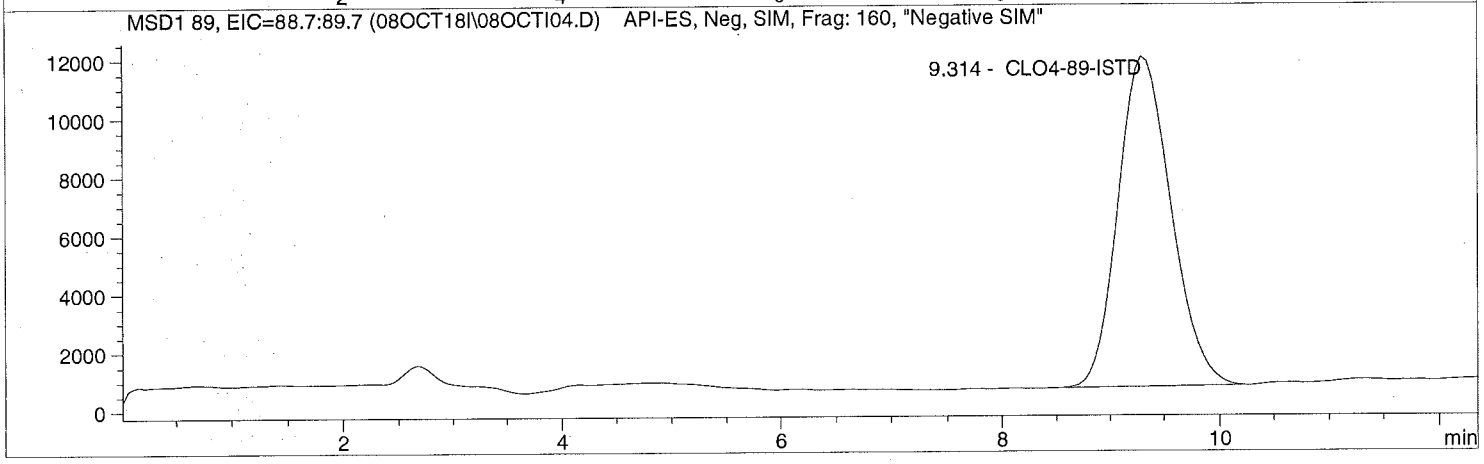
Injection Date:	10/08/2018 11:37:35	Seq Line:	4
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI04.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	10/08/2018 11:37:35	Seq Line:	4
Sample Name:	CLO4@ 1.0ug/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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.287	PBA	94079.0	0.9738	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.316	PBA	31798.7	0.9609	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.314	PBA	379544.7	5.0000	CLO4-89-ISTD

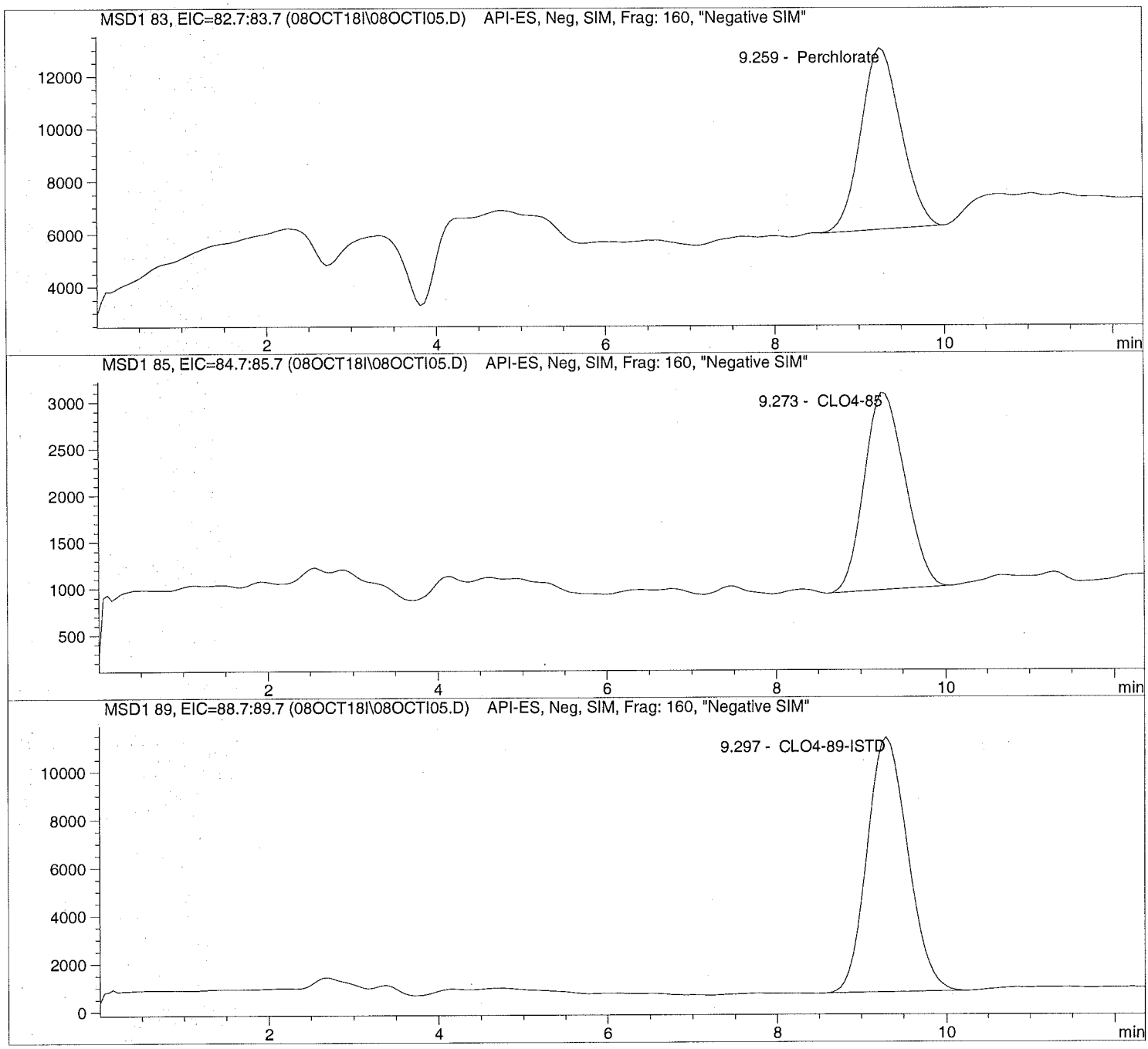
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI05.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	10/08/2018 11:51:45	Seq Line:	5
Sample Name:	CLO4@ 2.0ug/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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI05.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	10/08/2018 11:51:45	Seq Line:	5
Sample Name:	CLO4@ 2.0ug/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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.259	BBA	226957.1	2.1917	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.273	PBA	70543.6	2.1695	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.297	PBA	352581.8	5.0000	CLO4-89-ISTD

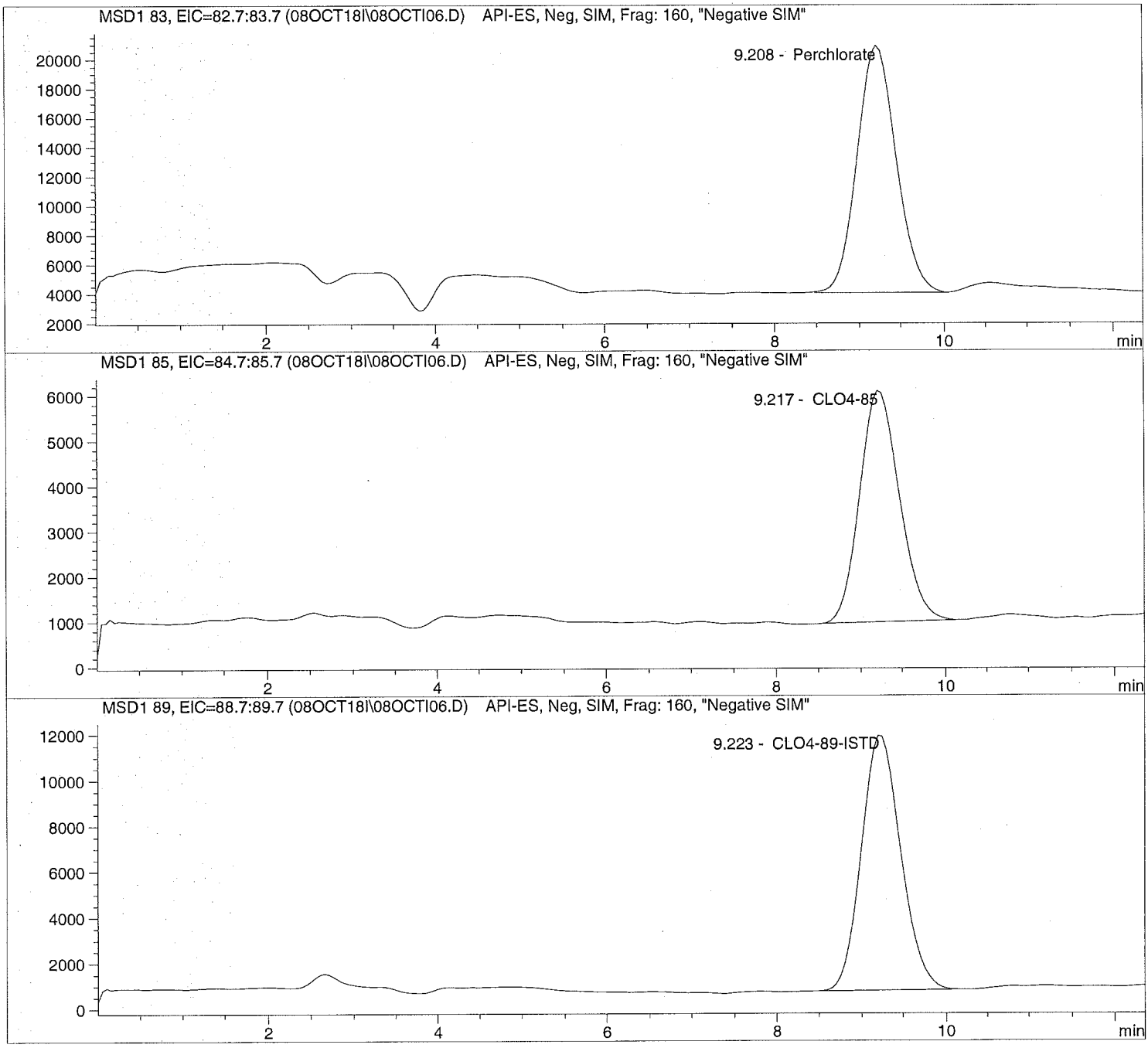
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI06.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	10/08/2018 12:05:59	Seq Line:	6
Sample Name:	CLO4@ 5.0ug/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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI06.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	10/08/2018 12:05:59	Seq Line:	6
Sample Name:	CLO4@ 5.0ug/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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.208	BBA	550306.9	4.8091	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.217	PBA	169833.3	4.8757	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.223	PBA	366804.8	5.0000	CLO4-89-ISTD

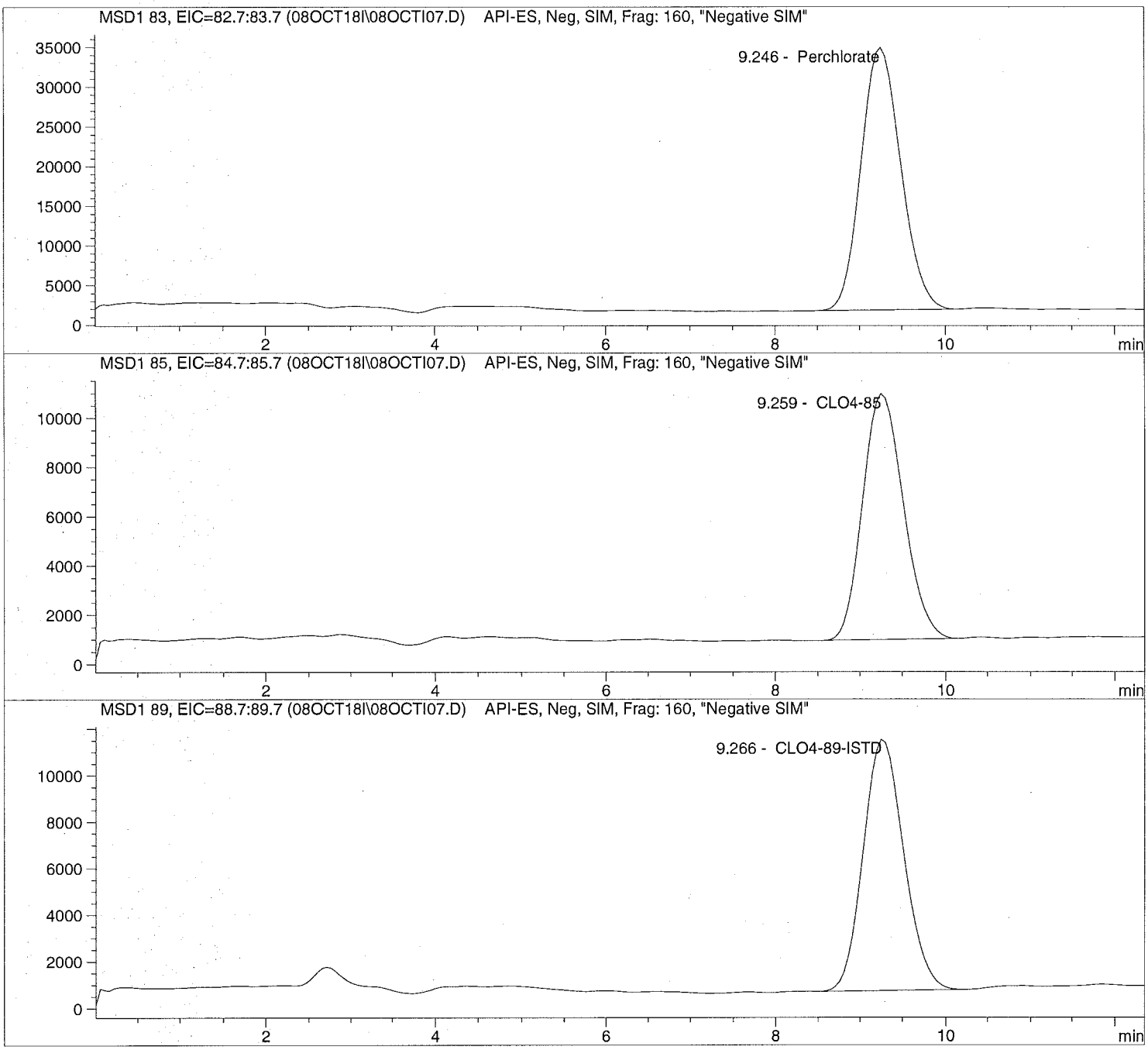
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI07.D Sample Name: CLO4@ 10.ug/L

Injection Date:	10/08/2018 12:20:10	Seq Line:	7
Sample Name:	CLO4@ 10.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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI07.D Sample Name: CLO4@ 10.ug/L

Injection Date:	10/08/2018 12:20:10	Seq Line:	7
Sample Name:	CLO4@ 10.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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.246	PBA	1076227.4	9.3829	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.259	PBA	331564.9	9.5873	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.266	PBA	356815.3	5.0000	CLO4-89-ISTD

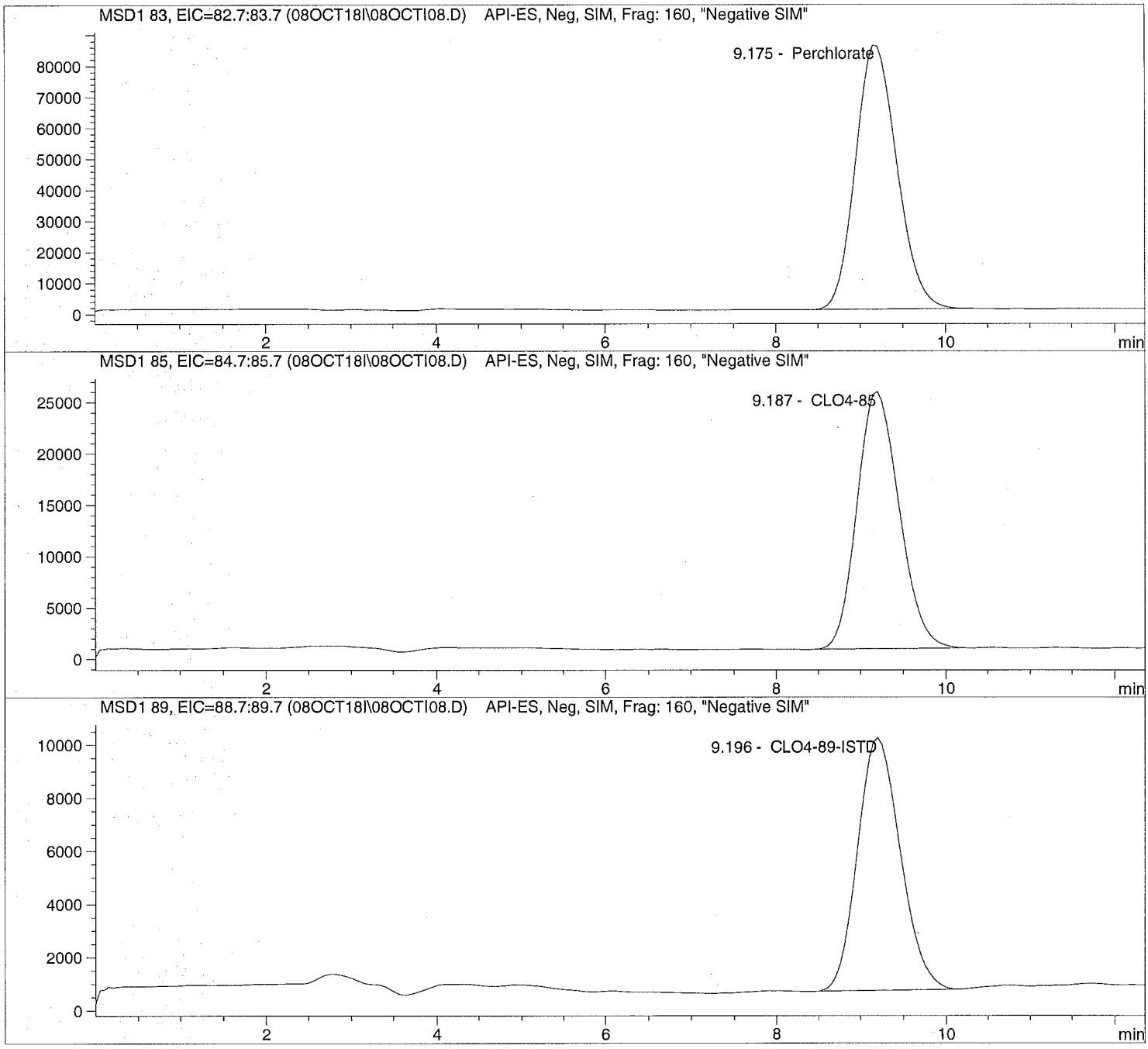
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI08.D Sample Name: CLO4@ 25.ug/L

Injection Date:	10/08/2018 12:34:24	Seq Line:	8
Sample Name:	CLO4@ 25.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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI08.D Sample Name: CLO4@ 25.ug/L

Injection Date:	10/08/2018 12:34:24	Seq Line:	8
Sample Name:	CLO4@ 25.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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.175	PBA	2880966.0	25.8304	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.187	PBA	862978.0	25.6268	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.196	PBA	332339.7	5.0000	CLO4-89-ISTD

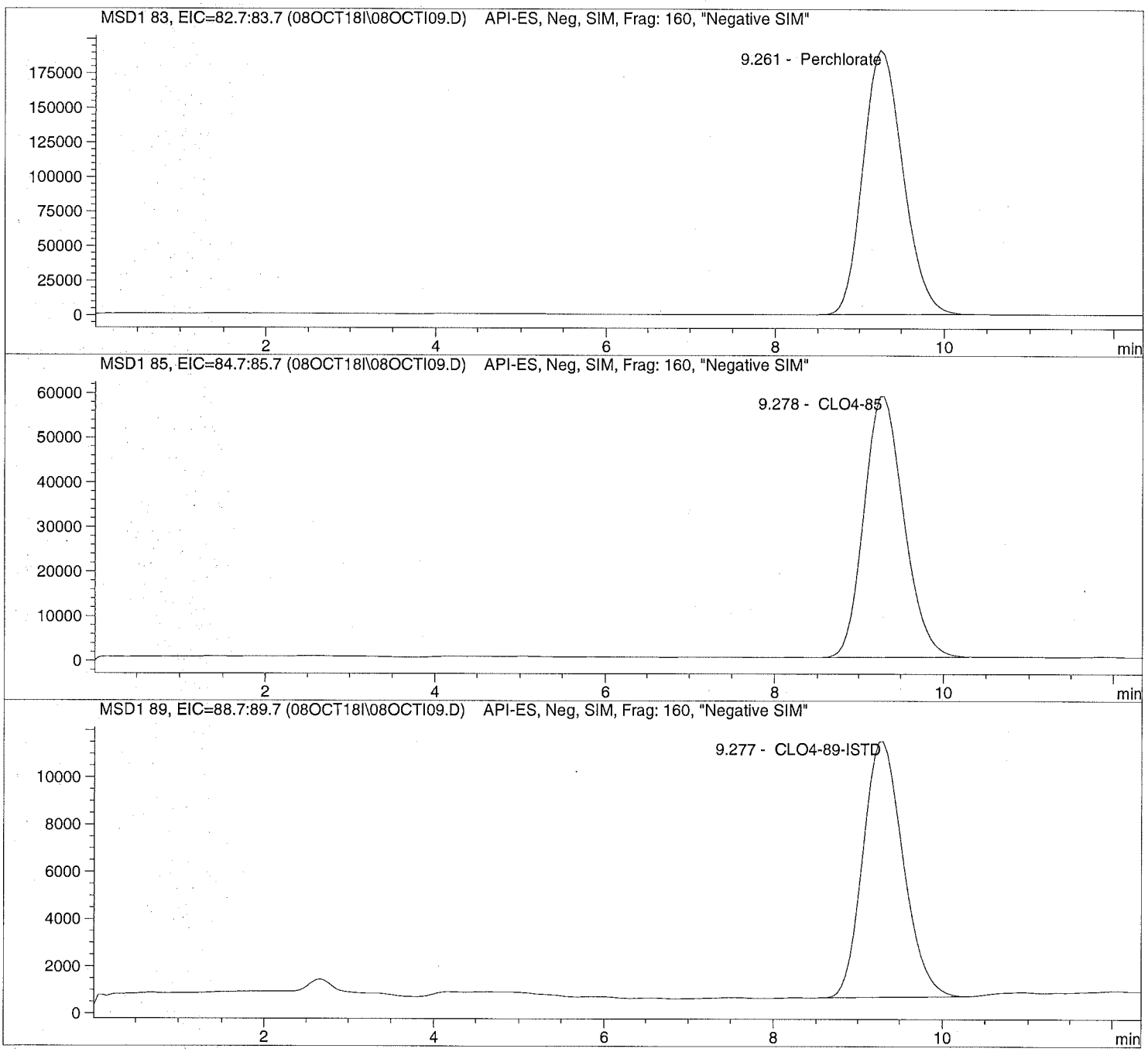
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI09.D Sample Name: CLO4@ 50.ug/L

Injection Date:	10/08/2018 12:48:34	Seq Line:	9
Sample Name:	CLO4@ 50.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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI09.D Sample Name: CLO4@ 50.ug/L

Injection Date:	10/08/2018 12:48:34	Seq Line:	9
Sample Name:	CLO4@ 50.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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	50.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.261	PBA	6295070.5	49.9198	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.278	PBA	1918466.9	49.7485	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.277	PBA	359392.8	5.0000	CLO4-89-ISTD

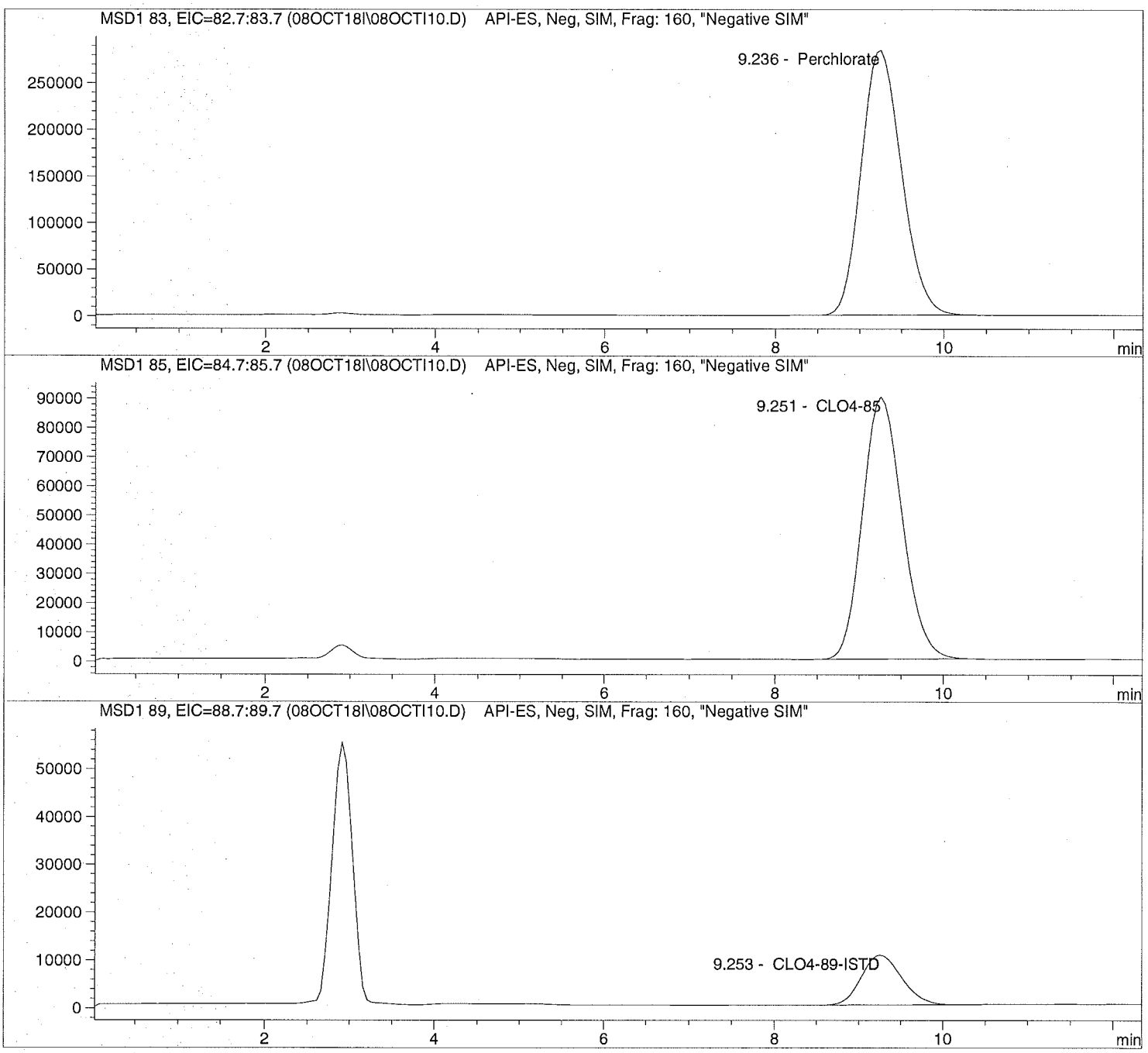
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI10.D Sample Name: CLO4@ 75.ug/L

Injection Date:	10/08/2018 13:02:48	Seq Line:	10
Sample Name:	CLO4@ 75.ug/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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI10.D Sample Name: CLO4@ 75.ug/L

Injection Date:	10/08/2018 13:02:48	Seq Line:	10
Sample Name:	CLO4@ 75.ug/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-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	75.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.236	PBA	9457367.0	74.8852	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.251	PBA	2938347.5	75.0265	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.253	PBA	345192.7	5.0000	CLO4-89-ISTD

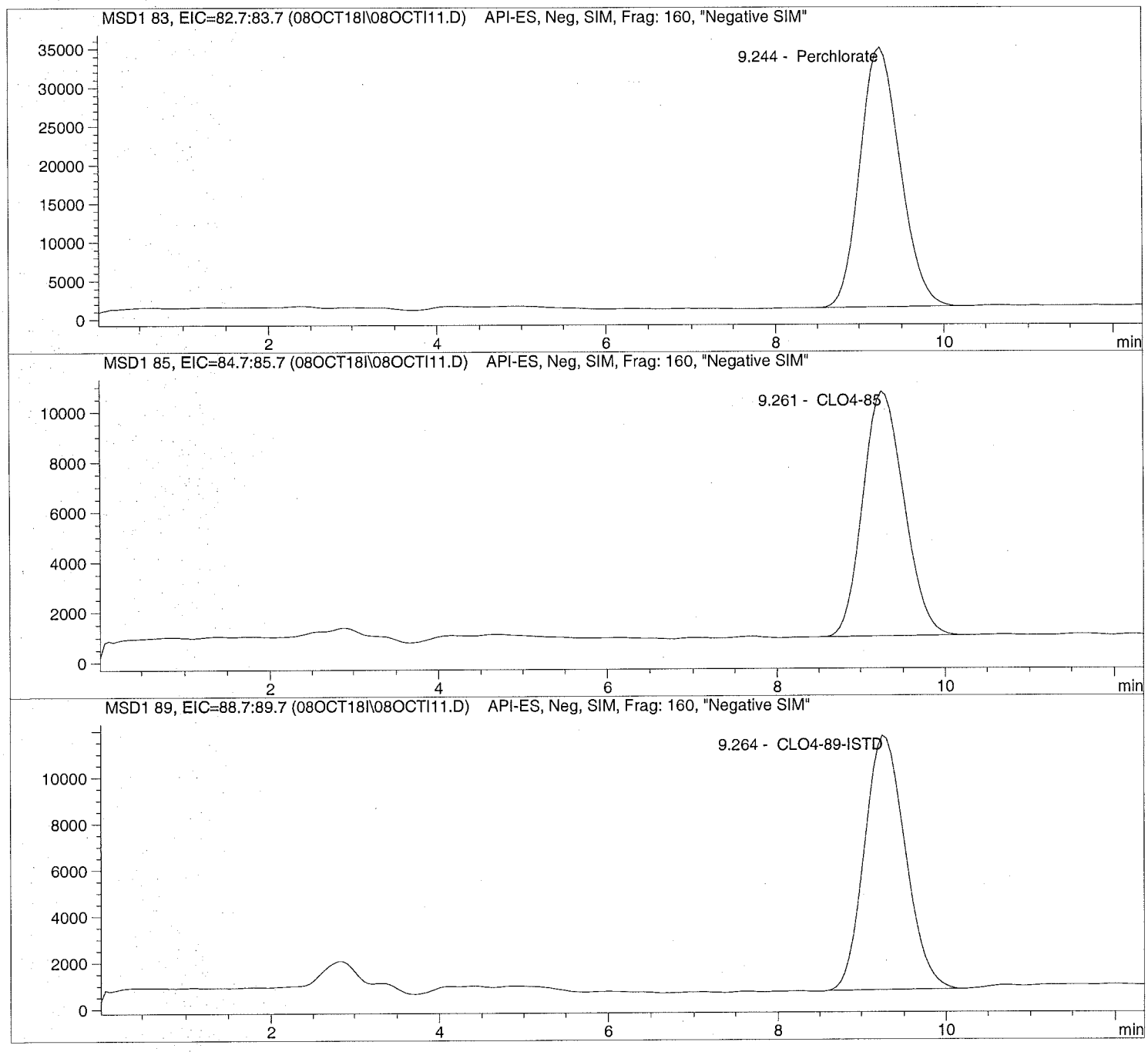
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI11.D Sample Name: ICAL Verf@10ug/L

Injection Date:	10/08/2018 13:17:00	Seq Line:	11
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08OCT18I\08OCTI11.D Sample Name: ICAL Verf@10ug/L

Injection Date:	10/08/2018 13:17:00	Seq Line:	11
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 10/9/2018 08:22:51

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Tue, 9. Oct. 2018, 08:01:57 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.244	PBA	1100685.7	9.3895	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.261	PBA	327974.4	9.2891	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.264	PBA	364657.2	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

November 27, 2019

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

Work Order: **HS19110320**

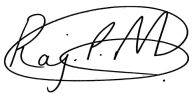
Laboratory Results for: **Longhorn Army Ammunition Plant**

Dear Susan,

ALS Environmental received 11 sample(s) on Nov 07, 2019 for the analysis presented in the following report.

This is a REVISED REPORT. Please see the Case Narrative for discussion concerning this revision.

Regards,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Work Order: HS19110320

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19110320-01	04WW02-191105	Water		05-Nov-2019 08:30	07-Nov-2019 14:00	☐
HS19110320-02	04WW02-191105-FD	Water		05-Nov-2019 08:30	07-Nov-2019 14:00	☐
HS19110320-03	LHSMW02-191105	Water		05-Nov-2019 09:55	07-Nov-2019 14:00	☐
HS19110320-04	04WW03-191106	Water		06-Nov-2019 08:20	07-Nov-2019 14:00	☐
HS19110320-05	04WW06-191106	Water		06-Nov-2019 09:10	07-Nov-2019 14:00	☐
HS19110320-06	04WW11-191106	Water		06-Nov-2019 09:55	07-Nov-2019 14:00	☐
HS19110320-07	04WW05-191106	Water		06-Nov-2019 10:45	07-Nov-2019 14:00	☐
HS19110320-08	04WW08-191106	Water		06-Nov-2019 11:35	07-Nov-2019 14:00	☐
HS19110320-09	04WW04-191106	Water		06-Nov-2019 12:20	07-Nov-2019 14:00	☐
HS19110320-10	LHSMW01-191106	Water		06-Nov-2019 13:15	07-Nov-2019 14:00	☐
HS19110320-11	Fire Station Well-191106	Water		06-Nov-2019 13:35	07-Nov-2019 14:00	☐

Client: Aptim Environmental & Infrastucture, Inc. **CASE NARRATIVE**
Project: Longhorn Army Ammunition Plant
Work Order: HS19110320

Work Order Comments

- Anions were missed by the lab, revised to report Nitrate/Nitrite and Sulfate.
  Nitrate/Nitrite preserved on 11/26/2019 per client request.
- The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.
- The analysis for TOC was subcontracted to ALS Kelso WA. Final report attached.

Wet Chemistry by Method SW9056

Batch ID: R351466

Sample ID: 04WW05-191106 (HS19110320-07)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes

Batch ID: R351465

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

WetChemistry by Method SM2320B

Batch ID: R350238

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW02-191105
Collection Date: 05-Nov-2019 08:30

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-01
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW02-191105-FD
Collection Date: 05-Nov-2019 08:30

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-02
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: LHSMW02-191105
Collection Date: 05-Nov-2019 09:55

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-03
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW03-191106
Collection Date: 06-Nov-2019 08:20

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-04
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW06-191106
Collection Date: 06-Nov-2019 09:10

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-05
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW11-191106
Collection Date: 06-Nov-2019 09:55

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-06
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW05-191106
Collection Date: 06-Nov-2019 10:45

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-07
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
ALKALINITY BY SM2320B		**Method:SM2320B**						Analyst: TH
Alkalinity, Total (As CaCO3)	**438**		**5.00**	**5.00**	**5.00**	**mg/L**	1	09-Nov-2019 18:54
ANIONS BY SW9056A		**Method:SW9056**						Analyst: KMU
Sulfate	**72.8**		**0.200**	**0.500**	**0.500**	**mg/L**	1	27-Nov-2019 10:54
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**						Analyst: KMU
Nitrogen, Nitrate-Nitrite	0.500	U	0.150	0.500	1.00	mg/L	5	27-Nov-2019 12:00
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	21-Nov-2019 16:31
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	25-Nov-2019 09:52

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW08-191106
Collection Date: 06-Nov-2019 11:35

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-08
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: 04WW04-191106
Collection Date: 06-Nov-2019 12:20

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-09
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: LHSMW01-191106
Collection Date: 06-Nov-2019 13:15

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-10
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
Sample ID: Fire Station Well-191106
Collection Date: 06-Nov-2019 13:35

ANALYTICAL REPORT
WorkOrder:HS19110320
Lab ID:HS19110320-11
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-Nov-2019 16:31

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

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
WorkOrder: HS19110320

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R350238 (0)	**Test Name :** ALKALINITY BY SM2320B				**Matrix:** Water	
HS19110320-07	04WW05-191106	06 Nov 2019 10:45			09 Nov 2019 18:54	1
Batch ID: R351046 (0)	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)				**Matrix:** Water	
HS19110320-01	04WW02-191105	05 Nov 2019 08:30			21 Nov 2019 16:31	1
HS19110320-02	04WW02-191105-FD	05 Nov 2019 08:30			21 Nov 2019 16:31	1
HS19110320-03	LHSMW02-191105	05 Nov 2019 09:55			21 Nov 2019 16:31	1
HS19110320-04	04WW03-191106	06 Nov 2019 08:20			21 Nov 2019 16:31	1
HS19110320-05	04WW06-191106	06 Nov 2019 09:10			21 Nov 2019 16:31	1
HS19110320-06	04WW11-191106	06 Nov 2019 09:55			21 Nov 2019 16:31	1
HS19110320-07	04WW05-191106	06 Nov 2019 10:45			21 Nov 2019 16:31	1
HS19110320-08	04WW08-191106	06 Nov 2019 11:35			21 Nov 2019 16:31	1
HS19110320-09	04WW04-191106	06 Nov 2019 12:20			21 Nov 2019 16:31	1
HS19110320-10	LHSMW01-191106	06 Nov 2019 13:15			21 Nov 2019 16:31	1
HS19110320-11	Fire Station Well-191106	06 Nov 2019 13:35			21 Nov 2019 16:31	1
Batch ID: R351196 (0)	**Test Name :** SUBCONTRACT ANALYSIS - TOC ANALYSIS				**Matrix:** Water	
HS19110320-07	04WW05-191106	06 Nov 2019 10:45			25 Nov 2019 09:52	1
Batch ID: R351465 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Water	
HS19110320-07	04WW05-191106	06 Nov 2019 10:45			27 Nov 2019 10:54	1
Batch ID: R351466 (0)	**Test Name :** NITRATE/NITRITE BY IC BY SW9056A				**Matrix:** Water	
HS19110320-07	04WW05-191106	06 Nov 2019 10:45			27 Nov 2019 12:00	5

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
WorkOrder: HS19110320

QC BATCH REPORT

Batch ID: R350238 (0) **Instrument: ManTech01** **Method: ALKALINITY BY SM2320B**

MBLK Sample ID: **WBLKW1-191109** Units: **mg/L** Analysis Date: **09-Nov-2019 16:34**
Client ID: Run ID: **ManTech01_350238** SeqNo: **5339051** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (As CaCO3)	5.00	5.00								U

LCS Sample ID: **LCS1-1911029** Units: **mg/L** Analysis Date: **09-Nov-2019 16:43**
Client ID: Run ID: **ManTech01_350238** SeqNo: **5339052** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (As CaCO3)	1014	5.00	1000	0	101	85 - 115				

LCSD Sample ID: **LCSD1-191109** Units: **mg/L** Analysis Date: **09-Nov-2019 16:51**
Client ID: Run ID: **ManTech01_350238** SeqNo: **5339053** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (As CaCO3)	1013	5.00	1000	0	101	85 - 115	1014	0.116	20	

DUP Sample ID: **HS19110347-01DUP** Units: **mg/L** Analysis Date: **09-Nov-2019 17:04**
Client ID: Run ID: **ManTech01_350238** SeqNo: **5339055** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (As CaCO3)	152.3	5.00					150.1	1.42	20	

The following samples were analyzed in this batch: HS19110320-07

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
WorkOrder: HS19110320

QC BATCH REPORT

Batch ID: R351465 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **WBLKW1-112619** Units: **mg/L** Analysis Date: **26-Nov-2019 18:46**
Client ID: Run ID: **ICS-Integrion_351465** SeqNo: **5365056** PrepDate: DF: **1**

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

LCS Sample ID: **WLCSW1-112619** Units: **mg/L** Analysis Date: **26-Nov-2019 19:02**
Client ID: Run ID: **ICS-Integrion_351465** SeqNo: **5365057** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	19.3	0.500	20	0	96.5	80 - 120				

LCSD Sample ID: **WLCSDW1-112619** Units: **mg/L** Analysis Date: **26-Nov-2019 19:19**
Client ID: Run ID: **ICS-Integrion_351465** SeqNo: **5365058** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	19.24	0.500	20	0	96.2	80 - 120	19.3	0.31	20	

MS Sample ID: **HS19111343-06MS** Units: **mg/L** Analysis Date: **26-Nov-2019 21:08**
Client ID: Run ID: **ICS-Integrion_351465** SeqNo: **5365062** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	45.49	0.500	10	37.09	84.0	80 - 120				

MS Sample ID: **HS19111189-03MS** Units: **mg/L** Analysis Date: **26-Nov-2019 22:48**
Client ID: Run ID: **ICS-Integrion_351465** SeqNo: **5365068** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	9.474	0.500	10	0.1582	93.2	80 - 120				

MSD Sample ID: **HS19111343-06MSD** Units: **mg/L** Analysis Date: **26-Nov-2019 21:25**
Client ID: Run ID: **ICS-Integrion_351465** SeqNo: **5365063** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	45.88	0.500	10	37.09	87.8	80 - 120	45.49	0.842	20	

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
WorkOrder: HS19110320

QC BATCH REPORT

Batch ID: R351465 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MSD Sample ID: **HS19111189-03MSD** Units: **mg/L** Analysis Date: **26-Nov-2019 23:04**
Client ID: Run ID: **ICS-Integrion_351465** SeqNo: **5365069** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	9.812	0.500	10	0.1582	96.5	80 - 120	9.474	3.51	20	

The following samples were analyzed in this batch: HS19110320-07

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
WorkOrder: HS19110320

QC BATCH REPORT

Batch ID: R351466 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY IC BY SW9056A**

MBLK Sample ID: **WBLKW1-112719** Units: **mg/L** Analysis Date: **27-Nov-2019 11:10**
Client ID: Run ID: **ICS-Integrion_351466** SeqNo: **5365082** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	0.100	0.200								U

LCS Sample ID: **WLCSW1-112719** Units: **mg/L** Analysis Date: **27-Nov-2019 11:27**
Client ID: Run ID: **ICS-Integrion_351466** SeqNo: **5365083** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.566	0.200	8	0	107	90 - 110				

LCSD Sample ID: **WLCSDW1-112719** Units: **mg/L** Analysis Date: **27-Nov-2019 11:44**
Client ID: Run ID: **ICS-Integrion_351466** SeqNo: **5365084** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.585	0.200	8	0	107	90 - 110	8.566	0.224	20	

MS Sample ID: **HS19110320-07MS** Units: **mg/L** Analysis Date: **27-Nov-2019 12:17**
Client ID: **04WW05-191106** Run ID: **ICS-Integrion_351466** SeqNo: **5365086** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	20.85	1.00	20	0	104	80 - 120				

MSD Sample ID: **HS19110320-07MSD** Units: **mg/L** Analysis Date: **27-Nov-2019 12:33**
Client ID: **04WW05-191106** Run ID: **ICS-Integrion_351466** SeqNo: **5365087** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	20.82	1.00	20	0	104	80 - 120	20.85	0.161	20	

The following samples were analyzed in this batch: HS19110320-07

Revision: 1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant
WorkOrder: **HS19110320**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

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

Unit Reported	Description
mg/L	Milligrams per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	19-028-0	27-Mar-2020
California	2919, 2019-2020	30-Apr-2020
Dept of Defense	ANAB L2231	20-Dec-2021
Florida	E87611-28	30-Jun-2020
Illinois	2000322019-2	09-May-2020
Kansas	E-10352 2019-2020	31-Jul-2020
Kentucky	123043, 2019-2020	30-Apr-2020
Louisiana	03087, 2019-2020	30-Jun-2020
Maryland	343, 2019-2020	30-Jun-2020
North Carolina	624-2019	31-Dec-2019
North Dakota	R-193 2019-2020	30-Apr-2020
Oklahoma	2019-067	31-Aug-2020
Texas	TX104704231-19-23	30-Apr-2020

Sample Receipt Checklist

Client Name: CBI-Houston
Work Order: HS19110320

Date/Time Received: **07-Nov-2019 14:00**
Received by: **PMG**

Checklist completed by: *Jared R. Makan* eSignature 7-Nov-2019 Date

Reviewed by: *RJ Modashia* eSignature 7-Nov-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):	0.7°C / 0.7°C UC/C	IR25
Cooler(s)/Kit(s):	42926	
Date/Time sample(s) sent to storage:	11/07/2019 14:40	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑

pH adjusted by:

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

APTIM

Page 1 of _____

COC ID: LHAAP04 Baseline Nov 2019 | TURNAROUND TIME: Standard | RUSH: No

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-50			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, Suite 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

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Sample Container and Preservatives	1-125ml /Cool to 6 deg C	1-250ml /Cool to 6 deg C	1-250ml /Cool to 6 deg C	2-40ml Amber/H2SO4						
									ANALYSIS	Perchlorate by SW6850	Anions (sulfate/nitrate/Nitrite) by SW9056	Alkalinity by SM2320B	TOC by SM5310C						
04WW02-191105	LHAAP 04				WG	11/5/19	0830	1		X									
04WW02-191105-FD	LHAAP 04				WG	11/5/19	0830	1		X									
LHSMW02-191105	LHAAP 04				WG	11/5/19	0955	1		X									
04WW03-191106	LHAAP 04				WG	11/6/19	0820	1		X									
04WW06-191106	LHAAP 04				WG	11/6/19	0910	1		X									
04WW11-191106	LHAAP 04				WG	11/6/19	0955	1		X									
04WW11-191106-MS	LHAAP 04				WG	11/6/19	0955	1		X									
04WW11-191106-MSD	LHAAP 04				WG	11/6/19	0955	1		X									
04WW05-191106	LHAAP 04				WG	11/6/19	1045	4		X	X	X	X						
04WW08-191106	LHAAP 04				WG	11/6/19	1135	1		X									
04WW04-191106	LHAAP 04				WG	11/6/19	1220	1		X									
LHSMW01-191106	LHAAP 04				WG	11/6/19	1315	1		X									
Fire Station well-191106	LHAAP 04				WG	11/6/19	1335	1		X									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	[illegible] BHATE	11/6/19 1400	ALS	11/7/19 08:42

HS19110320

Aptim Environmental & Infrastucture, Inc.
Longhorn Army Ammunition Plant

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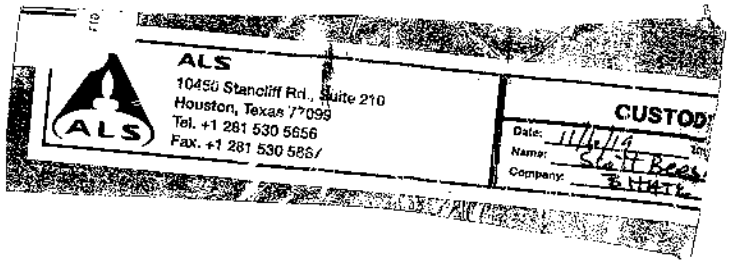
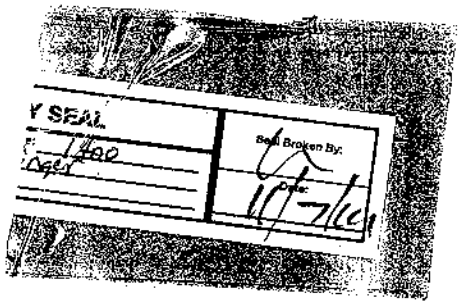

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5657
CUSTOD
Date:
Name:
Company: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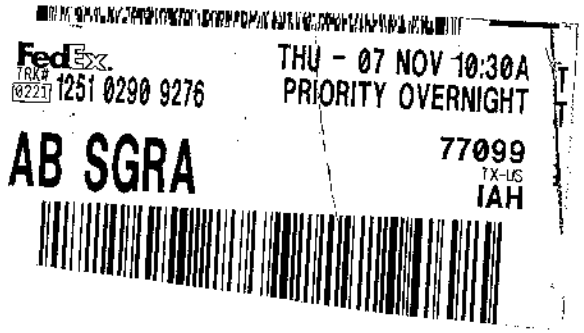
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ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

November 21, 2019

Analytical Report for Service Request No: K1910576

RJ Modashia
ALS Laboratory Group
10450 Stancliff Road
Suite 210
Houston, TX 77099-4338

RE: HS19110320

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory November 08, 2019
For your reference, these analyses have been assigned our service request number **K1910576.**

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
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

1317 South 13th Ave, Kelso, WA 98626 | 1-360-577-7222 | www.alsglobal.com

Client: ALS Environmental - US
Project: HS19110320
Sample Matrix: Water

Service Request: K1910576
Date Received: 11/08/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 11/08/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The sample was stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 11/21/2019

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

KI 910576

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

SAMPLING STATE: **Texas** **COC ID:** **12583**

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:	HS19110320
TSR:	Sonia West

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19110320-07**	**04WW05-191106**	**Water**	**06 Nov 2019 10:45**
	TOC Analysis with DOD Level IV/EQuIS APTIM EDD			21 Nov 2019

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

QC Level: DOD IV (DoD Data Package)

KI 910576

Relinquished By: _____ Date/Time: 11/7/19 1800

Received By: _____ Date/Time: 11/8/19 1000

Cooler ID(s): _____ Temperature(s): _____

PC KV

Cooler Receipt and Preservation Form

Client ALS - Houston Service Request *K19* 10576

Received: 11/8/19 Opened: 11/8/19 By: BR Unloaded: 11/8/19 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? 2 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
-0.2	0.1	—	—	+0.3	379		1Z51 0291 5190	

(NA) NA

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)636-1068
www.alsglobal.com

Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K1910576
Project:	HS19110320	**Date Collected:**	11/6/19
Sample Matrix:	Water	**Date Received:**	11/8/19
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
04WW05-191106	K1910576-001	**20.0**	0.50	0.20	0.07	1	11/16/19 05:06	
Method Blank	K1910576-MB	ND U	0.50	0.20	0.07	1	11/15/19 23:54	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1910576
Project	HS19110320	**Date Collected:**	11/06/19
Sample Matrix:	Water	**Date Received:**	11/08/19
		Date Analyzed:	11/16/19

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	04WW05-191106	**Units:**	mg/L
Lab Code:	K1910576-001	**Basis:**	NA

Analyte Name	Analysis Method	LOQ	LOD	MDL	Sample Result	Duplicate Sample K1910576-001DUP Result	Average	RPD	RPD Limit
Carbon, Total Organic	SM 5310 C	0.50	0.20	0.07	20.0	20.0	20.0	<1	10

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.

Client:	ALS Environmental - US	**Service Request:**	K1910576
Project:	HS19110320	**Date Analyzed:**	11/16/19
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:	660113

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1910576-LCS	24.8	25.0	99	83-117

Client: ALS Environmental - US **Service Request:** K1910576
Project: HS19110320

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	660113	KQ1916989-01	11/15/19 23:25	25.0	24.3	97	90-110
CCV2	660113	KQ1916989-02	11/16/19 04:08	25.0	24.6	99	90-110
CCV3	660113	KQ1916989-03	11/16/19 09:05	25.0	24.2	97	90-110
CCV4	660113	KQ1916989-04	11/16/19 13:50	25.0	23.7	95	90-110

Client: ALS Environmental - US **Service Request:**K1910576
Project: HS19110320

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	660113	KQ1916989-05	11/15/19 23:39	0.50	0.20	0.07	ND	U
CCB2	660113	KQ1916989-06	11/16/19 04:23	0.50	0.20	0.07	ND	U
CCB3	660113	KQ1916989-07	11/16/19 09:19	0.50	0.20	0.07	ND	U
CCB4	660113	KQ1916989-08	11/16/19 14:04	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
www.alsglobal.com

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Work Request # Original (K1910895, 160, 169, 187, 278, 332, 415, 473, 545, 547, 731, 473, 483, 561, 572, 576, 599, 254, 299, 760, 765)

Tier: II IV II I II I II II II IV I II II II II IV IV IV

Date Analyzed: 11/15/19

Analyst: BCP/BCP for HLM

Run # TOC: 660112, 660117, 660114, 660115

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
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: K1910160-3MS reports a low %Recovery due to suspected matrix interference.
K1910187-3/3d, 278-2/2d, 473-5/5d, 561-2/2d, 254-3/3d, 254-7/7d report a high %RSD. However, these samples are less than 5x the MRL.

Final Approved by: [signature] Date: 11/19/19

DQREPORT

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 660112 **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
K1910095-017	Carbon, Total Organic	N/A		Water	4.92 mg/L	10 mL	246 mg/L	50	4	25			11/15/19 15:25:00	N	II
K1910095-018	Carbon, Total Organic	N/A		Water	5.97 mg/L	10 mL	298 mg/L	50	4	25			11/15/19 15:53:00	N	II
K1910160-001	Carbon, Total Organic	N/A		Water	1.69 mg/L	10 mL	1.69 mg/L	1	0.07	0.50			11/15/19 16:36:00	N	IV
K1910160-002	Carbon, Total Organic	N/A		Water	1.38 mg/L	10 mL	1.38 mg/L	1	0.07	0.50			11/15/19 17:04:00	N	IV
K1910160-003	Carbon, Total Organic	N/A		Water	1.23 mg/L	10 mL	1.23 mg/L	1	0.07	0.50			11/15/19 17:32:00	N	IV
K1910169-001	Carbon, Total Organic	N/A		Ground Water	1.77 mg/L	10 mL	1.77 mg/L	1	0.07	0.50			11/15/19 18:44:00	N	II
K1910169-002	Carbon, Total Organic	N/A		Ground Water	3.51 mg/L	10 mL	3.51 mg/L	1	0.07	0.50			11/15/19 19:12:00	N	II
K1910169-003	Carbon, Total Organic	N/A		Ground Water	3.55 mg/L	10 mL	3.55 mg/L	1	0.07	0.50			11/15/19 19:40:00	N	II
K1910187-001	Carbon, Total Organic	N/A		Water	2.41 mg/L	10 mL	2.41 mg/L	1	0.07	0.50			11/15/19 20:08:00	N	I
K1910187-002	Carbon, Total Organic	N/A		Water	0.51 mg/L	10 mL	0.51 mg/L	1	0.07	0.50			11/15/19 20:36:00	N	I
K1910187-003	Carbon, Total Organic	N/A		Water	0.51 mg/L	10 mL	0.51 mg/L	1	0.07	0.50			11/15/19 21:04:00	N	I
K1910278-001	Carbon, Total Organic	N/A		Ground Water	3.33 mg/L	10 mL	3.33 mg/L	1	0.07	0.50			11/15/19 22:57:00	N	II
K1910278-002	Carbon, Total Organic	N/A		Ground Water	0.34 mg/L	10 mL	0.34 mg/L J	1	0.07	0.50			11/16/19 00:23:00	N	II
K1910332-001	Carbon, Total Organic	N/A		Drinking Water	0.37 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 21:32:00	N	I
K1910415-001	Carbon, Total Organic	N/A		Ocean Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 22:00:00	N	II
K1910473-001	Carbon, Total Organic	N/A		Ground Water	6.20 mg/L	10 mL	6.20 mg/L	1	0.07	0.50			11/16/19 00:51:00	N	II
K1910473-002	Carbon, Total Organic	N/A		Ground Water	6.32 mg/L	10 mL	6.32 mg/L	1	0.07	0.50			11/16/19 01:19:00	N	II
K1910473-003	Carbon, Total Organic	N/A		Ground Water	0.34 mg/L	10 mL	0.34 mg/L J	1	0.07	0.50			11/16/19 01:48:00	N	II
K1910545-001	Carbon, Total Organic	N/A		Water	1.83 mg/L	10 mL	1.83 mg/L	1	0.07	0.50			11/15/19 22:28:00	N	II
KQ1916988-01	Carbon, Total Organic	CCV		Water	24.50 mg/L	10 mL	24.5 mg/L	1					11/15/19 14:11:00	N	II
KQ1916988-02	Carbon, Total Organic	CCV		Water	24.74 mg/L	10 mL	24.7 mg/L	1					11/15/19 18:14:00	N	II
KQ1916988-03	Carbon, Total Organic	CCV		Water	24.27 mg/L	10 mL	24.3 mg/L	1					11/15/19 23:25:00	N	II
KQ1916988-04	Carbon, Total Organic	CCV		Water	24.63 mg/L	10 mL	24.6 mg/L	1					11/16/19 04:08:00	N	II
KQ1916988-05	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 14:26:00	N	II
KQ1916988-06	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 18:29:00	N	II
KQ1916988-07	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 23:39:00	N	II
KQ1916988-08	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 04:23:00	N	II
KQ1916988-09	Carbon, Total Organic	MB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 14:41:00	N	II
KQ1916988-10	Carbon, Total Organic	LCS		Water	25.27 mg/L	10 mL	25.3 mg/L	1	0.07	0.50	101		11/15/19 14:56:00	N	II
KQ1916988-11	Carbon, Total Organic	MS	K1910160-003	Water	21.53 mg/L	10 mL	21.5 mg/L	1	0.07	0.50	81*		11/15/19 18:00:00	N	IV
KQ1916988-12	Carbon, Total Organic	DUP	K1910095-017	Water	4.97 mg/L	10 mL	249 mg/L	50	4	25		1	11/15/19 15:25:00	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

Printed 11/19/19 15:15

Results Summary

11/19/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 660112 **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
KQ1916988-13	Carbon, Total Organic	DUP	K1910095-018	Water	6.04 mg/L	10 mL	302 mg/L	50	4	25		1	11/15/19 15:53:00	N	II
KQ1916988-15	Carbon, Total Organic	DUP	K1910160-002	Water	1.32 mg/L	10 mL	1.32 mg/L	1	0.07	0.50		5	11/15/19 17:04:00	N	IV
KQ1916988-16	Carbon, Total Organic	DUP	K1910160-001	Water	1.57 mg/L	10 mL	1.57 mg/L	1	0.07	0.50		7	11/15/19 16:36:00	N	IV
KQ1916988-17	Carbon, Total Organic	DUP	K1910160-003	Water	1.20 mg/L	10 mL	1.20 mg/L	1	0.07	0.50		2	11/15/19 17:32:00	N	IV
KQ1916988-18	Carbon, Total Organic	DUP	K1910169-001	Ground Water	1.78 mg/L	10 mL	1.78 mg/L	1	0.07	0.50		<1	11/15/19 18:44:00	N	II
KQ1916988-19	Carbon, Total Organic	DUP	K1910169-002	Ground Water	3.57 mg/L	10 mL	3.57 mg/L	1	0.07	0.50		2	11/15/19 19:12:00	N	II
KQ1916988-20	Carbon, Total Organic	DUP	K1910169-003	Ground Water	3.50 mg/L	10 mL	3.50 mg/L	1	0.07	0.50		2	11/15/19 19:40:00	N	II
KQ1916988-21	Carbon, Total Organic	DUP	K1910187-001	Water	2.39 mg/L	10 mL	2.39 mg/L	1	0.07	0.50		<1	11/15/19 20:08:00	N	I
KQ1916988-22	Carbon, Total Organic	DUP	K1910187-002	Water	0.50 mg/L	10 mL	0.50 mg/L	1	0.07	0.50		2	11/15/19 20:36:00	N	I
KQ1916988-23	Carbon, Total Organic	DUP	K1910187-003	Water	0.57 mg/L	10 mL	0.57 mg/L	1	0.07	0.50		11*	11/15/19 21:04:00	N	I
KQ1916988-24	Carbon, Total Organic	DUP	K1910278-001	Ground Water	3.20 mg/L	10 mL	3.20 mg/L	1	0.07	0.50		4	11/15/19 22:57:00	N	II
KQ1916988-25	Carbon, Total Organic	DUP	K1910278-002	Ground Water	0.24 mg/L	10 mL	0.24 mg/L J	1	0.07	0.50		37*	11/16/19 00:23:00	N	II
KQ1916988-26	Carbon, Total Organic	DUP	K1910332-001	Drinking Water	0.42 mg/L	10 mL	0.42 mg/L J	1	0.07	0.50		NC	11/15/19 21:32:00	N	I
KQ1916988-28	Carbon, Total Organic	DUP	K1910473-001	Ground Water	6.24 mg/L	10 mL	6.24 mg/L	1	0.07	0.50		<1	11/16/19 00:51:00	N	II
KQ1916988-29	Carbon, Total Organic	DUP	K1910473-002	Ground Water	6.33 mg/L	10 mL	6.33 mg/L	1	0.07	0.50		<1	11/16/19 01:19:00	N	II
KQ1916988-30	Carbon, Total Organic	DUP	K1910473-003	Ground Water	0.37 mg/L	10 mL	0.37 mg/L J	1	0.07	0.50		7	11/16/19 01:48:00	N	II
KQ1916988-31	Carbon, Total Organic	DUP	K1910545-001	Water	1.88 mg/L	10 mL	1.88 mg/L	1	0.07	0.50		3	11/15/19 22:28:00	N	II
KQ1916988-32	Carbon, Total Organic	DUP	K1910415-001	Ocean Water	0.02 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/15/19 22:00:00	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:** 660113 **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
K1910147-001	Carbon, Total Organic	N/A		Water	2.61 mg/L	10 mL	2.61 mg/L	1	0.07	0.50			11/16/19 12:53:00	N	IV
K1910331-001	Carbon, Total Organic	N/A		Water	8.66 mg/L	10 mL	866 mg/L	100	7	50			11/16/19 05:34:00	N	II
K1910331-002	Carbon, Total Organic	N/A		Water	9.22 mg/L	10 mL	922 mg/L	100	7	50			11/16/19 06:02:00	N	II
K1910331-003	Carbon, Total Organic	N/A		Water	7.00 mg/L	10 mL	700 mg/L	100	7	50			11/16/19 06:30:00	N	II
K1910473-004	Carbon, Total Organic	N/A		Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 02:16:00	N	II
K1910473-005	Carbon, Total Organic	N/A		Ground Water	0.74 mg/L	10 mL	0.74 mg/L	1	0.07	0.50			11/16/19 02:44:00	N	II
K1910473-006	Carbon, Total Organic	N/A		Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 03:12:00	N	II
K1910483-001	Carbon, Total Organic	N/A		Water	3.41 mg/L	10 mL	3.41 mg/L	1	0.07	0.50			11/16/19 03:40:00	N	II
K1910483-003	Carbon, Total Organic	N/A		Water	2.42 mg/L	10 mL	2.42 mg/L	1	0.07	0.50			11/16/19 04:38:00	N	II
K1910561-001	Carbon, Total Organic	N/A		Surface Water	12.22 mg/L	10 mL	122 mg/L	10	0.7	5.0			11/16/19 06:58:00	N	II
K1910561-002	Carbon, Total Organic	N/A		Surface Water	1.49 mg/L	10 mL	1.49 mg/L	1	0.07	0.50			11/16/19 07:26:00	N	II
K1910561-003	Carbon, Total Organic	N/A		Surface Water	4.36 mg/L	10 mL	8.7 mg/L	2	0.2	1.0			11/16/19 07:54:00	N	II
K1910572-001	Carbon, Total Organic	N/A		Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 08:22:00	N	II
K1910572-002	Carbon, Total Organic	N/A		Surface Water	0.01 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 10:05:00	N	II
K1910572-003	Carbon, Total Organic	N/A		Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 10:33:00	N	II
K1910572-004	Carbon, Total Organic	N/A		Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 11:01:00	N	II
K1910572-005	Carbon, Total Organic	N/A		Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 11:29:00	N	II
K1910572-006	Carbon, Total Organic	N/A		Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 11:57:00	N	II
K1910572-008	Carbon, Total Organic	N/A		Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 12:25:00	N	II
K1910576-001	Carbon, Total Organic	N/A		Water	20.04 mg/L	10 mL	20.0 mg/L	1	0.07	0.50			11/16/19 05:06:00	N	IV
KQ1916989-01	Carbon, Total Organic	CCV		Ground Water	24.27 mg/L	10 mL	24.3 mg/L	1					11/15/19 23:25:00	N	II
KQ1916989-02	Carbon, Total Organic	CCV		Ground Water	24.63 mg/L	10 mL	24.6 mg/L	1					11/16/19 04:08:00	N	II
KQ1916989-03	Carbon, Total Organic	CCV		Ground Water	24.21 mg/L	10 mL	24.2 mg/L	1					11/16/19 09:05:00	N	II
KQ1916989-04	Carbon, Total Organic	CCV		Ground Water	23.71 mg/L	10 mL	23.7 mg/L	1					11/16/19 13:50:00	N	II
KQ1916989-05	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 23:39:00	N	II
KQ1916989-06	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 04:23:00	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

11/19/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 660113 **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
KQ1916989-07	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 09:19:00	N	II
KQ1916989-08	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 14:04:00	N	II
KQ1916989-09	Carbon, Total Organic	MB		Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/15/19 23:54:00	N	II
KQ1916989-10	Carbon, Total Organic	LCS		Ground Water	24.76 mg/L	10 mL	24.8 mg/L	1	0.07	0.50	99		11/16/19 00:09:00	N	II
KQ1916989-11	Carbon, Total Organic	MS	K1910572-001	Surface Water	25.02 mg/L	10 mL	25.0 mg/L	1	0.07	0.50	100		11/16/19 08:50:00	N	II
KQ1916989-12	Carbon, Total Organic	DUP	K1910147-001	Water	2.59 mg/L	10 mL	2.59 mg/L	1	0.07	0.50		<1	11/16/19 12:53:00	N	IV
KQ1916989-13	Carbon, Total Organic	DUP	K1910331-001	Water	8.72 mg/L	10 mL	872 mg/L	100	7	50		<1	11/16/19 05:34:00	N	II
KQ1916989-14	Carbon, Total Organic	DUP	K1910331-002	Water	9.19 mg/L	10 mL	919 mg/L	100	7	50		<1	11/16/19 06:02:00	N	II
KQ1916989-15	Carbon, Total Organic	DUP	K1910473-004	Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 02:16:00	N	II
KQ1916989-16	Carbon, Total Organic	DUP	K1910473-005	Ground Water	0.62 mg/L	10 mL	0.62 mg/L	1	0.07	0.50		18*	11/16/19 02:44:00	N	II
KQ1916989-17	Carbon, Total Organic	DUP	K1910473-006	Ground Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 03:12:00	N	II
KQ1916989-18	Carbon, Total Organic	DUP	K1910483-003	Water	2.37 mg/L	10 mL	2.37 mg/L	1	0.07	0.50		2	11/16/19 04:38:00	N	II
KQ1916989-19	Carbon, Total Organic	DUP	K1910483-001	Water	3.31 mg/L	10 mL	3.31 mg/L	1	0.07	0.50		3	11/16/19 03:40:00	N	II
KQ1916989-20	Carbon, Total Organic	DUP	K1910331-003	Water	6.84 mg/L	10 mL	684 mg/L	100	7	50		2	11/16/19 06:30:00	N	II
KQ1916989-21	Carbon, Total Organic	DUP	K1910561-001	Surface Water	12.17 mg/L	10 mL	122 mg/L	10	0.7	5.0		<1	11/16/19 06:58:00	N	II
KQ1916989-22	Carbon, Total Organic	DUP	K1910561-002	Surface Water	1.28 mg/L	10 mL	1.28 mg/L	1	0.07	0.50		15*	11/16/19 07:26:00	N	II
KQ1916989-23	Carbon, Total Organic	DUP	K1910561-003	Surface Water	4.18 mg/L	10 mL	8.4 mg/L	2	0.2	1.0		4	11/16/19 07:54:00	N	II
KQ1916989-24	Carbon, Total Organic	DUP	K1910572-002	Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 10:05:00	N	II
KQ1916989-25	Carbon, Total Organic	DUP	K1910572-003	Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 10:33:00	N	II
KQ1916989-26	Carbon, Total Organic	DUP	K1910572-004	Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 11:01:00	N	II
KQ1916989-27	Carbon, Total Organic	DUP	K1910572-005	Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 11:29:00	N	II
KQ1916989-28	Carbon, Total Organic	DUP	K1910572-006	Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 11:57:00	N	II
KQ1916989-29	Carbon, Total Organic	DUP	K1910572-008	Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 12:25:00	N	II
KQ1916989-30	Carbon, Total Organic	DUP	K1910572-001	Surface Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/16/19 08:22:00	N	II
KQ1916989-31	Carbon, Total Organic	DUP	K1910576-001	Water	19.96 mg/L	10 mL	20.0 mg/L	1	0.07	0.50		<1	11/16/19 05:06:00	N	IV

# 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:** 660114 **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
K1910147-002	Carbon, Total Organic	N/A		Water	2.64 mg/L	10 mL	2.64 mg/L	1	0.07	0.50			11/16/19 13:22:00	N	IV
K1910147-006	Carbon, Total Organic	N/A		Water	3.06 mg/L	10 mL	3.06 mg/L	1	0.07	0.50			11/16/19 14:19:00	N	IV
K1910147-007	Carbon, Total Organic	N/A		Water	4.59 mg/L	10 mL	4.59 mg/L	1	0.07	0.50			11/16/19 14:47:00	N	IV
K1910199-001	Carbon, Total Organic	N/A		Water	1.80 mg/L	10 mL	1.80 mg/L	1	0.07	0.50			11/16/19 15:15:00	N	IV
K1910199-002	Carbon, Total Organic	N/A		Water	1.52 mg/L	10 mL	1.52 mg/L	1	0.07	0.50			11/16/19 15:43:00	N	IV
K1910199-003	Carbon, Total Organic	N/A		Water	1.23 mg/L	10 mL	1.23 mg/L	1	0.07	0.50			11/16/19 16:12:00	N	IV
K1910199-004	Carbon, Total Organic	N/A		Water	1.40 mg/L	10 mL	1.40 mg/L	1	0.07	0.50			11/16/19 16:40:00	N	IV
K1910199-007	Carbon, Total Organic	N/A		Water	1.93 mg/L	10 mL	1.93 mg/L	1	0.07	0.50			11/16/19 17:08:00	N	IV
K1910199-008	Carbon, Total Organic	N/A		Water	1.89 mg/L	10 mL	1.89 mg/L	1	0.07	0.50			11/16/19 17:36:00	N	IV
K1910199-010	Carbon, Total Organic	N/A		Water	1.51 mg/L	10 mL	1.51 mg/L	1	0.07	0.50			11/16/19 18:04:00	N	IV
K1910254-002	Carbon, Total Organic	N/A		Water	1.73 mg/L	10 mL	1.73 mg/L	1	0.07	0.50			11/16/19 19:46:00	N	IV
K1910254-003	Carbon, Total Organic	N/A		Water	0.99 mg/L	10 mL	0.99 mg/L	1	0.07	0.50			11/16/19 20:14:00	N	IV
K1910254-004	Carbon, Total Organic	N/A		Water	2.33 mg/L	10 mL	2.33 mg/L	1	0.07	0.50			11/16/19 20:42:00	Y	IV
K1910254-005	Carbon, Total Organic	N/A		Water	1.15 mg/L	10 mL	1.15 mg/L	1	0.07	0.50			11/16/19 21:39:00	N	IV
K1910254-006	Carbon, Total Organic	N/A		Water	28.09 mg/L	10 mL	28.1 mg/L	1	0.07	0.50			11/16/19 22:08:00	N	IV
K1910254-007	Carbon, Total Organic	N/A		Water	2.13 mg/L	10 mL	2.13 mg/L	1	0.07	0.50			11/16/19 22:36:00	N	IV
KQ1916990-01	Carbon, Total Organic	CCV		Water	24.21 mg/L	10 mL	24.2149 mg/L	1					11/16/19 09:05:00	N	IV
KQ1916990-02	Carbon, Total Organic	CCV		Water	23.71 mg/L	10 mL	23.7056 mg/L	1					11/16/19 13:50:00	N	IV
KQ1916990-03	Carbon, Total Organic	CCV		Water	23.93 mg/L	10 mL	23.9330 mg/L	1					11/16/19 18:47:00	N	IV
KQ1916990-04	Carbon, Total Organic	CCV		Water	23.87 mg/L	10 mL	23.8729 mg/L	1					11/16/19 23:04:00	N	IV
KQ1916990-05	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 09:19:00	N	IV
KQ1916990-06	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 14:04:00	N	IV
KQ1916990-07	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 19:02:00	N	IV
KQ1916990-08	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 23:18:00	N	IV
KQ1916990-09	Carbon, Total Organic	MB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 09:34:00	N	IV
KQ1916990-10	Carbon, Total Organic	LCS		Water	24.43 mg/L	10 mL	24.4 mg/L	1	0.07	0.50			11/16/19 09:49:00	N	IV
KQ1916990-11	Carbon, Total Organic	DUP	K1910147-002	Water	2.62 mg/L	10 mL	2.62 mg/L	1	0.07	0.50		<1	11/16/19 13:22:00	N	IV
KQ1916990-12	Carbon, Total Organic	DUP	K1910147-006	Water	2.99 mg/L	10 mL	2.99 mg/L	1	0.07	0.50		2	11/16/19 14:19:00	N	IV
KQ1916990-13	Carbon, Total Organic	DUP	K1910147-007	Water	4.39 mg/L	10 mL	4.39 mg/L	1	0.07	0.50		5	11/16/19 14:47:00	N	IV
KQ1916990-14	Carbon, Total Organic	DUP	K1910199-002	Water	1.53 mg/L	10 mL	1.53 mg/L	1	0.07	0.50		<1	11/16/19 15:43:00	N	IV
KQ1916990-15	Carbon, Total Organic	DUP	K1910199-003	Water	1.24 mg/L	10 mL	1.24 mg/L	1	0.07	0.50		1	11/16/19 16:12:00	N	IV
KQ1916990-16	Carbon, Total Organic	DUP	K1910199-004	Water	1.38 mg/L	10 mL	1.38 mg/L	1	0.07	0.50		1	11/16/19 16:40:00	N	IV
KQ1916990-17	Carbon, Total Organic	DUP	K1910199-007	Water	1.86 mg/L	10 mL	1.86 mg/L	1	0.07	0.50		4	11/16/19 17:08:00	N	IV
KQ1916990-18	Carbon, Total Organic	DUP	K1910199-008	Water	1.89 mg/L	10 mL	1.89 mg/L	1	0.07	0.50		<1	11/16/19 17:36:00	N	IV
KQ1916990-19	Carbon, Total Organic	DUP	K1910199-001	Water	1.83 mg/L	10 mL	1.83 mg/L	1	0.07	0.50		2	11/16/19 15:15:00	N	IV
KQ1916990-20	Carbon, Total Organic	DUP	K1910199-010	Water	1.59 mg/L	10 mL	1.59 mg/L	1	0.07	0.50		5	11/16/19 18:04:00	N	IV

# 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:** 660114 **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
KQ1916990-22	Carbon, Total Organic	DUP	K1910254-002	Water	1.59 mg/L	10 mL	1.59 mg/L	1	0.07	0.50		8	11/16/19 19:46:00	N	IV
KQ1916990-23	Carbon, Total Organic	DUP	K1910254-003	Water	1.11 mg/L	10 mL	1.11 mg/L	1	0.07	0.50		11*	11/16/19 20:14:00	N	IV
KQ1916990-24	Carbon, Total Organic	DUP	K1910254-004	Water	2.30 mg/L	10 mL	2.30 mg/L	1	0.07	0.50		1	11/16/19 20:42:00	N	IV
KQ1916990-25	Carbon, Total Organic	DUP	K1910254-005	Water	1.11 mg/L	10 mL	1.11 mg/L	1	0.07	0.50		3	11/16/19 21:39:00	N	IV
KQ1916990-26	Carbon, Total Organic	DUP	K1910254-006	Water	28.17 mg/L	10 mL	28.2 mg/L	1	0.07	0.50		<1	11/16/19 22:08:00	N	IV
KQ1916990-27	Carbon, Total Organic	DUP	K1910254-007	Water	1.84 mg/L	10 mL	1.84 mg/L	1	0.07	0.50		14*	11/16/19 22:36:00	N	IV
KQ1916990-28	Carbon, Total Organic	MS	K1910254-004	Water	27.79 mg/L	10 mL	27.8 mg/L	1	0.07	0.50			11/16/19 21:10:00	N	IV

# 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:** 660115 **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
K1910254-008	Carbon, Total Organic	N/A		Water	1.45 mg/L	10 mL	1.45 mg/L	1	0.07	0.50			11/16/19 23:33:00	N	IV
K1910299-001	Carbon, Total Organic	N/A		Water	7.30 mg/L	10 mL	7.30 mg/L	1	0.07	0.50			11/17/19 00:01:00	N	IV
K1910760-001	Carbon, Total Organic	N/A		Water	1.23 mg/L	10 mL	1.23 mg/L	1	0.07	0.50			11/17/19 02:22:00	N	IV
K1910765-001	Carbon, Total Organic	N/A		Ground Water	9.06 mg/L	10 mL	9.06 mg/L	1	0.07	0.50			11/17/19 00:29:00	N	IV
K1910765-002	Carbon, Total Organic	N/A		Ground Water	13.64 mg/L	10 mL	13.6 mg/L	1	0.07	0.50			11/17/19 00:58:00	N	IV
K1910765-003	Carbon, Total Organic	N/A		Ground Water	22.60 mg/L	10 mL	22.6 mg/L	1	0.07	0.50			11/17/19 01:26:00	N	IV
K1910765-004	Carbon, Total Organic	N/A		Ground Water	10.31 mg/L	10 mL	10.3 mg/L	1	0.07	0.50			11/17/19 01:54:00	N	IV
KQ1916991-01	Carbon, Total Organic	CCV		Water	23.87 mg/L	10 mL	23.9 mg/L	1					11/16/19 23:04:00	N	IV
KQ1916991-02	Carbon, Total Organic	CCV		Water	23.67 mg/L	10 mL	23.7 mg/L	1					11/17/19 03:33:00	N	IV
KQ1916991-03	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 23:18:00	N	IV
KQ1916991-04	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/17/19 03:48:00	N	IV
KQ1916991-05	Carbon, Total Organic	MB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/16/19 19:16:00	N	IV
KQ1916991-06	Carbon, Total Organic	LCS		Water	24.59 mg/L	10 mL	24.6 mg/L	1	0.07	0.50	98		11/16/19 19:31:00	N	IV
KQ1916991-07	Carbon, Total Organic	MS	K1910760-001	Water	25.85 mg/L	10 mL	25.8 mg/L	1	0.07	0.50	98		11/17/19 02:50:00	N	IV
KQ1916991-08	Carbon, Total Organic	DUP	K1910254-008	Water	1.42 mg/L	10 mL	1.42 mg/L	1	0.07	0.50		2	11/16/19 23:33:00	N	IV
KQ1916991-09	Carbon, Total Organic	DUP	K1910299-001	Water	7.01 mg/L	10 mL	7.01 mg/L	1	0.07	0.50		4	11/17/19 00:01:00	N	IV
KQ1916991-10	Carbon, Total Organic	DUP	K1910760-001	Water	1.12 mg/L	10 mL	1.12 mg/L	1	0.07	0.50		10	11/17/19 02:22:00	N	IV
KQ1916991-11	Carbon, Total Organic	DUP	K1910765-002	Ground Water	13.45 mg/L	10 mL	13.4 mg/L	1	0.07	0.50		1	11/17/19 00:58:00	N	IV
KQ1916991-12	Carbon, Total Organic	DUP	K1910765-001	Ground Water	8.90 mg/L	10 mL	8.90 mg/L	1	0.07	0.50		2	11/17/19 00:29:00	N	IV
KQ1916991-13	Carbon, Total Organic	DUP	K1910765-003	Ground Water	22.72 mg/L	10 mL	22.7 mg/L	1	0.07	0.50		<1	11/17/19 01:26:00	N	IV
KQ1916991-14	Carbon, Total Organic	DUP	K1910765-004	Ground Water	9.87 mg/L	10 mL	9.87 mg/L	1	0.07	0.50		4	11/17/19 01:54:00	N	IV

11/19/19

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

TOC660112
660113
660114
660115

Schedule: 11152019

Version: 15
Instrument: Fusion1
Last Saved by: Fusion1 (Fusion1)
Last Saved on: 2019/11/16 10:07 - Saturday

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	K1910095-017.08 50x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
4	Sample	K1910095-018.08 50x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
5	Sample	K1910157-001.02 25x	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
6	Sample	K1910160-001.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
7	Sample	K1910160-002.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
8	Sample	K1910160-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
9	Sample	K1910160-003.01 ms	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
10	Sample	K1910169-001.08	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
11	Sample	K1910169-002.08	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
12	Sample	K1910169-003.08	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
13	Sample	K1910187-001.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
14	Sample	K1910187-002.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
15	Sample	K1910187-003.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
16	Sample	K1910332-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
17	Sample	K1910415-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
18	Sample	K1910545-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
19	Sample	K1910278-001.08	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	K1910278-002.08	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
22	Sample	K1910473-001.13	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
23	Sample	K1910473-002.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
24	Sample	K1910473-003.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
25	Sample	K1910473-004.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
26	Sample	K1910473-005.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
27	Sample	K1910473-006.12	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
28	Sample	K1910483-001.01	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
29	Sample	K1910483-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
30	Sample	K1910576-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
31	Sample	K1910331-001.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
32	Sample	K1910331-002.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
33	Sample	K1910331-003.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
34	Sample	K1910561-001.15 10x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
35	Sample	K1910561-002.15	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
36	Sample	K1910561-003.14 2x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
37	Sample	K1910572-001.16	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
38	Sample	K1910572-001.16 ms	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

11/19/19

Schedule: 11152019

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 [25.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
40	Sample	K1910572-002.16	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
41	Sample	K1910572-003.15	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
42	Sample	K1910572-004.15	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
43	Sample	K1910572-005.15	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
44	Sample	K1910572-006.16	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
45	Sample	K1910572-008.15	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
46	Sample	K1910147-001.05	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
47	Sample	K1910147-002.05	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	K1910147-006.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
49	Sample	K1910147-007.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
50	Sample	K1910199-001.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
51	Sample	K1910199-002.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
52	Sample	K1910199-003.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
53	Sample	K1910199-004.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
54	Sample	K1910199-007.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
55	Sample	K1910199-008.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
56	Sample	K1910199-010.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
57	Sample	K1910254-001.04	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	True	Ready
C	Check Standard	[TOC] LCS [25.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
59	Sample	K1910254-002.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
60	Sample	K1910254-003.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
61	Sample	K1910254-004.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
62	Sample	K1910254-004.04 ms	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
63	Sample	rb	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
64	Sample	K1910254-005.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
65	Sample	K1910254-006.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
66	Sample	K1910254-007.04	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	K1910254-008.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
68	Sample	K1910299-001.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
69	Sample	K1910765-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
70	Sample	K1910765-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
71	Sample	K1910765-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
72	Sample	K1910765-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
73	Sample	K1910760-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
74	Sample	K1910760-001.01 ms	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
75	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 - 11152019
Friday, November 15, 2019 12:08 PM

(View - Reps, Unused Reps, Meta-Data, Signature, History)
Printed on 2019/11/19 09:11 - Tuesday

Report Summary Information

Company Location:	Gen Chem Lab		
Schedule Name:	11152019	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) (v4) Fusion1 (Fusion1) (v6) Fusion1 (Fusion1) (v7) Fusion1 (Fusion1) (v8) Fusion1 (Fusion1) (v10) Fusion1 (Fusion1) (v11) Fusion1 (Fusion1) (v13) Fusion1 (Fusion1) (v14) Fusion1 (Fusion1) (v15)		
Comment:			

Report Results

11/19/19

Sample Type: Clean — From Schedule Version 4

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/11/15 12:08

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	12.76	16.22	3.46	49.69	05:27
2	TC Clean	5.39	8.81	3.42	49.82	07:17
3	TC Clean	1.94	5.58	3.64	49.82	07:04
4	TC Clean	1.93	5.53	3.60	49.84	07:02

Sample Type: Clean — From Schedule Version 6

	Pos	Analysis Type	Sample ID	Start Time
◈	(clean)		Clean	2019/11/15 12:40

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	0.80	4.46	3.66	49.66	05:16

2	TC Clean	4.24	7.86	3.62	50.13	04:06
3	TC Clean	1.75	5.37	3.62	50.25	03:46
4	TC Clean	1.62	5.16	3.54	50.24	03:48

Sample Type: Clean — From Schedule Version 6

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/11/15 13:02

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	0.95	4.19	3.25	49.74	05:11
2	TC Clean	4.91	8.40	3.49	50.60	04:00
3	TC Clean	2.28	5.87	3.59	50.40	03:47
4	TC Clean	1.86	5.44	3.58	50.34	03:44

Sample Type: Blank (Creating v1320) — From Schedule Version 7

	Pos	Analysis Type	Sample ID	Start Time
◆	(blank)		Reagent/Acid Blank	2019/11/15 13:23

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	7.01	10.68	3.68	49.53	05:10
2	TC Clean	3.98	7.63	3.65	50.07	03:58
3	TC Clean	1.76	5.38	3.62	50.26	03:47
4	TC Clean	1.43	5.09	3.66	50.10	03:52
5	Reagent Blank	6.99	10.63	3.64	50.08	05:07
6	Acid Blank	1.76	5.53	3.77	49.64	05:30

Sample Type: Sample — From Schedule Version 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	D	TOC	RB	0.4469 ppm	0.0000 ppm	0.0000%	2019/11/15 13:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4469	4.4691	12.02	15.81	3.79	50.10	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.5004 ppm (PASS)	0.0000 ppm	0%	2019/11/15 14:11

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.5004	245.0044	175.77	179.74	3.97	50.15	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 8

	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%	2019/11/15 14:26

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	8.77	12.50	3.73	50.15	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 10

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	1	TOC	MB1	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/15 14:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.28	11.96	3.68	50.14	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — From Schedule Version 11

	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)	25.2718 ppm (PASS)	0.0000 ppm	0%	2019/11/15 14:56

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	25.2718	252.7180	181.01	184.83	3.83	50.15	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 11

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	2	TOC	ICS	0.2494 ppm	0.0000 ppm	0.0000%	2019/11/15 15:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2494	2.4936	10.68	14.48	3.81	50.15	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	3	TOC	K1910095-017.08 50x	4.9489 ppm	0.0367 ppm	0.7400%	2019/11/15 15:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.9229	49.2294	42.40	46.05	3.65	50.14	10:27
2	TOC	4.9748	49.7480	42.75	46.46	3.71	50.16	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	4	TOC	K1910095-018.08 50x	6.0030 ppm	0.0514 ppm	0.8600%	2019/11/15 15:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.9667	59.6670	49.48	53.06	3.57	50.17	10:29
2	TOC	6.0393	60.3933	49.98	53.65	3.67	50.17	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	5	TOC	K1910157-001.02 25x	4.0567 ppm	0.0000 ppm	0.0000%	2019/11/15 16:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.0567	40.5670	36.52	40.26	3.74	50.21	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	6	TOC	K1910160-001.02	1.6341 ppm	0.0855 ppm	5.2300%	2019/11/15 16:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6946	16.9457	20.48	23.99	3.50	50.21	10:28
2	TOC	1.5736	15.7362	19.66	23.40	3.74	50.22	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	7	TOC	K1910160-002.02	1.3500 ppm	0.0433 ppm	3.2100%	2019/11/15 17:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.3806	13.8063	18.35	22.02	3.67	50.22	10:27
2	TOC	1.3193	13.1934	17.94	21.58	3.64	50.22	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	8	TOC	K1910160-003.01	1.2163 ppm	0.0172 ppm	1.4100%	2019/11/15 17:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2284	12.2845	17.32	20.91	3.59	50.23	10:31
2	TOC	1.2041	12.0414	17.16	20.75	3.59	50.25	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	9	TOC	K1910160-003.01 ms	21.5289 ppm	0.0000 ppm	0.0000%	2019/11/15 18:00

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	21.5289	215.2886	155.12	158.72	3.60	50.22	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 11

	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%	2019/11/15 18:14

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	181.03	3.61	50.24	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 11

	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%	2019/11/15 18:29

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	7.97	11.50	3.53	50.27	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 11

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	10	TOC	K1910169-001.08	1.7747 ppm	0.0073 ppm	0.4100%	2019/11/15 18:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.7696	17.6955	20.99	24.65	3.66	50.27	10:25
2	TOC	1.7799	17.7987	21.06	24.79	3.73	50.24	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	11	TOC	K1910169-002.08	3.5395 ppm	0.0386 ppm	1.0900%	2019/11/15 19:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.5122	35.1220	32.82	36.70	3.88	50.26	10:26
2	TOC	3.5669	35.6686	33.19	36.76	3.56	50.26	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	12	TOC	K1910169-003.08	3.5263 ppm	0.0377 ppm	1.0700%	2019/11/15 19:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.5530	35.5301	33.10	36.72	3.62	50.26	10:27
2	TOC	3.4997	34.9968	32.74	36.33	3.59	50.26	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	13	TOC	K1910187-001.03	2.3984 ppm	0.0130 ppm	0.5400%	2019/11/15 20:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.4076	24.0760	25.32	29.11	3.78	50.30	10:30
2	TOC	2.3892	23.8918	25.20	28.77	3.57	50.28	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	14	TOC	K1910187-002.03	0.5055 ppm	0.0070 ppm	1.3800%	2019/11/15 20:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5104	5.1041	12.45	16.08	3.63	50.26	10:28
2	TOC	0.5005	5.0054	12.38	16.05	3.67	50.27	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	15	TOC	K1910187-003.03	0.5422 ppm	0.0431 ppm	7.9500%	2019/11/15 21:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5117	5.1173	12.46	16.08	3.62	50.26	10:31
2	TOC	0.5727	5.7273	12.87	16.45	3.58	50.26	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	16	TOC	K1910332-001.01	0.3940 ppm	0.0384 ppm	9.7600%	2019/11/15 21:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3668	3.6677	11.47	15.05	3.58	50.27	10:27
2	TOC	0.4211	4.2113	11.84	15.41	3.57	50.27	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	17	TOC	K1910415-001.01	0.0098 ppm	0.0106 ppm	108.2500%	2019/11/15 22:00

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0023	0.0230	9.00	12.60	3.60	50.25	10:27
2	TOC	0.0173	0.1733	9.10	12.69	3.59	50.29	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	18	TOC	K1910545-001.01	1.8523 ppm	0.0385 ppm	2.0800%	2019/11/15 22:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.8251	18.2509	21.37	25.07	3.69	50.27	10:32
2	TOC	1.8796	18.7960	21.74	25.24	3.50	50.25	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	19	TOC	K1910278-001.08	3.2661 ppm	0.0957 ppm	2.9300%	2019/11/15 22:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.3338	33.3380	31.61	35.17	3.56	50.28	10:26
2	TOC	3.1984	31.9841	30.69	34.18	3.49	50.25	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 11

	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)	24.2686 ppm (PASS)	0.0000 ppm	0%	2019/11/15 23:25

Pos	Base Analysis	ID	Rep	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run

	Type		#							Time
B	TOC	25 ppm	1	24.2686	242.6855	174.20	177.87	3.67	50.24	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 11

	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%	2019/11/15 23:39

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	6.87	10.59	3.72	50.23	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 11

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	20	TOC	MB2	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/15 23:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	6.26	9.99	3.73	50.23	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS From Schedule Version 11

	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)	24.7580 ppm (PASS)	0.0000 ppm	0%	2019/11/16 00:09

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.7580	247.5795	177.52	181.15	3.63	50.25	10:34

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 11

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	21	TOC	K1910278-002.08	0.2897 ppm	0.0752 ppm	25.9600%	2019/11/16 00:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3429	3.4291	11.31	14.96	3.65	50.23	10:29
2	TOC	0.2365	2.3654	10.59	14.37	3.78	50.25	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	22	TOC	K1910473-001.13	6.2195 ppm	0.0283 ppm	0.4600%	2019/11/16 00:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.1995	61.9947	51.06	54.70	3.64	50.20	10:28
2	TOC	6.2395	62.3954	51.34	55.03	3.69	50.22	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	23	TOC	K1910473-002.12	6.3251 ppm	0.0117 ppm	0.1800%	2019/11/16 01:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.3169	63.1688	51.86	55.39	3.52	50.22	10:27
2	TOC	6.3334	63.3338	51.97	55.71	3.74	50.27	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	24	TOC	K1910473-003.12	0.3568 ppm	0.0176 ppm	4.9300%	2019/11/16 01:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3444	3.4438	11.32	15.12	3.80	50.20	10:28
2	TOC	0.3693	3.6928	11.49	15.22	3.74	50.22	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	25	TOC	K1910473-004.12	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 02:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time

1	TOC	0.0000	0.0000	7.93	11.60	3.67	50.20	10:28
2	TOC	0.0000	0.0000	7.22	10.80	3.58	50.21	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	26	TOC	K1910473-005.12	0.6764 ppm	0.0841 ppm	12.4300%	2019/11/16 02:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7358	7.3581	13.98	17.62	3.64	50.18	10:30
2	TOC	0.6169	6.1692	13.17	16.93	3.76	50.18	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	27	TOC	K1910473-006.12	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 03:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	6.73	10.39	3.66	50.20	10:31
2	TOC	0.0000	0.0000	6.66	10.44	3.78	50.19	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	28	TOC	K1910483-001.01	3.3577 ppm	0.0669 ppm	1.9900%	2019/11/16 03:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4050	34.0495	32.10	35.66	3.56	50.21	10:31
2	TOC	3.3104	33.1037	31.45	35.28	3.83	50.22	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 11

	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)	24.6323 ppm (PASS)	0.0000 ppm	0%	2019/11/16 04:08

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.6323	246.3229	176.66	180.34	3.68	50.21	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 11

	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%	2019/11/16 04:23

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	6.45	10.17	3.71	50.24	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 11

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	29	TOC	K1910483-003.01	2.3901 ppm	0.0355 ppm	1.4900%	2019/11/16 04:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.4153	24.1526	25.38	28.86	3.48	50.20	10:28
2	TOC	2.3650	23.6502	25.04	28.74	3.70	50.23	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	30	TOC	K1910576-001.01	20.0038 ppm	0.0575 ppm	0.2900%	2019/11/16 05:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	20.0445	200.4446	145.04	148.74	3.70	50.22	10:30
2	TOC	19.9631	199.6314	144.49	148.32	3.83	50.23	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	31	TOC	K1910331-001.01 100x	8.6865 ppm	0.0435 ppm	0.5000%	2019/11/16 05:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.6557	86.5574	67.74	71.55	3.81	50.23	10:27

2	TOC	8.7173	87.1732	68.16	71.92	3.77	50.20	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	32	TOC	K1910331-002.01 100x	9.2041 ppm	0.0188 ppm	0.2000%	2019/11/16 06:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.2173	92.1732	71.55	75.19	3.64	50.19	10:28
2	TOC	9.1908	91.9080	71.37	75.00	3.63	50.18	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	33	TOC	K1910331-003.01 100x	6.9189 ppm	0.1166 ppm	1.6800%	2019/11/16 06:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.0013	70.0133	56.51	60.25	3.74	50.23	10:26
2	TOC	6.8365	68.3648	55.39	59.06	3.67	50.22	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	34	TOC	K1910561-001.15 10x	12.1977 ppm	0.0334 ppm	0.2700%	2019/11/16 06:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	12.2213	122.2132	91.94	95.61	3.67	50.22	10:30
2	TOC	12.1740	121.7403	91.62	95.40	3.78	50.21	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Sample From Schedule Version 13

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	35	TOC	K1910561-002.15	1.3849 ppm	0.1446 ppm	10.4400%	2019/11/16 07:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4871	14.8714	19.08	22.85	3.78	50.22	10:26
2	TOC	1.2827	12.8266	17.69	21.42	3.73	50.23	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC)	CAS_salt_010711	CAS_salt_010711

(v1320) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	36	TOC	K1910561-003.14 2x	4.2701 ppm	0.1282 ppm	3.0000%	2019/11/16 07:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.3608	43.6077	38.58	42.30	3.72	50.20	10:28
2	TOC	4.1794	41.7942	37.35	40.99	3.63	50.21	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	37	TOC	K1910572-001.16	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 08:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	7.22	10.80	3.57	50.25	10:28
2	TOC	0.0000	0.0000	6.60	10.17	3.57	50.28	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	38	TOC	K1910572-001.16 ms	25.0218 ppm	0.0000 ppm	0.0000%	2019/11/16 08:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.0218	250.2182	178.83	182.43	3.60	50.26	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 13

	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)	24.2149 ppm (PASS)	0.0000 ppm	0%	2019/11/16 09:05

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.2149	242.1493	173.83	177.36	3.53	50.24	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 13

	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%	2019/11/16 09:19

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	6.62	10.33	3.71	50.28	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 13

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	39	TOC	MB3	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 09:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	6.12	9.77	3.65	50.22	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS From Schedule Version 13

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	C	TOC	25.0000	1:1	[TOC] LCS [25.0 ppm]	0 / infinity (NA / NA)	24.4262 ppm (PASS)	0.0000 ppm	0%	2019/11/16 09:49

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.4262	244.2619	175.27	178.87	3.61	50.21	10:33

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 14

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	40	TOC	K1910572-002.16	0.0031 ppm	0.0044 ppm	141.4200%	2019/11/16 10:05

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time

1	TOC	0.0063	0.0628	9.02	12.56	3.53	50.19	10:26
2	TOC	0.0000	0.0000	8.21	11.78	3.57	50.21	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Sample

From Schedule Version 15

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	41	TOC	K1910572-003.15	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 10:33

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	7.12	10.60	3.48	50.21	10:27
2	TOC	0.0000	0.0000	7.16	10.64	3.49	50.21	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	42	TOC	K1910572-004.15	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 11:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	6.62	10.19	3.57	50.23	10:28
2	TOC	0.0000	0.0000	6.68	10.42	3.74	50.24	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	43	TOC	K1910572-005.15	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 11:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	6.56	10.22	3.66	50.27	10:29
2	TOC	0.0000	0.0000	6.90	10.35	3.45	50.27	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	44	TOC	K1910572-006.16	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 11:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.22	11.93	3.70	50.25	10:30
2	TOC	0.0000	0.0000	8.40	12.04	3.64	50.25	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	45	TOC	K1910572-008.15	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 12:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.44	11.97	3.53	50.25	10:27
2	TOC	0.0000	0.0000	8.27	11.78	3.51	50.25	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	46	TOC	K1910147-001.05	2.6001 ppm	0.0141 ppm	0.5400%	2019/11/16 12:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.6100	26.1001	26.70	30.36	3.66	50.25	10:31
2	TOC	2.5901	25.9013	26.56	30.27	3.71	50.25	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	47	TOC	K1910147-002.05	2.6326 ppm	0.0141 ppm	0.5300%	2019/11/16 13:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.6426	26.4257	26.92	30.45	3.53	50.24	10:30
2	TOC	2.6227	26.2268	26.78	30.30	3.52	50.28	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 15

	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)	23.7056 ppm (PASS)	0.0000 ppm	0%	2019/11/16 13:50

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.7056	237.0564	170.38	173.90	3.53	50.25	10:32

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria	Do Nothing	CAS_salt_010711	CAS_salt_010711	50 ppmC

met.	(v4)	(v30)

Sample Type: Check Standard --> CCB — From Schedule Version 15

	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%	2019/11/16 14:04

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	6.11	9.76	3.65	50.27	10:35

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 15

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	48	TOC	K1910147-006.04	3.0222 ppm	0.0485 ppm	1.6100%	2019/11/16 14:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.0565	30.5654	29.73	33.30	3.57	50.30	10:30
2	TOC	2.9879	29.8789	29.26	32.89	3.63	50.27	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	49	TOC	K1910147-007.04	4.4869 ppm	0.1435 ppm	3.2000%	2019/11/16 14:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.5884	45.8838	40.13	43.86	3.74	50.25	10:26
2	TOC	4.3854	43.8537	38.75	42.61	3.86	50.27	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	50	TOC	K1910199-001.04	1.8117 ppm	0.0221 ppm	1.2200%	2019/11/16 15:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.7961	17.9607	21.17	24.95	3.77	50.27	10:26
2	TOC	1.8273	18.2730	21.39	25.08	3.70	50.32	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	51	TOC	K1910199-002.04	1.5258 ppm	0.0105 ppm	0.6900%	2019/11/16 15:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5184	15.1837	19.29	22.78	3.49	50.25	10:29
2	TOC	1.5333	15.3325	19.39	22.89	3.50	50.24	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	52	TOC	K1910199-003.04	1.2318 ppm	0.0092 ppm	0.7400%	2019/11/16 16:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2254	12.2535	17.30	20.69	3.39	50.26	10:27
2	TOC	1.2383	12.3832	17.39	20.92	3.53	50.29	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	53	TOC	K1910199-004.04	1.3880 ppm	0.0127 ppm	0.9200%	2019/11/16 16:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.3970	13.9698	18.46	22.10	3.63	50.25	10:25
2	TOC	1.3790	13.7901	18.34	21.88	3.54	50.24	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	54	TOC	K1910199-007.04	1.8976 ppm	0.0515 ppm	2.7100%	2019/11/16 17:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.9340	19.3396	22.11	25.67	3.56	50.25	10:30
2	TOC	1.8612	18.6119	21.62	25.11	3.50	50.22	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	55	TOC	K1910199-008.04	1.8928 ppm	0.0022 ppm	0.1200%	2019/11/16 17:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.8943	18.9433	21.84	25.41	3.57	50.24	10:28
2	TOC	1.8912	18.9124	21.82	25.38	3.56	50.23	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	56	TOC	K1910199-010.04	1.5466 ppm	0.0566 ppm	3.6600%	2019/11/16 18:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5066	15.0659	19.21	22.81	3.60	50.25	10:29
2	TOC	1.5866	15.8658	19.75	23.11	3.36	50.25	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	57	TOC	K1910254-001.04	2.0643 ppm	0.0000 ppm	0.0000%	2019/11/16 18:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.0643	20.6434	22.99	26.69	3.70	50.28	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 15

	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)	23.9330 ppm (PASS)	0.0000 ppm	0%	2019/11/16 18:47

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.9330	239.3296	171.92	175.42	3.50	50.25	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 15

	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	0.0000 ppm	0%	2019/11/16 19:02

							(PASS)			

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	5.78	9.45	3.66	50.24	10:34

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 15

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	58	TOC	MB4	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 19:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.29	8.80	3.51	50.26	10:33

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — From Schedule Version 15

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◈	C	TOC	25.0000	1:1	[TOC] LCS [25.0 ppm]	0 / infinity (NA / NA)	24.5930 ppm (PASS)	0.0000 ppm	0%	2019/11/16 19:31

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.5930	245.9295	176.40	179.86	3.46	50.26	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 15

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	59	TOC	K1910254-002.04	1.6585 ppm	0.0964 ppm	5.8100%	2019/11/16 19:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.7267	17.2668	20.70	24.27	3.57	50.28	10:30
2	TOC	1.5904	15.9041	19.78	23.42	3.64	50.25	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC)	CAS_salt_010711	CAS_salt_010711

(v1320) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	60	TOC	K1910254-003.04	1.0469 ppm	0.0839 ppm	8.0100%	2019/11/16 20:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9876	9.8758	15.69	19.40	3.72	50.25	10:29
2	TOC	1.1062	11.0617	16.49	20.11	3.61	50.24	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	61	TOC	K1910254-004.04	2.3140 ppm	0.0238 ppm	1.0300%	2019/11/16 20:42

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.3308	23.3084	24.80	28.50	3.69	50.24	10:30
2	TOC	2.2973	22.9725	24.58	27.88	3.30	50.26	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	62	TOC	K1910254-004.04 ms	27.7911 ppm	0.0000 ppm	0.0000%	2019/11/16 21:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.7911	277.9114	197.63	201.14	3.51	50.25	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	63	TOC	rb	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/16 21:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.64	9.30	3.66	50.26	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	64	TOC	K1910254-005.04	1.1292 ppm	0.0235 ppm	2.0800%	2019/11/16 21:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.1458	11.4580	16.76	20.42	3.66	50.25	10:26
2	TOC	1.1125	11.1251	16.53	20.33	3.79	50.24	10:27

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	65	TOC	K1910254-006.04	28.1311 ppm	0.0561 ppm	0.2000%	2019/11/16 22:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	28.0914	280.9138	199.67	203.23	3.56	50.25	10:25
2	TOC	28.1708	281.7079	200.20	204.08	3.88	50.24	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	66	TOC	K1910254-007.04	1.9818 ppm	0.2031 ppm	10.2500%	2019/11/16 22:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.1255	21.2548	23.41	27.00	3.59	50.28	10:27
2	TOC	1.8382	18.3820	21.46	24.95	3.49	50.25	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 15

	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)	23.8729 ppm (PASS)	0.0000 ppm	0%	2019/11/16 23:04

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.8729	238.7285	171.51	175.00	3.49	50.24	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 15

	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%	2019/11/16 23:18

Pos	Base Analysis	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

	Type									
D	TOC	0 ppm	1	0.0000	0.0000	6.38	9.91	3.53	50.26	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 15

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	67	TOC	K1910254-008.04	1.4375 ppm	0.0190 ppm	1.3200%	2019/11/16 23:33

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4509	14.5090	18.83	22.51	3.68	50.25	10:28
2	TOC	1.4241	14.2409	18.65	22.21	3.56	50.31	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	68	TOC	K1910299-001.03	7.1545 ppm	0.2045 ppm	2.8600%	2019/11/17 00:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.2991	72.9907	58.53	62.07	3.54	50.24	10:30
2	TOC	7.0099	70.0988	56.57	60.19	3.63	50.26	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	69	TOC	K1910765-001.01	8.9810 ppm	0.1088 ppm	1.2100%	2019/11/17 00:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.0579	90.5792	70.47	73.94	3.47	50.27	10:31
2	TOC	8.9041	89.0412	69.42	73.00	3.58	50.23	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	70	TOC	K1910765-002.01	13.5412 ppm	0.1337 ppm	0.9900%	2019/11/17 00:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	13.6357	136.3574	101.54	105.14	3.60	50.23	10:28
2	TOC	13.4467	134.4673	100.26	104.04	3.78	50.25	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	71	TOC	K1910765-003.01	22.6620 ppm	0.0885 ppm	0.3900%	2019/11/17 01:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	22.5994	225.9944	162.39	166.08	3.69	50.23	10:26
2	TOC	22.7247	227.2466	163.24	166.80	3.56	50.12	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	72	TOC	K1910765-004.01	10.0901 ppm	0.3055 ppm	3.0300%	2019/11/17 01:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	10.3062	103.0616	78.94	82.74	3.80	50.11	10:30
2	TOC	9.8741	98.7407	76.01	79.77	3.76	50.16	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	73	TOC	K1910760-001.01	1.1733 ppm	0.0796 ppm	6.7800%	2019/11/17 02:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2296	12.2963	17.33	20.90	3.57	50.08	10:28
2	TOC	1.1171	11.1707	16.57	20.17	3.61	50.20	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	74	TOC	K1910760-001.01 ms	25.8462 ppm	0.0000 ppm	0.0000%	2019/11/17 02:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.8462	258.4622	184.42	187.91	3.49	50.11	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	75	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/17 03:05

Rep	Base			Adjusted		Baseline	Pressure	Run

#	Analysis Type	ppm	µg	(Abs)	NDIR (Abs)	(Abs)	(psig)	Time
1	TOC	0.0000	0.0000	6.30	9.69	3.39	50.09	10:28
2	TOC	0.0000	0.0000	5.64	9.26	3.62	50.11	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.9824 (IC) (v1320)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 15

	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)	23.6725 ppm (PASS)	0.0000 ppm	0%	2019/11/17 03:33

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.6725	236.7250	170.15	173.77	3.62	50.15	10:35

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 15

	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%	2019/11/17 03:48

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	5.73	9.31	3.58	50.18	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

Meta Data Used in this Report

Blanks

Version	Reagent (Abs)	Acid (Abs)	DI IC (Abs)	DI TC (Abs)	DI TOC (Abs)	Save Time	Operator
v1319	0.9217	1.0210	0.0000	0.0000	0.0000	2019/11/13 13:58	Fusion1 (Fusion1)
v1320	2.3307	1.7570	0.0000	0.0000	0.0000	2019/11/15 13:57	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
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	2019/11/17 04:03

StarLIMS Run: 660112, 660113, 660114, 660115

Analysis: DOC/TOC

Method: SM 5310 C, 9060A, 415.1, 9060

CCV: 11-GEN-05-82C 50 ppm LCS: 11-GEN-05-79J 25.0 ppm

ICAL Date: 3/6/19

ICAL ID: 11-GEN-05-76H

ICS ID: 11-GEN-05-78M

ICS TV: 25.0 ppm ICS % R < 1

Spike ID: 11-GEN-05-82C 0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-83A

21 % H3PO4: 11-GEN-05-82G

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, 129001F, N11314F, Marge

FILTER ID: 16967789

Analyzed By: BK	Date Analyzed: 11/15/19
Reviewed By:	Date Reviewed: 11/19/19

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1931753; 1932010

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2319 (252142)

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

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

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

Holding Times: Holding times were met for all analyses.

Dilutions: NA

Method QC data: The method blank (LMB 684808) was less than 1/2 the CRDL. The recovery for the LCS (684805) was within acceptable parameters.

MS/MSD Analysis: MS/MSD was performed on samples 1931753007/08 (Client ID: 04WW11-191106). 3.0µL of Working Standard Solution Horizon ID 49947 was added to 10.0mL of sample preparation. The spike target was 3.µg/L. The MS/MSD (684133/34) 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 – 684806) is reported from the analysis of the Laboratory Control Sample (LCS – 684805) at a level of 3.0µg/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: 20SEPI03) along with datafile 19OCT19D02.

Thomas Bosch November 20, 2019
Analyst Date

ANALYTICAL REPORT

Report Date: November 21, 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: **34-1931753**
Project ID: HS19110320
Purchase Order: HS19110320
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
04WW02-191105	1931753001	11/05/19	11/08/19	
04WW02-191105-FD	1931753002	11/05/19	11/08/19	
LHSMW02-191105	1931753003	11/05/19	11/08/19	
04WW03-191106	1931753004	11/06/19	11/08/19	
04WW06-191106	1931753005	11/06/19	11/08/19	
04WW11-191106	1931753006	11/06/19	11/08/19	
04WW05-191106	1931753009	11/06/19	11/08/19	
04WW08-191106	1931753010	11/06/19	11/08/19	
04WW04-191106	1931753011	11/06/19	11/08/19	
LHSMW01-191106	1931753012	11/06/19	11/08/19	
Fire Station Well-191106	1931753013	11/06/19	11/08/19	

Client QC ID *	Lab ID	Collect Date	Receive Date	Sampling Site
04WW11-191106MS	1931753007	11/06/19	11/08/19	
04WW11-191106MSD	1931753008	11/06/19	11/08/19	

***Client QC is reported as part of the Quality Control results report, if requested.**

ANALYTICAL REPORT

Workorder: 34-1931753
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **04WW02-191105** | Sampling Site: NA | Collected: 11/05/2019
Lab ID: 1931753001 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 09:45 | **Report Basis:** Wet

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

Sample ID: **04WW02-191105-FD** | Sampling Site: NA | Collected: 11/05/2019
Lab ID: 1931753002 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 09:59 | **Report Basis:** Wet

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

Sample ID: **LHSMW02-191105** | Sampling Site: NA | Collected: 11/05/2019
Lab ID: 1931753003 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 10:13 | **Report Basis:** Wet

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

Sample ID: **04WW03-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753004 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 10:27 | **Report Basis:** Wet

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

ANALYTICAL REPORT

Workorder: 34-1931753
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **04WW06-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753005 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 10:41 | **Report Basis:** Wet

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

Sample ID: **04WW11-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753006 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 10:55 | **Report Basis:** Wet

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

Sample ID: **04WW05-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753009 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 11:36 | **Report Basis:** Wet

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

Sample ID: **04WW08-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753010 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 11:50 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**13**	1.0	2.0	4.0	1	

ANALYTICAL REPORT

Workorder: 34-1931753
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **04WW04-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753011 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 12:17 | **Report Basis:** Wet

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

Sample ID: **LHSMW01-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753012 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 12:31 | **Report Basis:** Wet

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

Sample ID: **Fire Station Well-191106** | Sampling Site: NA | Collected: 11/06/2019
Lab ID: 1931753013 | Media: 125 mL Nalgene | Received: 11/08/2019
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/2319 (HBN: 252142) | **%Solids:** NA
Analyzed: 11/19/2019 12:45 | **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 11/19/2019 17:26	/S/ Stephen Brose 11/21/2019 07:07

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: 34-1931753
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
	Iowa (TNI)	IA# 376	http://www.shl.uiowa.edu/labcert/idnr/
	Kansas	E-10416	http://www.kdheks.gov/envlab/disclaimer.html
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: 1931753

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850, DoD QSM
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2319 (HBN: 252142)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 684808
Analyzed: 11/19/2019 09:32
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 684805
Analyzed: 11/19/2019 09:04
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	2.81	3.00	93.7	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample:	1931753006	**MS:**	1931753007	**MSD:**	1931753008
Analyzed:	11/19/2019 10:55	**Analyzed:**	11/19/2019 11:08	**Analyzed:**	11/19/2019 11:22
Dilution:	1	**Dilution:**	1	**Dilution:**	1
Units:	ug/L	**Units:**	ug/L	**Units:**	ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	2.72	3	90.7	78.8	123.8	2.94	98.1	7.82	0.0	20.0

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

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
11/20/2019 12:46	11/21/2019 07:07

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

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

18698/#2

SAMPLING STATE: **Texas**

COC ID: **12582**

1931753

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:	HS19110320
TSR:	Sonia West

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19110320-01**	**04WW02-191105**	**Water**	**05 Nov 2019 08:30**
	SUB_Perch-6850			21 Nov 2019
2.	**HS19110320-02**	**04WW02-191105-FD**	**Water**	**05 Nov 2019 08:30**
	SUB_Perch-6850			21 Nov 2019
3.	**HS19110320-03**	**LHSMW02-191105**	**Water**	**05 Nov 2019 09:55**
	SUB_Perch-6850			21 Nov 2019
4.	**HS19110320-04**	**04WW03-191106**	**Water**	**06 Nov 2019 08:20**
	SUB_Perch-6850			21 Nov 2019
5.	**HS19110320-05**	**04WW06-191106**	**Water**	**06 Nov 2019 09:10**
	SUB_Perch-6850			21 Nov 2019
6.	**HS19110320-06**	**04WW11-191106**	**Water**	**06 Nov 2019 09:55**
	SUB_Perch-6850	MS/MSD		21 Nov 2019
7.	**HS19110320-07**	**04WW05-191106**	**Water**	**06 Nov 2019 10:45**
	SUB_Perch-6850			21 Nov 2019
8.	**HS19110320-08**	**04WW08-191106**	**Water**	**06 Nov 2019 11:35**
	SUB_Perch-6850			21 Nov 2019
9.	**HS19110320-09**	**04WW04-191106**	**Water**	**06 Nov 2019 12:20**

Subcontract Chain of Custody

SAMPLING STATE: **Texas** **COC ID:** **12582**

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
	SUB_Perch-6850			21 Nov 2019
10.	**HS19110320-10**	**LHSMW01-191106**	**Water**	**06 Nov 2019 13:15**
	SUB_Perch-6850			21 Nov 2019
11.	**HS19110320-11**	**Fire Station Well-191106**	**Water**	**06 Nov 2019 13:35**
	SUB_Perch-6850			21 Nov 2019

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

HS19110320-06 MS/MSD

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 11/7/19 1800

Received By: Jamie Jussell Date/Time: 11/8/19 8:40

Cooler ID(s): _____ Temperature(s): _____

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston

Project/Task/Site: 193753

Date/Time of Receipt: 11-08-19 8:40

Number of Coolers Received: 1

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

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

Cooler Received	Cooler Condition	Temp.	Cooler Received	Cooler Condition	Temp.	Cooler Received	Cooler Condition	Temp.
1	good	2 °C	4		°C	7		°C
2		°C	5		°C	8		°C
3		°C	6		°C	9		°C

Taken By: Jamie Vanassell (Signature) T. Vanassell (Printed Name) 11-08-19 (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: _____

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

SHIP DATE: 07NOV19
ACTWGT: 23.35 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: HS19110320-RJ

FedEx Express

TRK# 0201 1251 0291 5179

FRI - 08 NOV 3:00P
STANDARD OVERNIGHT

AX BTFA

84123
UT-US SLC

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

Purchase Order

PO: HS19110320

VENDOR:

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:	12582
TSR:	Sonia West

	Item	Catalog No	Unit Price	Quantity	Ext Price
1.	SUB_Perch-6850	NA	$56.25	11	$618.75

Order Total: $618.75

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS19110320	***Split:***	**Workorder ID:** 1931753	**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, D6D QSM
1	11/05/2019 08:30	04WW02-191105	1931753001		Water	A	1	A
2	11/05/2019 08:30	04WW02-191105-FD	1931753002	FLDDUP	Water	A	1	A
3	11/05/2019 08:30	LHSMW02-191105	1931753003		Water	A	1	A
4	11/06/2019 08:20	04WW03-191106	1931753004		Water	A	1	A
5	11/06/2019 09:10	04WW06-191106	1931753005		Water	A	1	A
6	11/06/2019 09:55	04WW11-191106	1931753006		Water	A	1	A
7	11/06/2019 09:55	04WW11-191106MS	1931753007	MS	Water	A	1	A
8	11/06/2019 09:55	04WW11-191106MSD	1931753008	MSD	Water	A	1	A
9	11/06/2019 10:45	04WW05-191106	1931753009		Water	A	1	A
10	11/06/2019 11:35	04WW08-191106	1931753010		Water	A	1	A

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ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	11/08/2019 08:40	ALS Sample Receiving	Sample Login
[signature]	11/8/19 1400	R.33.1	storage
R.33.1	11.14.19/12:10	T. Bush	coc analysis

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 Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS19110320	Split:	Workorder ID: 1931753	Level: ENV_LVL4	Requested Analysis
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly	
Comments:			Preservatives	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	EPA 6850, DoD QSM
11	11/06/2019 12:20	04WW04-191106	1931753011		Water	A	1	A
12	11/06/2019 13:15	LHSMW01-191106	1931753012		Water	A	1	A
13	11/06/2019 13:35	Fire Station Well-191106	1931753013		Water	A	1	A
14								
15								
16								
17								
18								
19								
20								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Waraich, Julie	11/08/2019 08:40	ALS Sample Receiving	Sample Login
Julie Waraich	11/8/19 1400	R.33.1	storage
R.33.1	11.14.19/12:10	T. Busch	CLO4 analysis

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

Batch Worklist

Batch: ELMS/ 2319 **Created:** 11/19/2019 07:58 **Instrument:** LCMS04 **HBN:** 252142

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

Workorder: 1931753 [ENV_LVL4]

Workorder: 1932010 [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	684804	CCV for HBN 252142 [ELMS/2319]				CCV	3		E685041C3Q	5311		11/21/2019	11/19/2019
2	684805	LCS for HBN 252142 [ELMS/2319]				LCS	3		E6850Q413Q	5311		11/21/2019	11/19/2019
3	684807	ICS for HBN 252142 [ELMS/2319]				ICS	3		E6850..D3Q	5311		11/21/2019	11/19/2019
4	684808	LMB for HBN 252142 [ELMS/2319]				LMB	3		E6850Q413Q	5311		11/21/2019	11/19/2019
5	1931753001	04WW02-191105				SAMPLE	3	1931753001-A	E6850Q41.3	5480	12/3/2019	11/21/2019	11/19/2019
6	1931753002	04WW02-191105-FD				FLDDUP	3	1931753002-A	E6850Q41.3	5480	12/3/2019	11/21/2019	11/19/2019
7	1931753003	LHSMW02-191105				SAMPLE	3	1931753003-A	E6850Q41.3	5480	12/3/2019	11/21/2019	11/19/2019
8	1931753004	04WW03-191106				SAMPLE	3	1931753004-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
9	1931753005	04WW06-191106				SAMPLE	3	1931753005-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
10	1931753006	04WW11-191106				SAMPLE	3	1931753006-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
11	1931753007	04WW11-191106MS				MS	3	1931753007-A	E6850Q413Q	5480		11/21/2019	11/19/2019
12	1931753008	04WW1I-191106MSD				MSD	3	1931753008-A	E6850Q413Q	5480		11/21/2019	11/19/2019
13	1931753009	04WW05-191106				SAMPLE	3	1931753009-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
14	1931753010	04WW08-191106				SAMPLE	3	1931753010-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
15	684809	CCV for HBN 252142 [ELMS/2319]				CCV	3		E685041C3Q	5311		11/21/2019	11/19/2019
16	1931753011	04WW04-191106				SAMPLE	3	1931753011-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
17	1931753012	LHSMW01-191106				SAMPLE	3	1931753012-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
18	1931753013	Fire Station Well-191106				SAMPLE	3	1931753013-A	E6850Q41.3	5480	12/4/2019	11/21/2019	11/19/2019
19	1932010001	50WW21-191108				SAMPLE	3	1932010001-A	E6850Q41.3	5480	12/6/2019	11/25/2019	11/19/2019
20	1932010002	50WW24-191108				SAMPLE	3	1932010002-A	E6850Q41.3	5480	12/6/2019	11/25/2019	11/19/2019
21	1932010003	50WW27-191108				SAMPLE	3	1932010003-A	E6850Q41.3	5480	12/6/2019	11/25/2019	11/19/2019
22	1932010004	50WW15-191108				SAMPLE	3	1932010004-A	E6850Q41.3	5480	12/6/2019	11/25/2019	11/19/2019
23	1932010005	50WW05-191108				SAMPLE	3	1932010005-A	E6850Q41.3	5480	12/6/2019	11/25/2019	11/19/2019
24	1932010006	50WW18-191108				SAMPLE	3	1932010006-A	E6850Q41.3	5480	12/6/2019	11/25/2019	11/19/2019
25	1932010007	50WW17-191108				SAMPLE	3	1932010007-A	E6850Q41.3	5480	12/6/2019	11/25/2019	11/19/2019
26	684806	RLVS for HBN 252142 [ELMS/2319				RLVS	3		E685041C3Q	5311		11/21/2019	
27	684810	CCV for HBN 252142 [ELMS/2319]				CCV	3		E685041C3Q	5311		11/21/2019	11/19/2019

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

Analyst Write-up

ALS Work Order #'s & Sample #( )'s: 1931753 (001-13); 1932010 (001-07)
ELMS Batch/HBN ID: 2319 (252142)
Prep Date: 11/14,19/2019 Analysis Date: 11/19/2019 Analyst: Tom Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2019\NOV\19NOV19D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by Tom Bosch. 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 DU461-US)/0.1% glacial acetic acid (JT-Baker Lot 122550).
Eluent B1: 95% ACN (B&J Lot DU461-US)/5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 122550).

STANDARDS: Internal Standard Spiking Solution Horizon# 47863. Dilutions of Working Standards (Horizon: 49947/48) used for ICAL, CCV's, RLVS and ICS.

CALIBRATION CURVE: Used curve from 09/20/2019, sequence 20SEP19D.s Offline Quantitation Method: CLO4-DP3.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: 7 Injection Volume: 30µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1 Run time: 12.0min.

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: 3.0µL of QC Solution Horizon ID 47516 was used for LCS 684805; Target = 3.0µg/L. ASTM type II water was used for LMB 684808.

MS/MSD: The Matrix Spike and duplicate (MS/MSD) was performed on samples 1931753007/08 (Client ID's: 04WW01-191106. 3.0µl of Working Standard Solution Horizon ID 49947 was added to 10.0mL of sample preparation. Spike target = 3.0µg/L.

COMMENTS:

1) Results reported in µg/L.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2019\NOV\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2019\252142-DoD-ALS-Hstn LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#
5) The Reporting Limit Verification Standard (RLVS – 684806) is reported from the analysis of the Laboratory Control Sample (LCS – 684805) at a level of 3.0µg/L.
6) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations were performed for one of the Initial Calibration analyses (datafile: 20SEPI03) along with datafile 19OCT19D02.

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: 2319 HBN: 252142 **Sample Set IDs if Applicable:** 1931753 / 1932010	**Analyst Initials**	**Reviewer Initials**
Sample positions on autosampler verified against instrument sequence	TB	NA
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
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	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	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR#_____	TB	SB
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK — **Description - Perchlorate ISTD Wrk 1,000ug/L**

Standard:	49946	**Created By:**	Thomas Bosch	**Amount:**	25 mL
MFG:	ALS/SLC	**Create Date:**	09/23/2019 03:09PM	**Expires:**	09/19/2020
MFG Lot:	TNB: 09/20/2019	**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
47863	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	12/05/2028

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		**Description - Perchlorate ISTD Stock**
Standard: **47863**	**Created By:** Thomas Bosch	**Amount:** 1 mL
MFG: Cambridge Isotope	**Create Date:** 05/23/2019 10:05AM	**Expires:** 12/05/2028
MFG Lot: SDIH-016	**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

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — **Description - 6850 WKG Std 100.ug/L**

Standard: 49948
MFG: ALS/SLC
MFG Lot: TNB: 09/20/2019
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 09/20/2019 03:09PM

Amount: 10 mL
Expires: 07/25/2020
Usable: Yes
Lab Lot: CLO4 WRK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL
2	14797-73-0-8385	Perchlorate 83:85 Ratio	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
49947	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	07/25/2020

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:** Yes
Part ID: IC-PER-10X-1		**Lab Lot:** CLO4 STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL
2	14797-73-0-8385	Perchlorate 83:85 Ratio	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: 49947	**Created By:** Thomas Bosch	**Amount:** 10 mL
MFG: ALS/SLC	**Create Date:** 09/23/2019 03:09PM	**Expires:** 07/25/2020
MFG Lot: TNB: 09/20/2019		**Usable:** Yes
Pipette ID: Not Provided		**Lab Lot:** CLO4 INT

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL
2	14797-73-0-8385	Perchlorate 83:85 Ratio	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: 47516
MFG: ALS/SLC
MFG Lot: TNB: 05/06/2019
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/06/2019 03:05PM

Amount: 10 mL
Expires: 03/31/2020
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
47515	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	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

Constituent

Working Standard - CLO4 QC INT

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

Standard: 47515
MFG: ALS/SLC
MFG Lot: TNB: 05/06/2019
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/06/2019 03:05PM

Amount: 10 mL
Expires: 03/31/2020
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

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

GHS

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.

AccuStandard is accredited to ISO 17034, ISO/IEC 17025 and certified to ISO 9001:2015

QR-ORG/INO-001
Rev. 5/18

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

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

S 36748

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

Product Name: Perchlorate IC Standard

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

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

Solvent: water (low TOC, < 50 ppb)

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

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

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

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

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

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

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

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

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

ANAB ACCREDITED ACCREDITED TESTING LABORATORY

ISO 9001 Registered Quality System – TUV USA

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

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

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

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

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

Daniel J. Lamendola
Director of QA/RA

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ISO 9001 Registered Quality System – TUV USA

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

S 47863

Product Name: PERCHLORIC ACID, SODIUM SALT
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDIH-016

Catalog Number: OLM-7310-S

Product Information

Chemical Purity Specification:	≥ 98%
MW*: *For isotopically labeled compounds, MW listed is for the fully enriched product.	130.44
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

$NaCl^{18}O_4$

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. CIL Certificates of Analysis are occasionally updated with new data following recertification. We recommend checking the website for the latest version.

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.

Approved by: Sashi Sivendran-Basak

Sashi Sivendran-Basak, Ph.D., Quality Review

Quality Control Tests and Results

QC Release Date	12/05/2018
Expiration Date	12/05/2028
Concentration Based on Gravimetry	100.0 ± 1.0 µg/mL (k=2)
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	105.4 ± 1.1 µg/mL (k=2)

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Batch Report: C:\HPCHEM\1\DATA\19NOV19D\19NOV19S.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP3.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
*	684804 CCV@25	Vial 71	1	Control	1	1.11549e6	7.375	25.70542
*	684805 QC@3.0	Vial 72	1	Control	2	1.57343e5	7.389	2.81132
*	684807 ICS@3.0	Vial 73	1	Control	3	9.81343e4	7.227	2.70044
*	684808 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1931753001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1931753002	Vial 76	1	Sample	6	0.00000	0.000	0.00000
*	1931753003	Vial 77	1	Sample	7	0.00000	0.000	0.00000
*	1931753004	Vial 78	1	Sample	8	0.00000	0.000	0.00000
*	1931753005	Vial 79	1	Sample	9	0.00000	0.000	0.00000
*	1931753006	Vial 80	1	Sample	10	0.00000	0.000	0.00000
*	1931753007 MS	Vial 81	1	Sample	11	1.30769e5	7.199	2.72098
*	1931753008 MSD	Vial 82	1	Sample	12	1.27060e5	7.171	2.94244
*	1931753009	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1931753010	Vial 84	1	Sample	14	4.91726e5	7.095	13.36216
*	684809 CCV@25	Vial 71	1	Control	15	9.31289e5	7.389	24.67348
*	1931753011	Vial 85	1	Sample	16	0.00000	0.000	0.00000
*	1931753012	Vial 86	1	Sample	17	0.00000	0.000	0.00000
*	1931753013	Vial 87	1	Sample	18	0.00000	0.000	0.00000
*	1932010001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1932010002	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1932010003	Vial 90	1	Sample	21	0.00000	0.000	0.00000
*	1932010004	Vial 91	1	Sample	22	0.00000	0.000	0.00000
*	1932010005	Vial 92	1	Sample	23	0.00000	0.000	0.00000
*	1932010006	Vial 93	1	Sample	24	0.00000	0.000	0.00000
*	1932010007	Vial 94	1	Sample	25	0.00000	0.000	0.00000
*	684810 CCV@25	Vial 71	1	Control	26	9.08551e5	7.429	24.23157

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-IS RT	CLO4-89-ISTD Amount
*	684804 CCV@25	Vial 71	1	Control	1	1.47847e5	7.396	5.00000
*	684805 QC@3.0	Vial 72	1	Control	2	2.05736e5	7.412	5.00000
*	684807 ICS@3.0	Vial 73	1	Control	3	1.33496e5	7.255	5.00000
*	684808 LMB	Vial 74	1	Control	4	1.53147e5	7.417	5.00000
*	1931753001	Vial 75	1	Sample	5	1.89772e5	7.293	5.00000
*	1931753002	Vial 76	1	Sample	6	1.71402e5	7.294	5.00000
*	1931753003	Vial 77	1	Sample	7	1.69955e5	7.124	5.00000
*	1931753004	Vial 78	1	Sample	8	1.72551e5	7.195	5.00000
*	1931753005	Vial 79	1	Sample	9	1.42815e5	7.006	5.00000
*	1931753006	Vial 80	1	Sample	10	1.77283e5	7.209	5.00000
*	1931753007 MS	Vial 81	1	Sample	11	1.76570e5	7.222	5.00000
*	1931753008 MSD	Vial 82	1	Sample	12	1.58843e5	7.200	5.00000
*	1931753009	Vial 83	1	Sample	13	1.48965e5	7.198	5.00000
*	1931753010	Vial 84	1	Sample	14	1.31911e5	7.114	5.00000
*	684809 CCV@25	Vial 71	1	Control	15	1.29143e5	7.405	5.00000
*	1931753011	Vial 85	1	Sample	16	1.57073e5	7.174	5.00000
*	1931753012	Vial 86	1	Sample	17	1.56727e5	7.325	5.00000
*	1931753013	Vial 87	1	Sample	18	1.16312e5	7.227	5.00000
*	1932010001	Vial 88	1	Sample	19	1.18044e5	6.887	5.00000
*	1932010002	Vial 89	1	Sample	20	1.30569e5	7.171	5.00000
*	1932010003	Vial 90	1	Sample	21	1.33641e5	7.163	5.00000
*	1932010004	Vial 91	1	Sample	22	1.24695e5	7.109	5.00000
*	1932010005	Vial 92	1	Sample	23	1.43110e5	7.154	5.00000
*	1932010006	Vial 93	1	Sample	24	1.12592e5	7.082	5.00000
*	1932010007	Vial 94	1	Sample	25	1.22348e5	7.114	5.00000
*	684810 CCV@25	Vial 71	1	Control	26	1.28522e5	7.458	5.00000

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	684804 CCV@25	Vial 71	1	Control	1	3.31757e5	7.394	25.13176
*	684805 QC@3.0	Vial 72	1	Control	2	5.33816e4	7.396	3.04097
*	684807 ICS@3.0	Vial 73	1	Control	3	3.51191e4	7.259	3.08495
*	684808 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	1931753001	Vial 75	1	Sample	5	0.00000	0.000	0.00000
*	1931753002	Vial 76	1	Sample	6	0.00000	0.000	0.00000
*	1931753003	Vial 77	1	Sample	7	0.00000	0.000	0.00000
*	1931753004	Vial 78	1	Sample	8	0.00000	0.000	0.00000
*	1931753005	Vial 79	1	Sample	9	0.00000	0.000	0.00000
*	1931753006	Vial 80	1	Sample	10	0.00000	0.000	0.00000
*	1931753007 MS	Vial 81	1	Sample	11	4.43687e4	7.202	2.94112
*	1931753008 MSD	Vial 82	1	Sample	12	4.43897e4	7.197	3.28446
*	1931753009	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1931753010	Vial 84	1	Sample	14	1.59614e5	7.112	14.10318
*	684809 CCV@25	Vial 71	1	Control	15	2.87274e5	7.401	24.93224
*	1931753011	Vial 85	1	Sample	16	0.00000	0.000	0.00000
*	1931753012	Vial 86	1	Sample	17	0.00000	0.000	0.00000
*	1931753013	Vial 87	1	Sample	18	0.00000	0.000	0.00000
*	1932010001	Vial 88	1	Sample	19	0.00000	0.000	0.00000
*	1932010002	Vial 89	1	Sample	20	0.00000	0.000	0.00000
*	1932010003	Vial 90	1	Sample	21	0.00000	0.000	0.00000
*	1932010004	Vial 91	1	Sample	22	0.00000	0.000	0.00000
*	1932010005	Vial 92	1	Sample	23	0.00000	0.000	0.00000
*	1932010006	Vial 93	1	Sample	24	0.00000	0.000	0.00000
*	1932010007	Vial 94	1	Sample	25	0.00000	0.000	0.00000
*	684810 CCV@25	Vial 71	1	Control	26	2.85245e5	7.448	24.88059

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

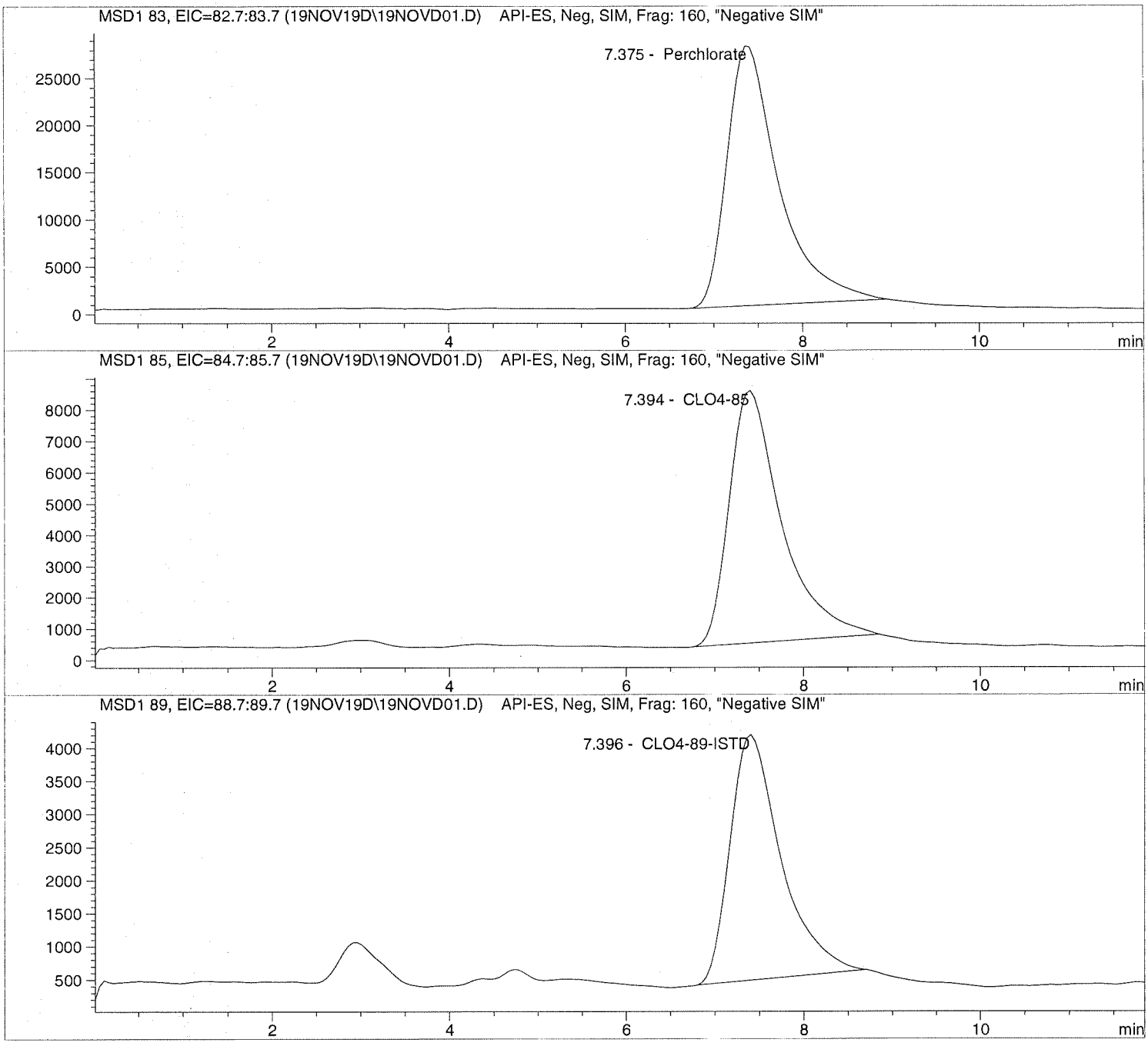
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	684804	CCV@25	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	684805	QC@3.0	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	684807	ICS@3.0	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	684808	LMB	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	1931753001		CLO4-AQN	1	Sample		
6	Vial 76	1931753002		CLO4-AQN	1	Sample		
7	Vial 77	1931753003		CLO4-AQN	1	Sample		
8	Vial 78	1931753004		CLO4-AQN	1	Sample		
9	Vial 79	1931753005		CLO4-AQN	1	Sample		
10	Vial 80	1931753006		CLO4-AQN	1	Sample		
11	Vial 81	1931753007	MS	CLO4-AQN	1	Sample		
12	Vial 82	1931753008	MSD	CLO4-AQN	1	Sample		
13	Vial 83	1931753009		CLO4-AQN	1	Sample		
14	Vial 84	1931753010		CLO4-AQN	1	Sample		
15	Vial 71	684809	CCV@25	CLO4-AQN	1	Ctrl Samp		
16	Vial 85	1931753011		CLO4-AQN	1	Sample		
17	Vial 86	1931753012		CLO4-AQN	1	Sample		
18	Vial 87	1931753013		CLO4-AQN	1	Sample		
19	Vial 88	1932010001		CLO4-AQN	1	Sample		
20	Vial 89	1932010002		CLO4-AQN	1	Sample		
21	Vial 90	1932010003		CLO4-AQN	1	Sample		
22	Vial 91	1932010004		CLO4-AQN	1	Sample		
23	Vial 92	1932010005		CLO4-AQN	1	Sample		
24	Vial 93	1932010006		CLO4-AQN	1	Sample		
25	Vial 94	1932010007		CLO4-AQN	1	Sample		
26	Vial 71	684810	CCV@25	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD01.D Sample Name: 684804 CCV@25

Injection Date:	11/19/2019 08:46:14	Seq Line:	1
Sample Name:	684804 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD01.D Sample Name: 684804 CCV@25

Injection Date:	11/19/2019 08:46:14	Seq Line:	1
Sample Name:	684804 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.375	PBA	1115487.1	25.7054	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.394	PBA	331756.7	25.1318	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.396	PBA	147846.5	5.0000	CLO4-89-ISTD

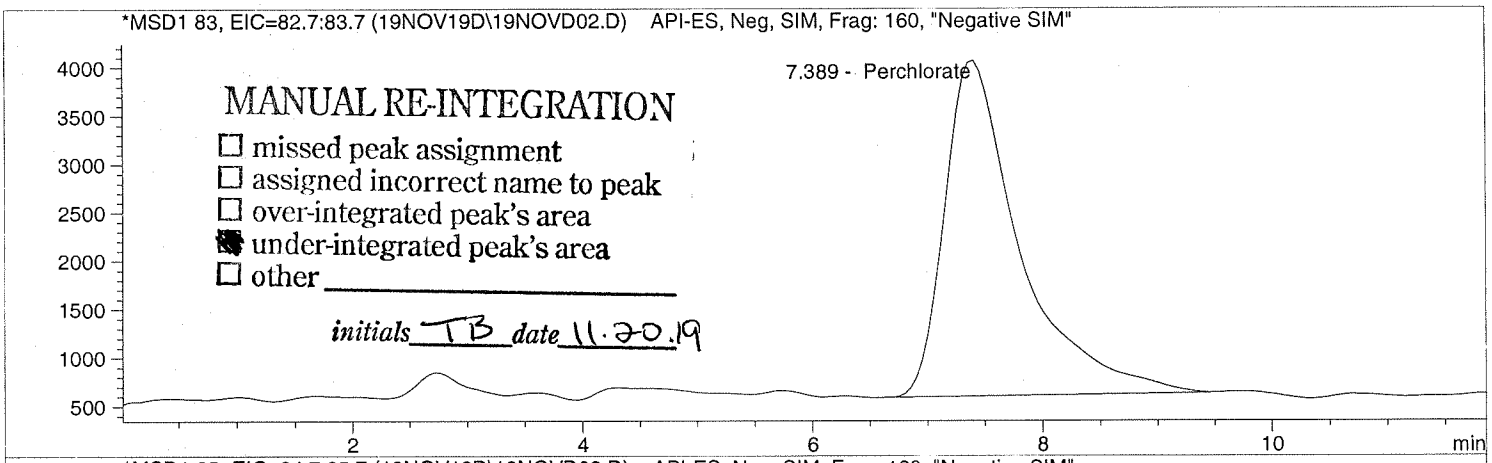
*** End of Report ***

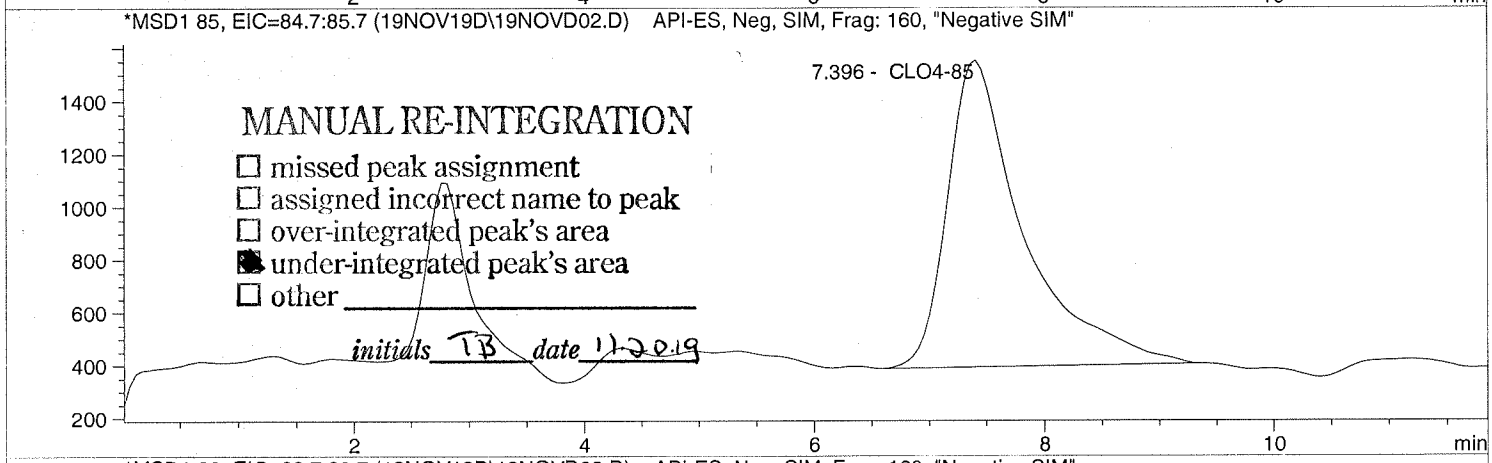
Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD02.D Sample Name: 684805 QC@3.0

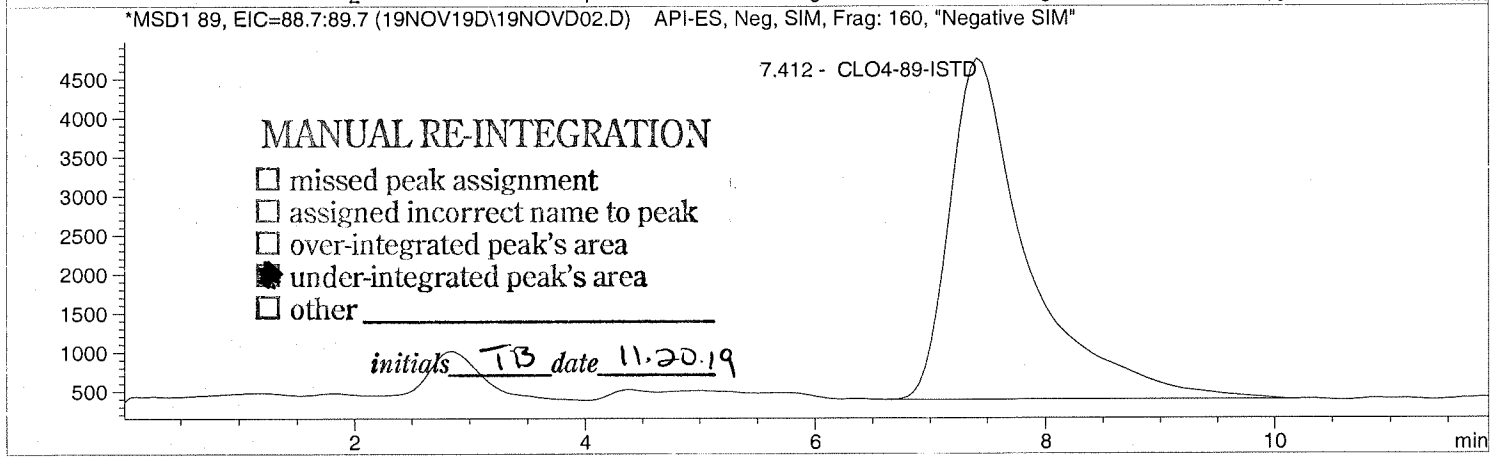
Injection Date:	11/19/2019 09:04:34	Seq Line:	2
Sample Name:	684805 QC@3.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD02.D Sample Name: 684805 QC@3.0

Injection Date:	11/19/2019 09:04:34	Seq Line:	2
Sample Name:	684805 QC@3.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	3.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.389	MM	157343.1	2.8113	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.396	MM	53381.6	3.0410	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.412	MM	205736.2	5.0000	CLO4-89-ISTD

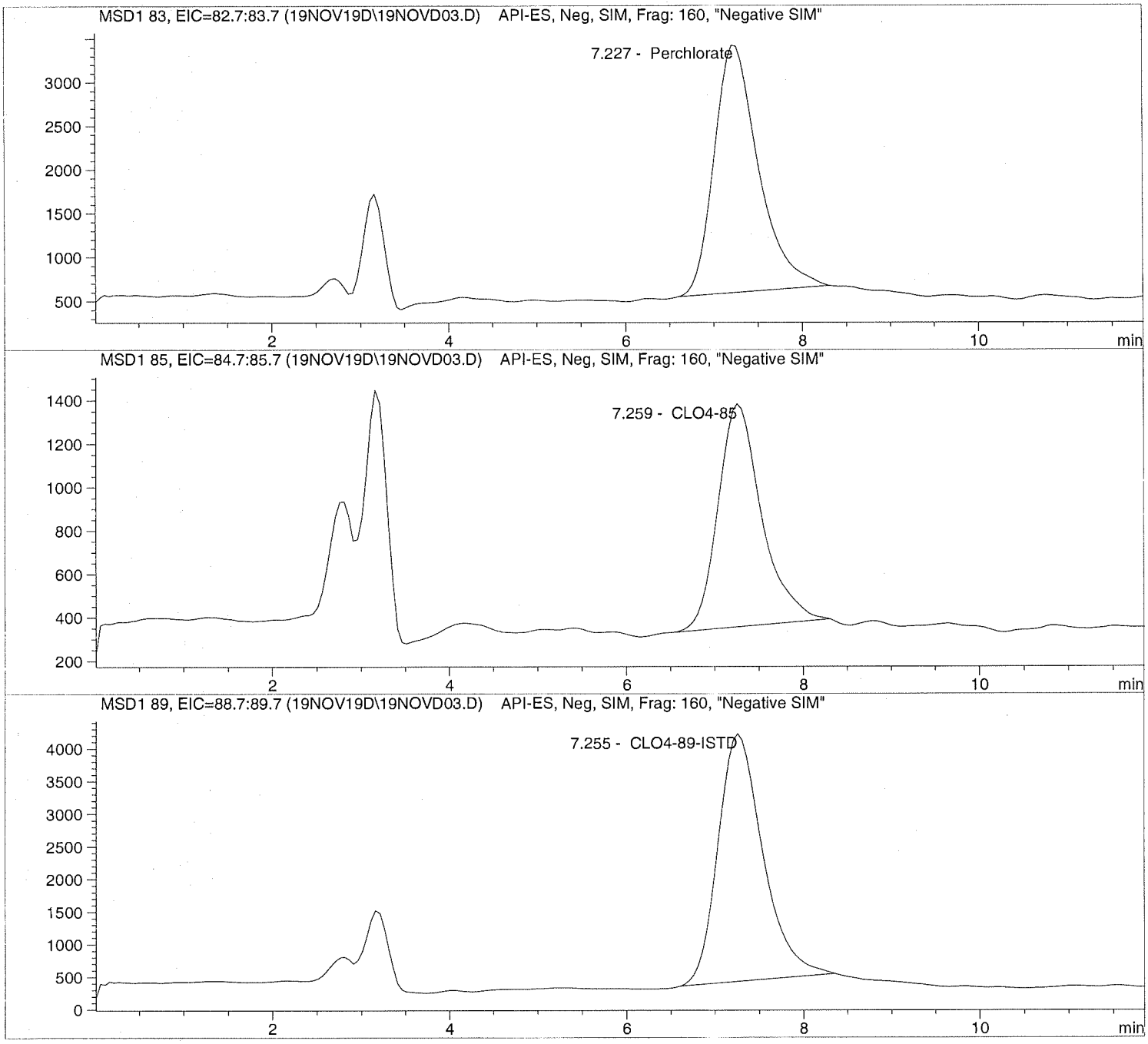
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD03.D Sample Name: 684807 ICS@3.0

Injection Date:	11/19/2019 09:18:20	Seq Line:	3
Sample Name:	684807 ICS@3.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD03.D Sample Name: 684807 ICS@3.0

Injection Date:	11/19/2019 09:18:20	Seq Line:	3
Sample Name:	684807 ICS@3.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	3.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.227	BBA	98134.3	2.7004	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.259	PBA	35119.1	3.0849	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.255	PBA	133495.5	5.0000	CLO4-89-ISTD

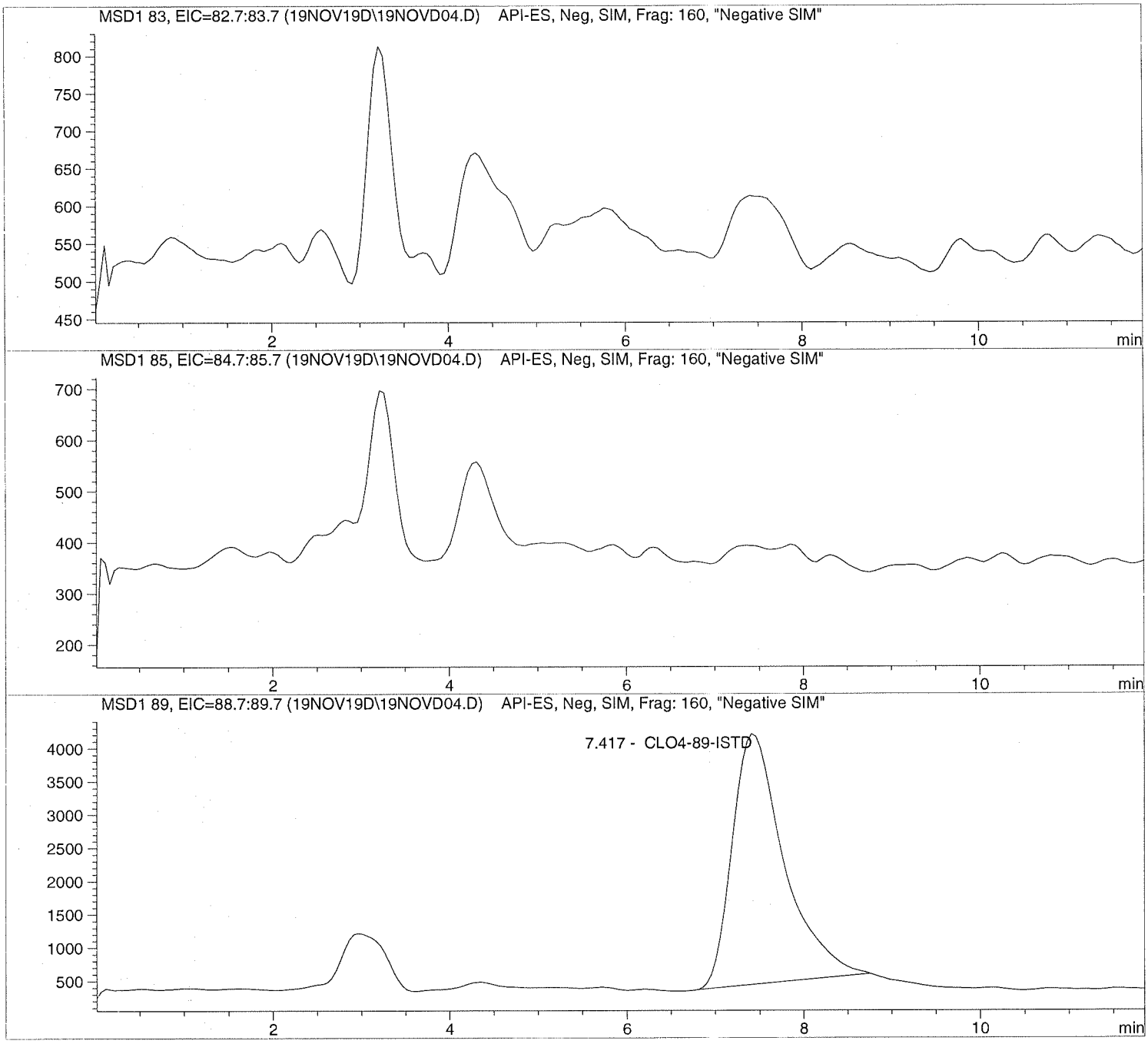
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD04.D Sample Name: 684808 LMB

Injection Date:	11/19/2019 09:32:09	Seq Line:	4
Sample Name:	684808 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD04.D Sample Name: 684808 LMB

Injection Date:	11/19/2019 09:32:09	Seq Line:	4
Sample Name:	684808 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.417	PBA	153146.8	5.0000	CLO4-89-ISTD

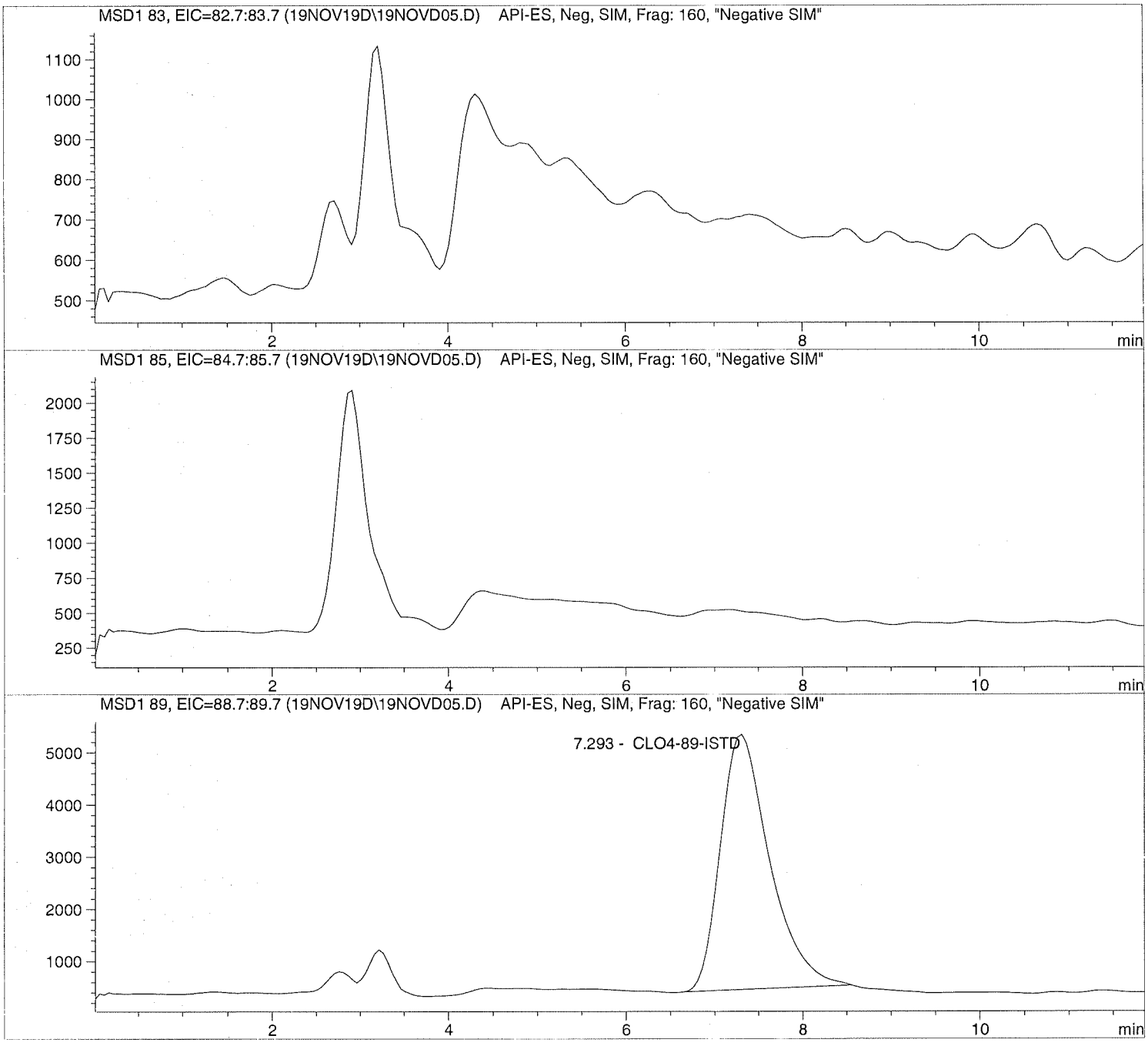
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD05.D Sample Name: 1931753001

Injection Date:	11/19/2019 09:45:57	Seq Line:	5
Sample Name:	1931753001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD05.D Sample Name: 1931753001

Injection Date:	11/19/2019 09:45:57	Seq Line:	5
Sample Name:	1931753001	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.293	PBA	189772.2	5.0000	CLO4-89-ISTD

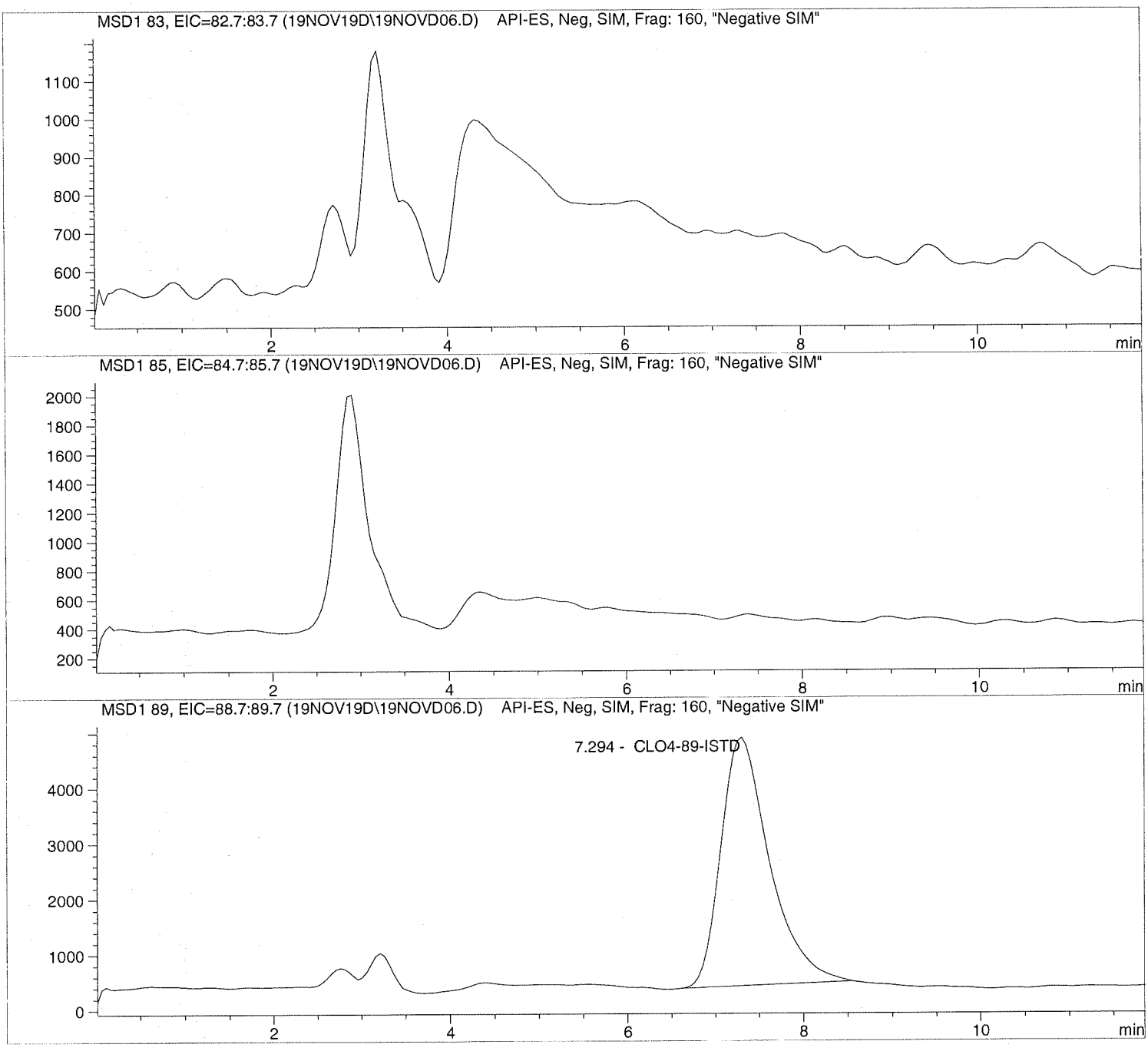
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD06.D Sample Name: 1931753002

Injection Date:	11/19/2019 09:59:43	Seq Line:	6
Sample Name:	1931753002	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD06.D Sample Name: 1931753002

Injection Date:	11/19/2019 09:59:43	Seq Line:	6
Sample Name:	1931753002	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.294	PBA	171402.0	5.0000	CLO4-89-ISTD

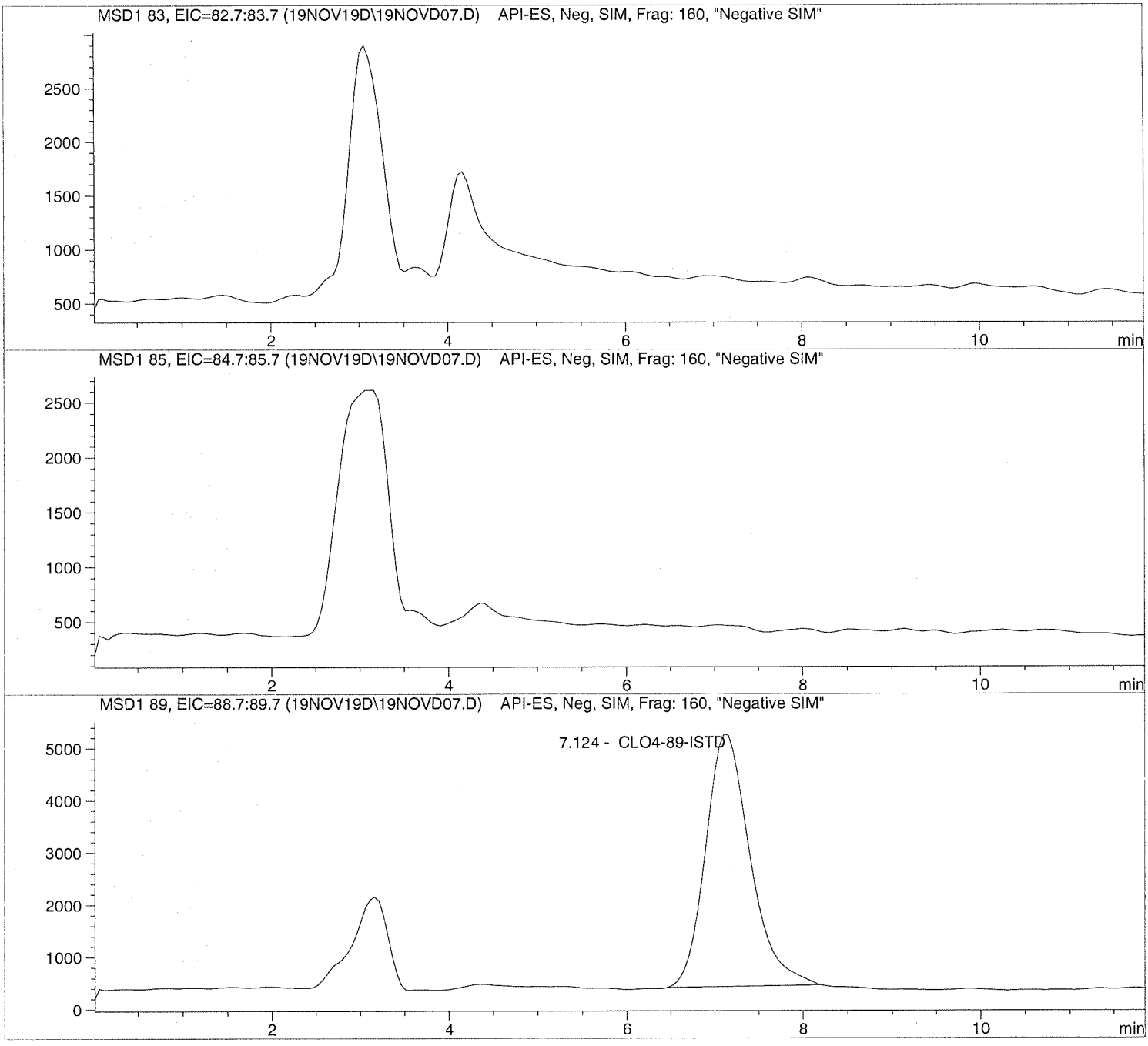
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD07.D Sample Name: 1931753003

Injection Date:	11/19/2019 10:13:33	Seq Line:	7
Sample Name:	1931753003	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD07.D Sample Name: 1931753003

Injection Date:	11/19/2019 10:13:33	Seq Line:	7
Sample Name:	1931753003	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.124	PBA	169954.7	5.0000	CLO4-89-ISTD

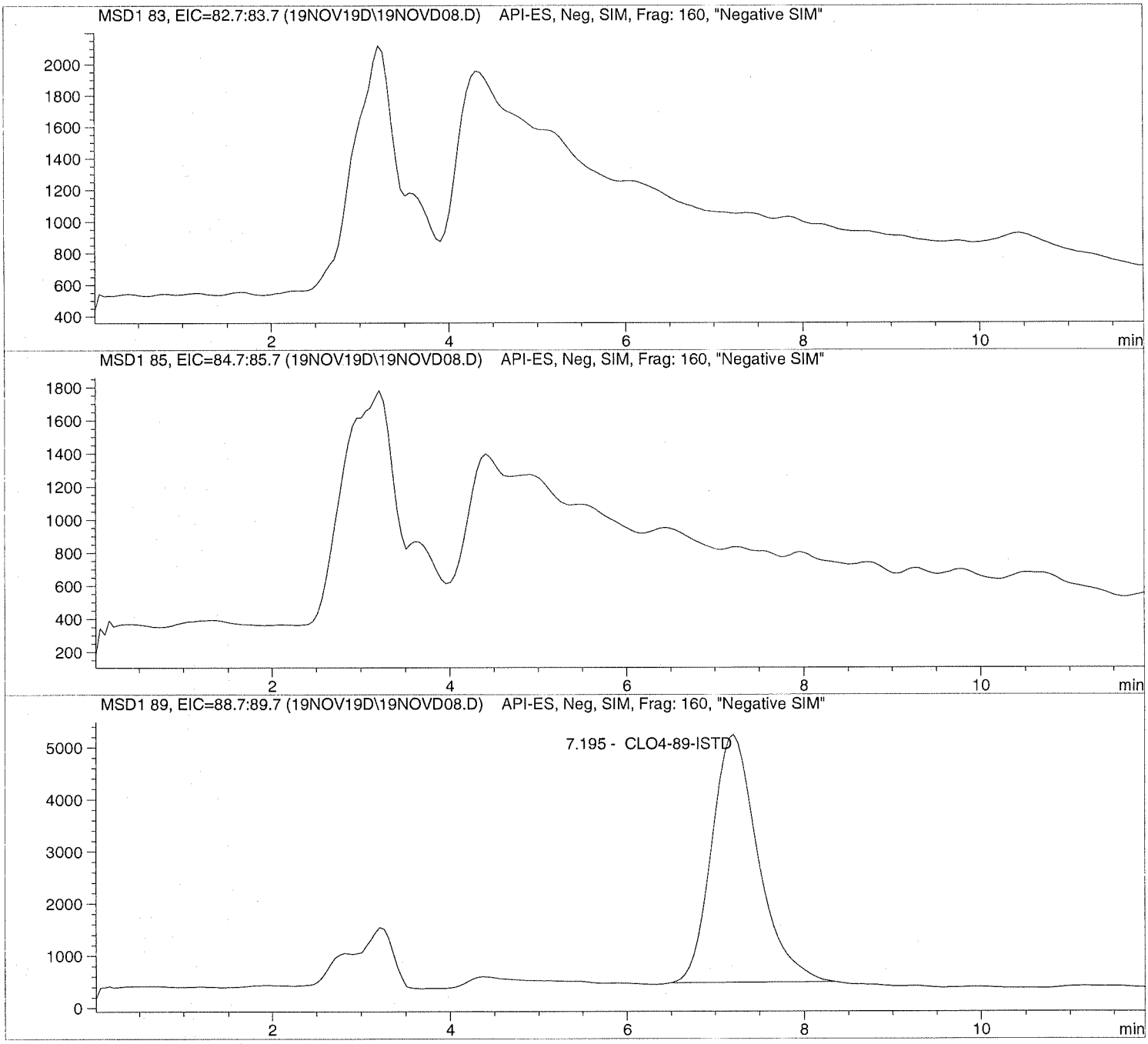
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD08.D Sample Name: 1931753004

Injection Date:	11/19/2019 10:27:21	Seq Line:	8
Sample Name:	1931753004	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD08.D Sample Name: 1931753004

Injection Date:	11/19/2019 10:27:21	Seq Line:	8
Sample Name:	1931753004	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.195	BBA	172551.3	5.0000	CLO4-89-ISTD

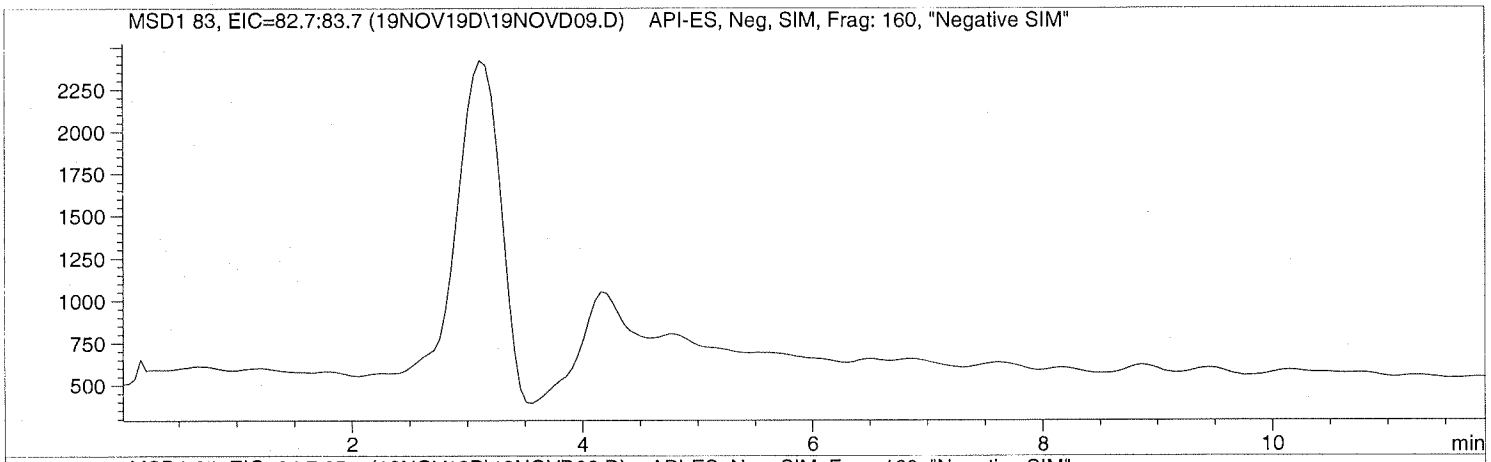
*** End of Report ***

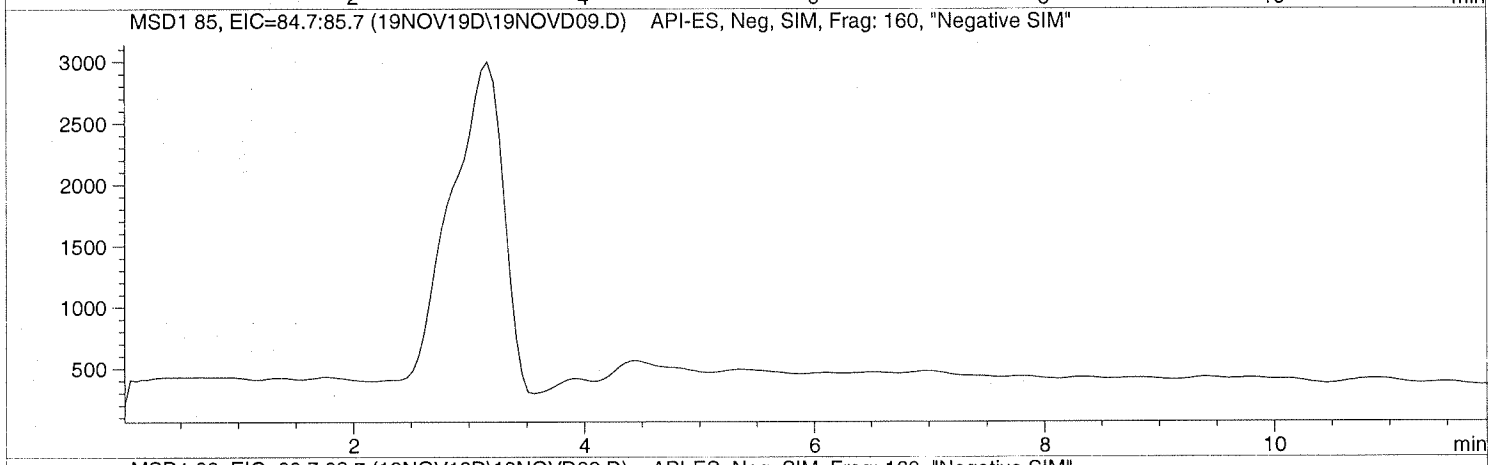
Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD09.D Sample Name: 1931753005

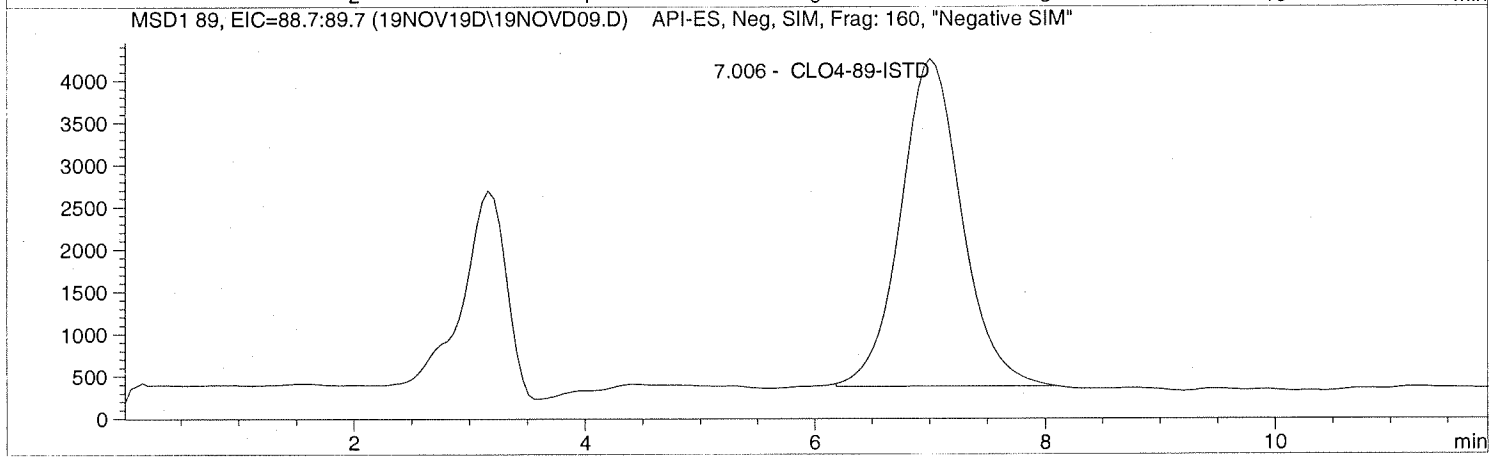
Injection Date:	11/19/2019 10:41:09	Seq Line:	9
Sample Name:	1931753005	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD09.D Sample Name: 1931753005

Injection Date:	11/19/2019 10:41:09	Seq Line:	9
Sample Name:	1931753005	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.006	BBA	142814.7	5.0000	CLO4-89-ISTD

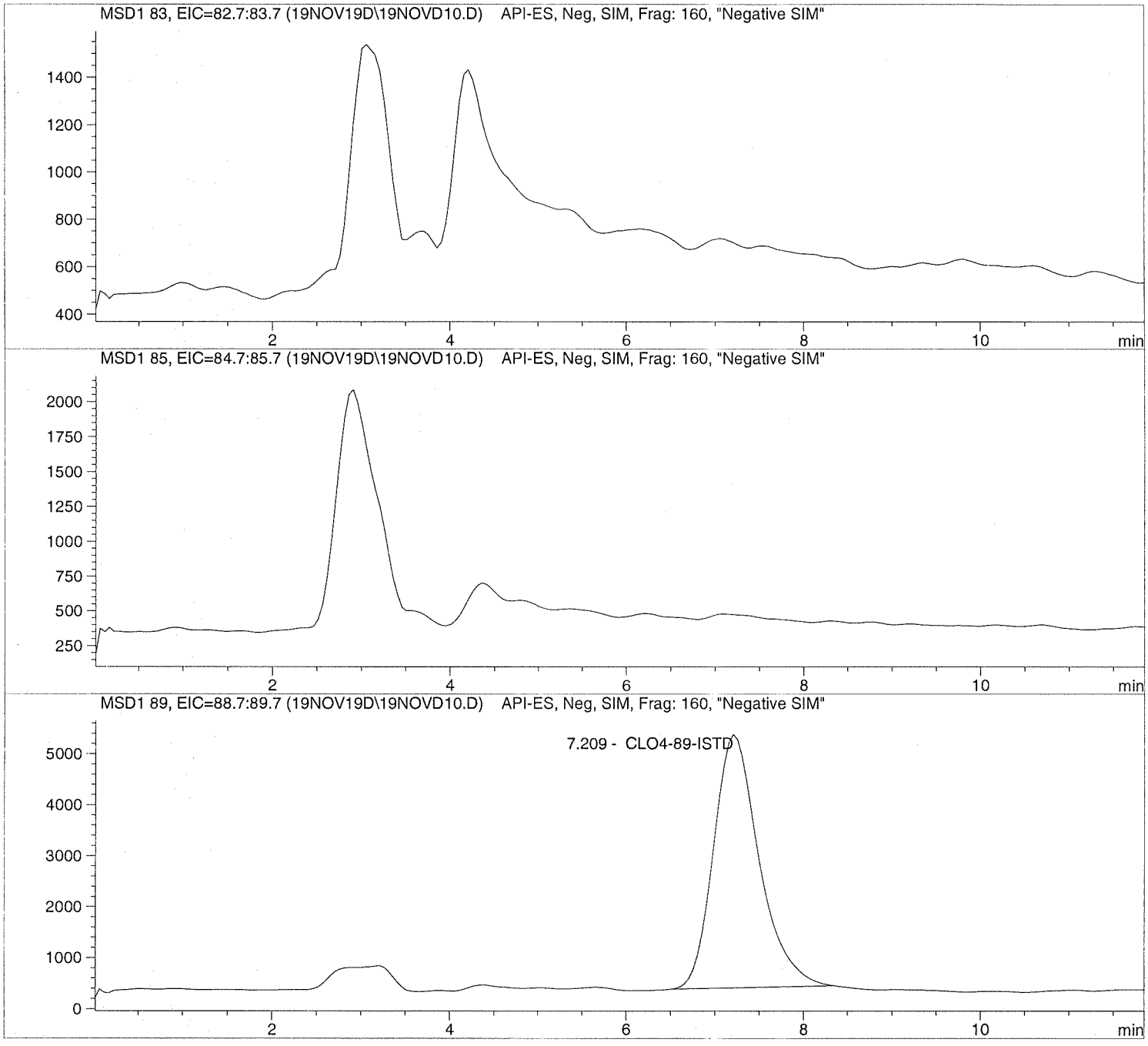
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD10.D Sample Name: 1931753006

Injection Date:	11/19/2019 10:55:02	Seq Line:	10
Sample Name:	1931753006	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD10.D Sample Name: 1931753006

Injection Date:	11/19/2019 10:55:02	Seq Line:	10
Sample Name:	1931753006	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
7.209	PBA	177283.0	5.0000	CLO4-89-ISTD

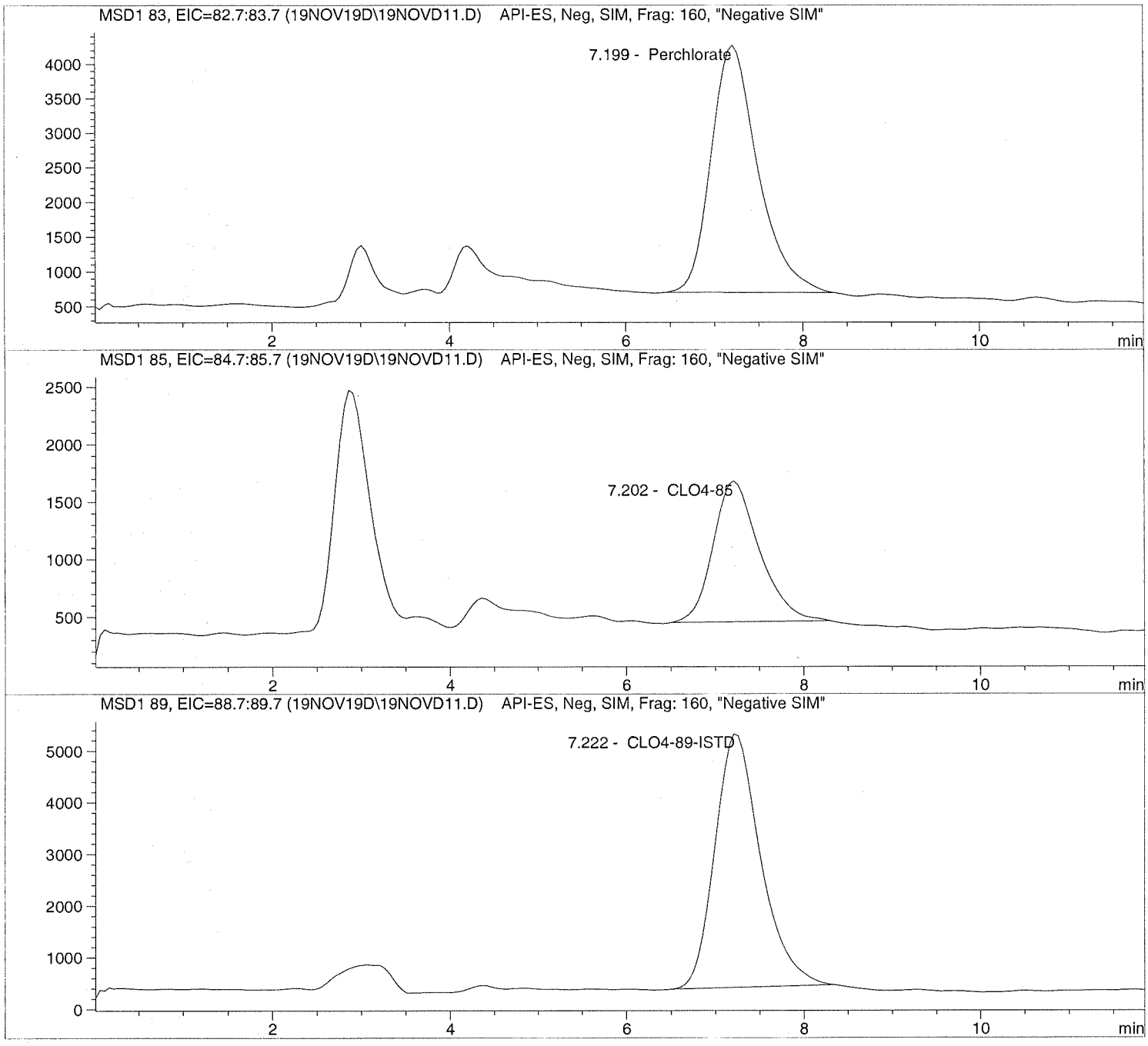
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD11.D Sample Name: 1931753007 MS

Injection Date:	11/19/2019 11:08:49	Seq Line:	11
Sample Name:	1931753007 MS	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD11.D Sample Name: 1931753007 MS

Injection Date:	11/19/2019 11:08:49	Seq Line:	11
Sample Name:	1931753007 MS	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.199	PBA	130769.1	2.7210	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.202	PBA	44368.7	2.9411	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.222	PBA	176570.0	5.0000	CLO4-89-ISTD

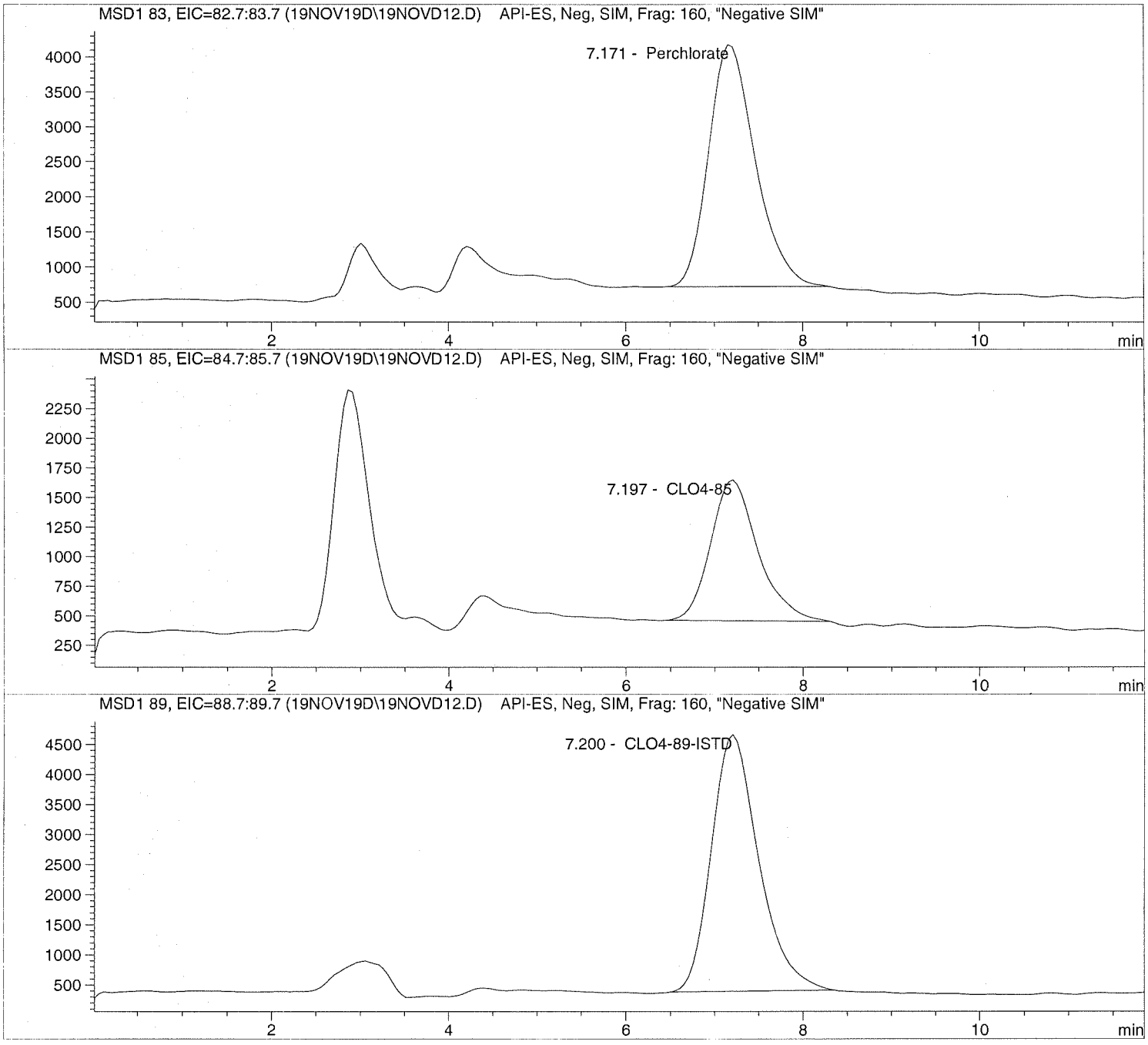
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD12.D Sample Name: 1931753008 MSD

Injection Date:	11/19/2019 11:22:36	Seq Line:	12
Sample Name:	1931753008 MSD	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD12.D Sample Name: 1931753008 MSD

Injection Date:	11/19/2019 11:22:36	Seq Line:	12
Sample Name:	1931753008 MSD	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.171	BBA	127059.9	2.9424	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.197	PBA	44389.7	3.2845	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.200	BBA	158843.2	5.0000	CLO4-89-ISTD

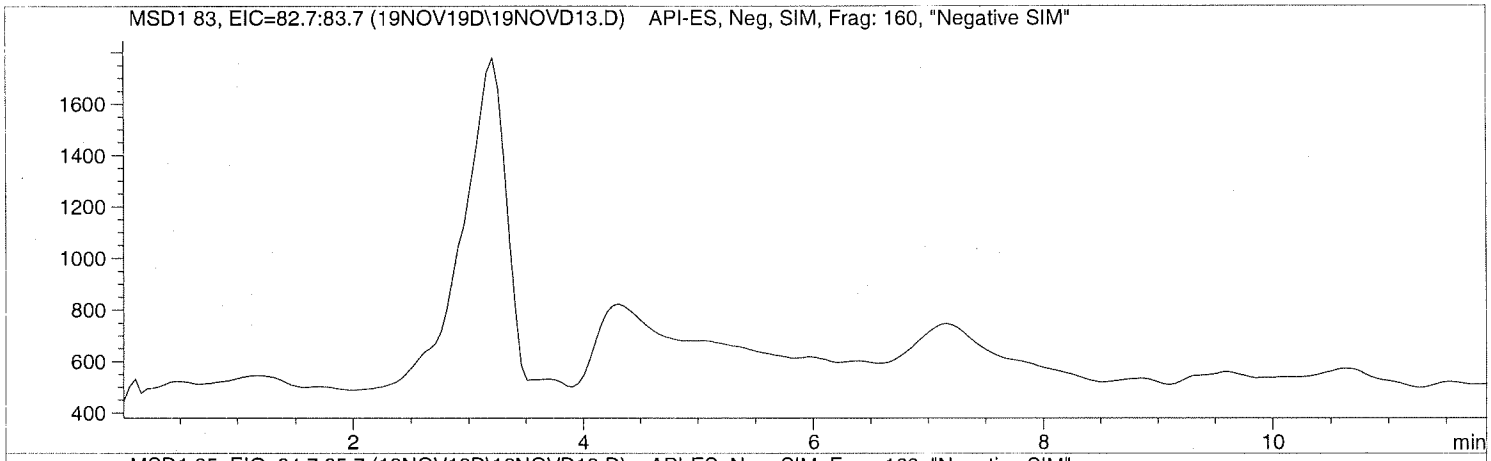
*** End of Report ***

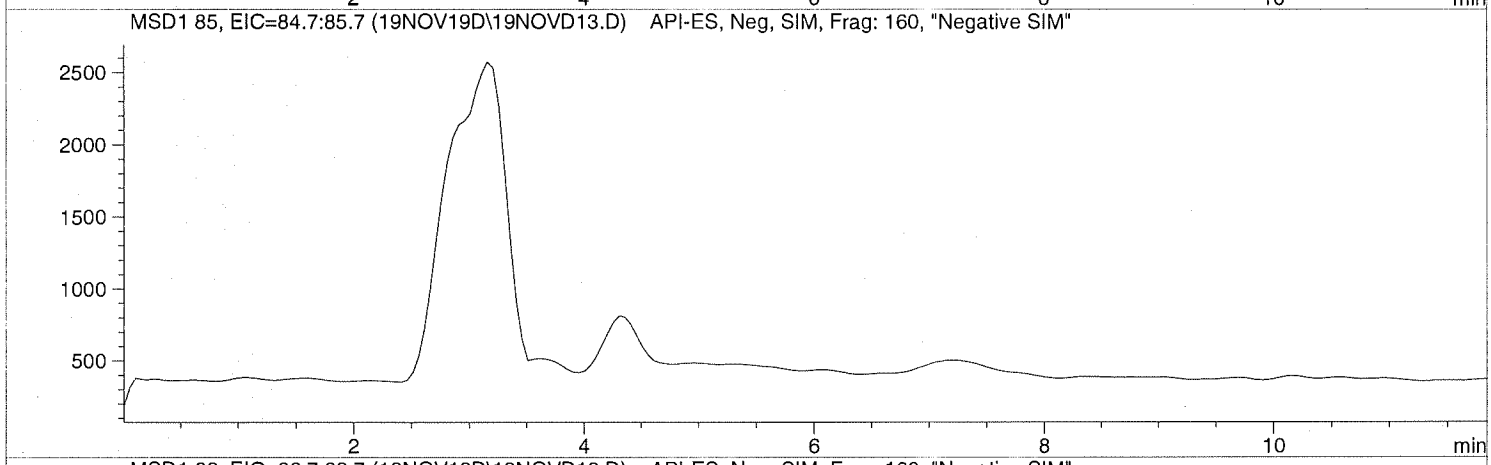
Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD13.D Sample Name: 1931753009

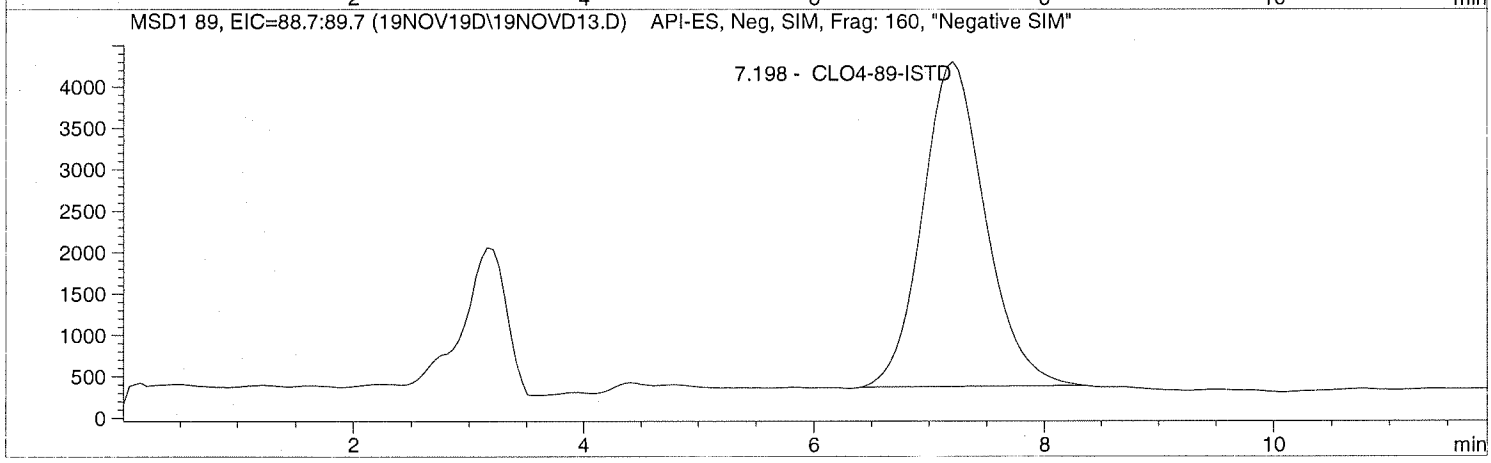
Injection Date:	11/19/2019 11:36:21	Seq Line:	13
Sample Name:	1931753009	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD13.D Sample Name: 1931753009

Injection Date:	11/19/2019 11:36:21	Seq Line:	13
Sample Name:	1931753009	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.198	PBA	148964.8	5.0000	CLO4-89-ISTD

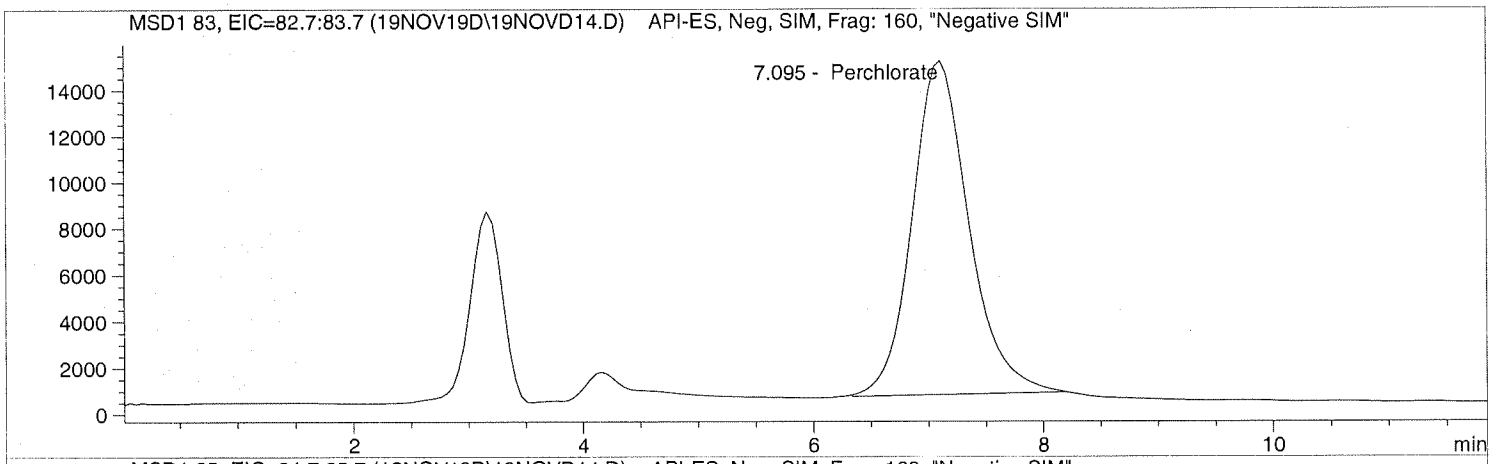
*** End of Report ***

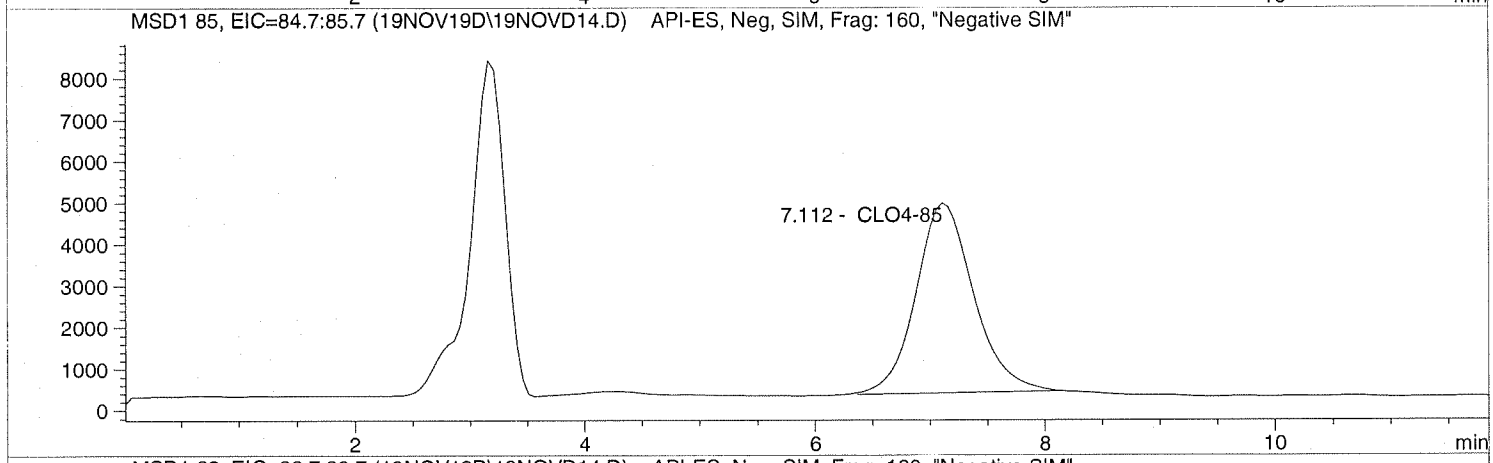
Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD14.D Sample Name: 1931753010

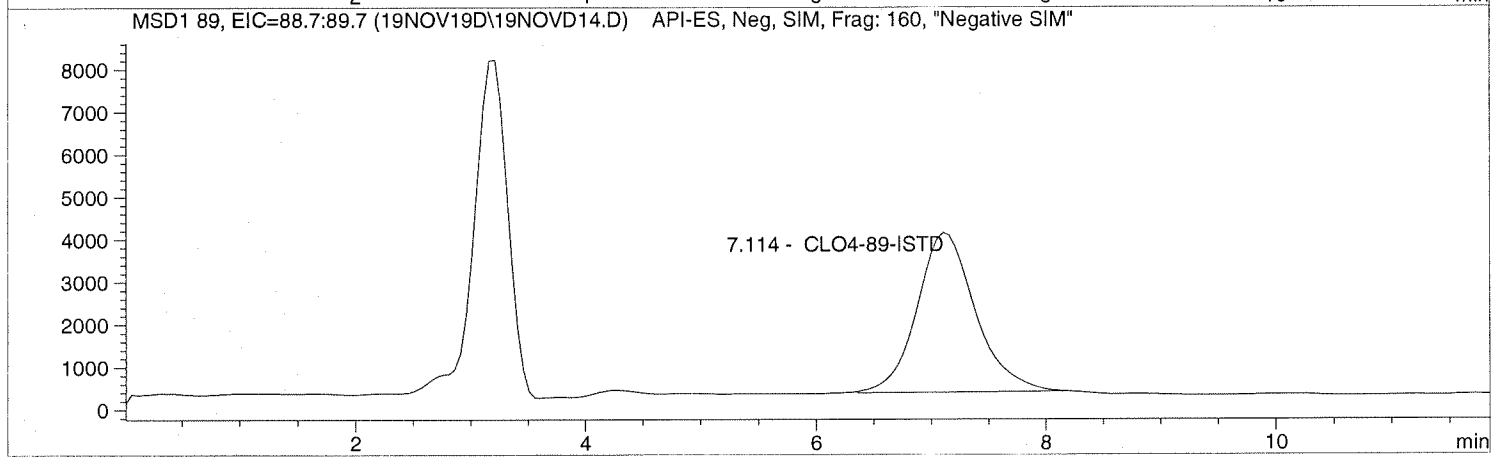
Injection Date:	11/19/2019 11:50:06	Seq Line:	14
Sample Name:	1931753010	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD14.D Sample Name: 1931753010

Injection Date:	11/19/2019 11:50:06	Seq Line:	14
Sample Name:	1931753010	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.095	BBA	491725.6	13.3622	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.112	BBA	159613.7	14.1032	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.114	BBA	131911.3	5.0000	CLO4-89-ISTD

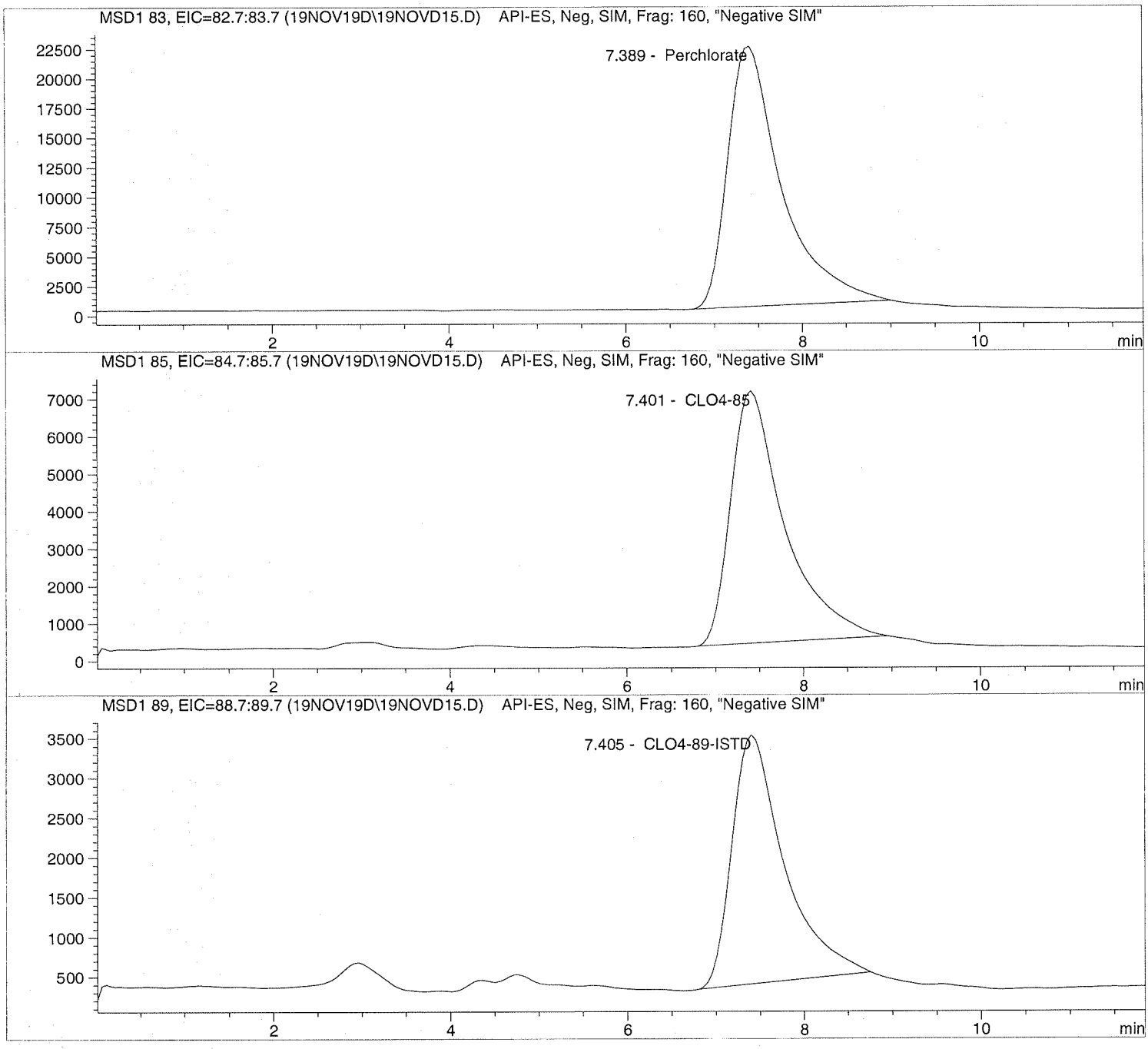
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD15.D Sample Name: 684809 CCV@25

Injection Date:	11/19/2019 12:03:53	Seq Line:	15
Sample Name:	684809 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD15.D Sample Name: 684809 CCV@25

Injection Date:	11/19/2019 12:03:53	Seq Line:	15
Sample Name:	684809 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.389	PBA	931288.6	24.6735	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.401	PBA	287273.8	24.9322	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.405	PBA	129143.4	5.0000	CLO4-89-ISTD

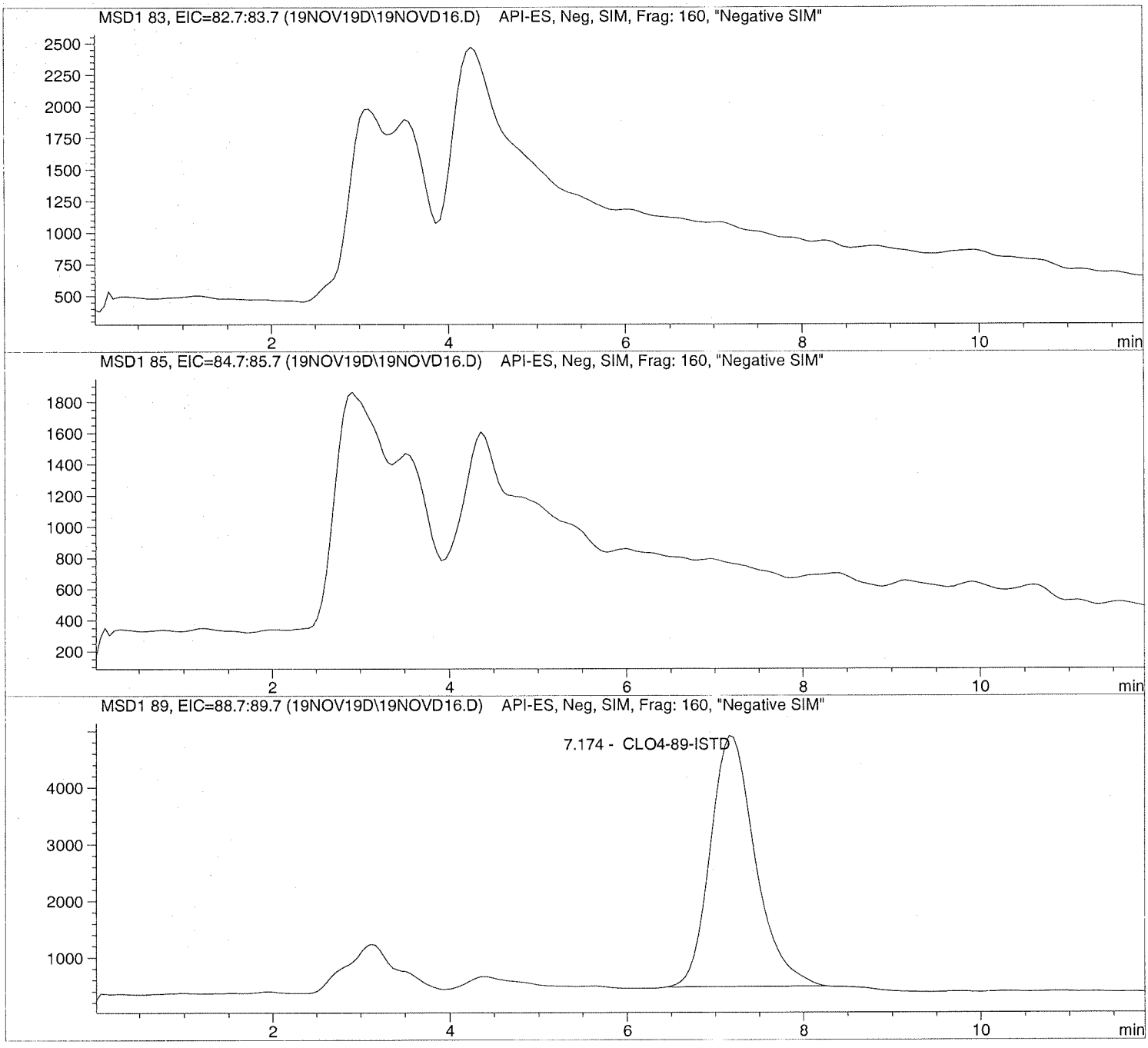
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD16.D Sample Name: 1931753011

Injection Date:	11/19/2019 12:17:41	Seq Line:	16
Sample Name:	1931753011	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD16.D Sample Name: 1931753011

Injection Date:	11/19/2019 12:17:41	Seq Line:	16
Sample Name:	1931753011	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
7.174	BBA	157072.7	5.0000	CLO4-89-ISTD

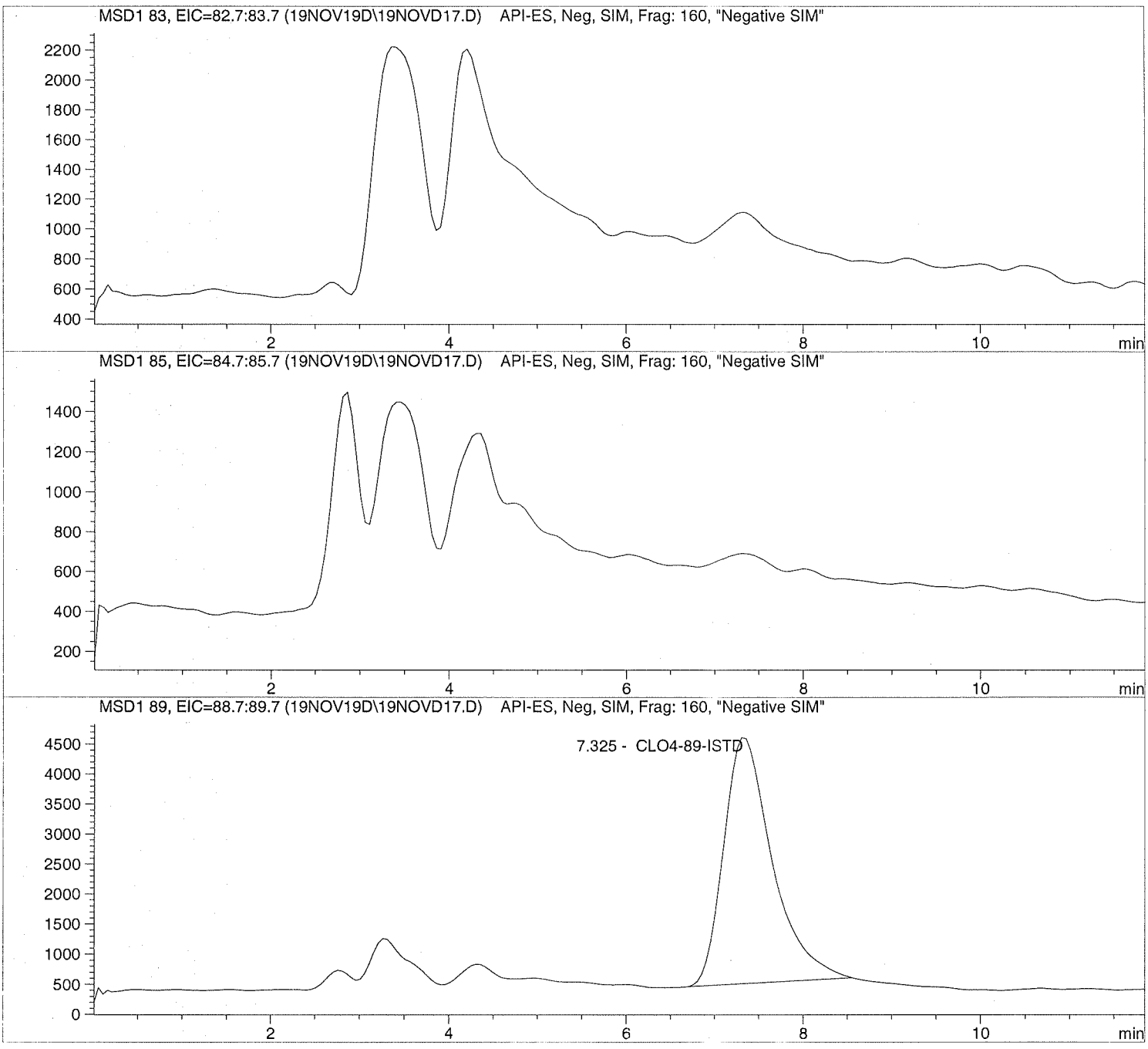
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD17.D Sample Name: 1931753012

Injection Date:	11/19/2019 12:31:25	Seq Line:	17
Sample Name:	1931753012	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD17.D Sample Name: 1931753012

Injection Date:	11/19/2019 12:31:25	Seq Line:	17
Sample Name:	1931753012	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
7.325	PBA	156727.4	5.0000	CLO4-89-ISTD

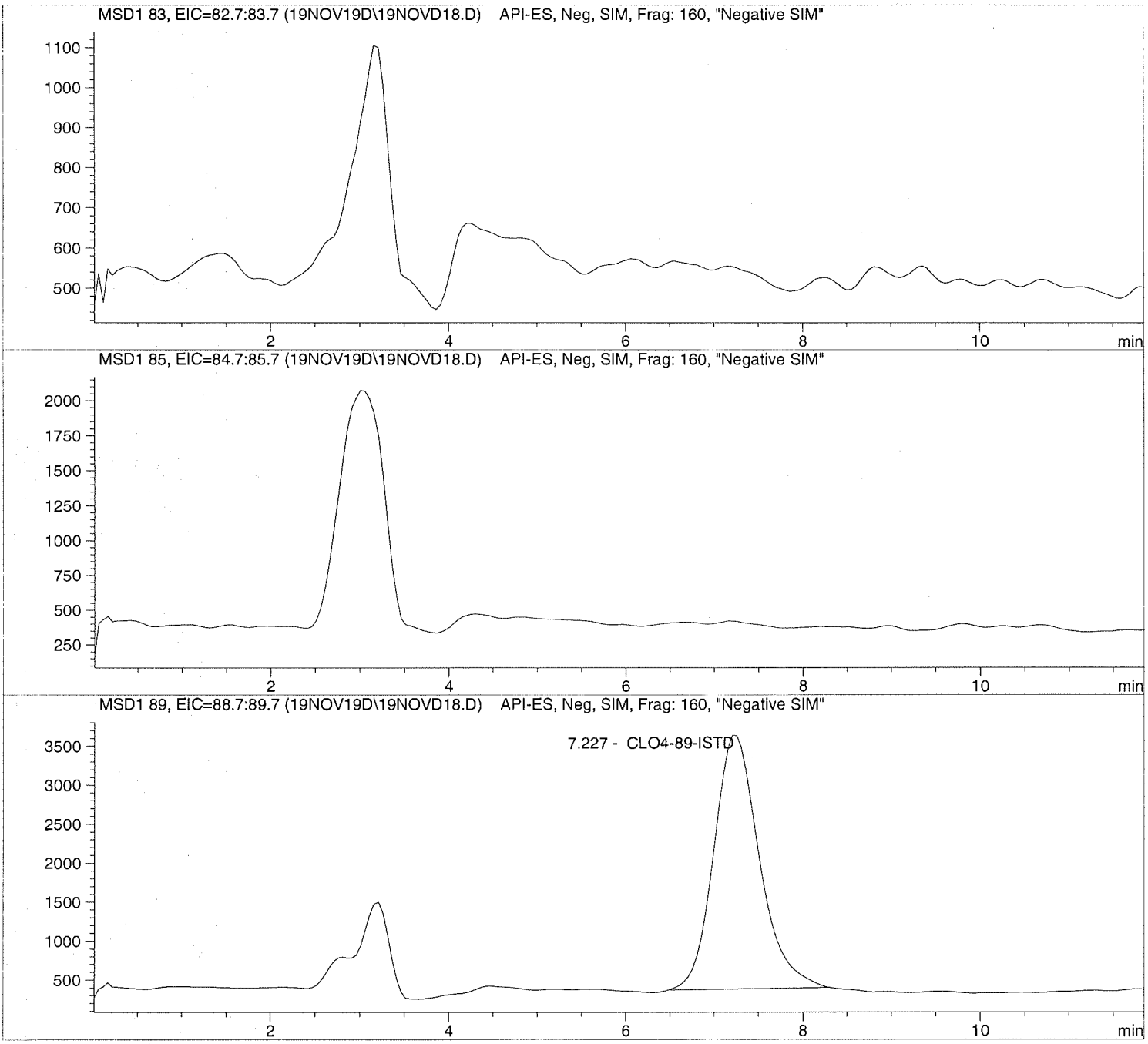
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD18.D Sample Name: 1931753013

Injection Date:	11/19/2019 12:45:09	Seq Line:	18
Sample Name:	1931753013	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD18.D Sample Name: 1931753013

Injection Date:	11/19/2019 12:45:09	Seq Line:	18
Sample Name:	1931753013	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
7.227	BBA	116311.5	5.0000	CLO4-89-ISTD

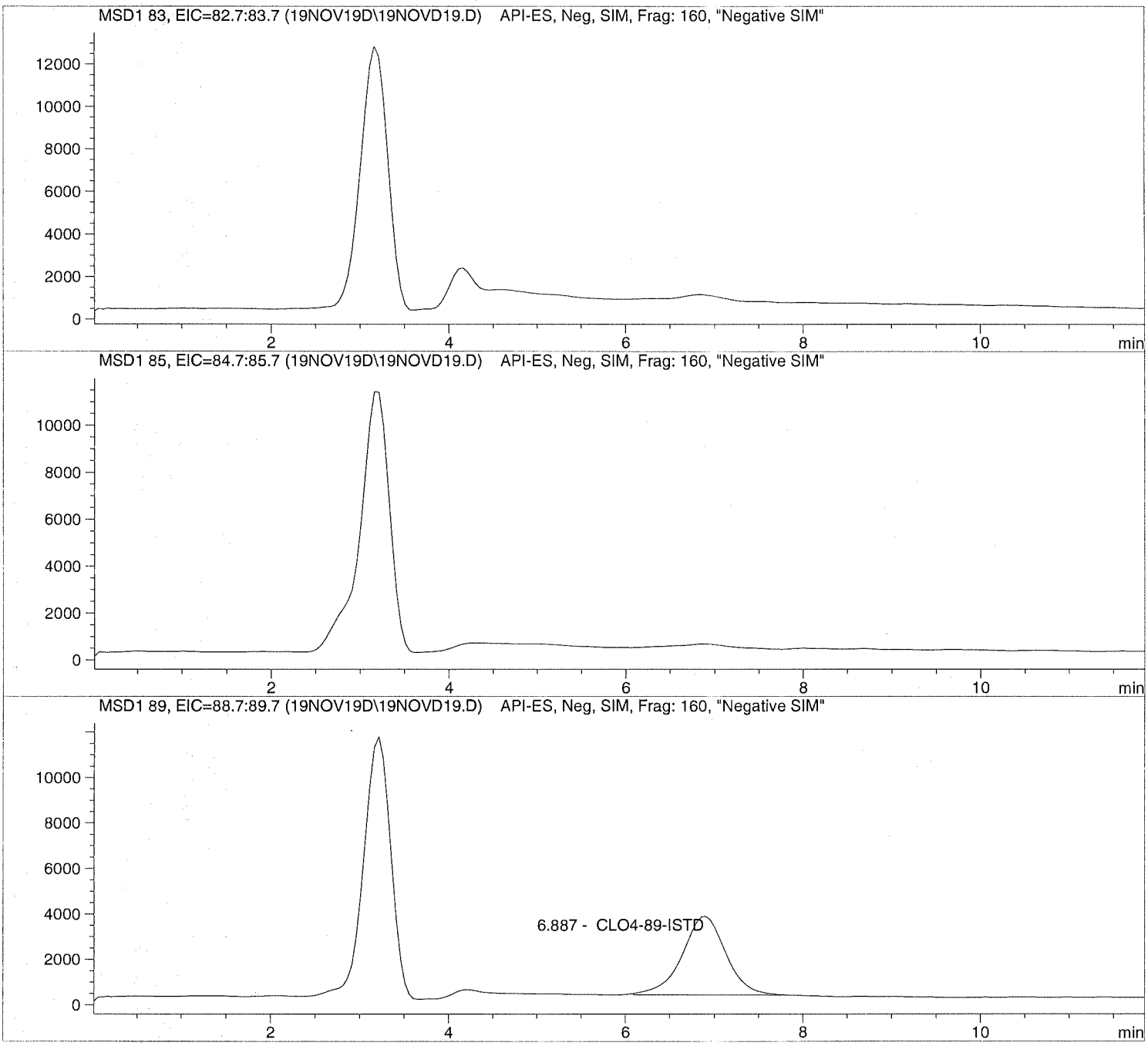
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD19.D Sample Name: 1932010001

Injection Date:	11/19/2019 12:58:54	Seq Line:	19
Sample Name:	1932010001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD19.D Sample Name: 1932010001

Injection Date:	11/19/2019 12:58:54	Seq Line:	19
Sample Name:	1932010001	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
6.887	BBA	118043.7	5.0000	CLO4-89-ISTD

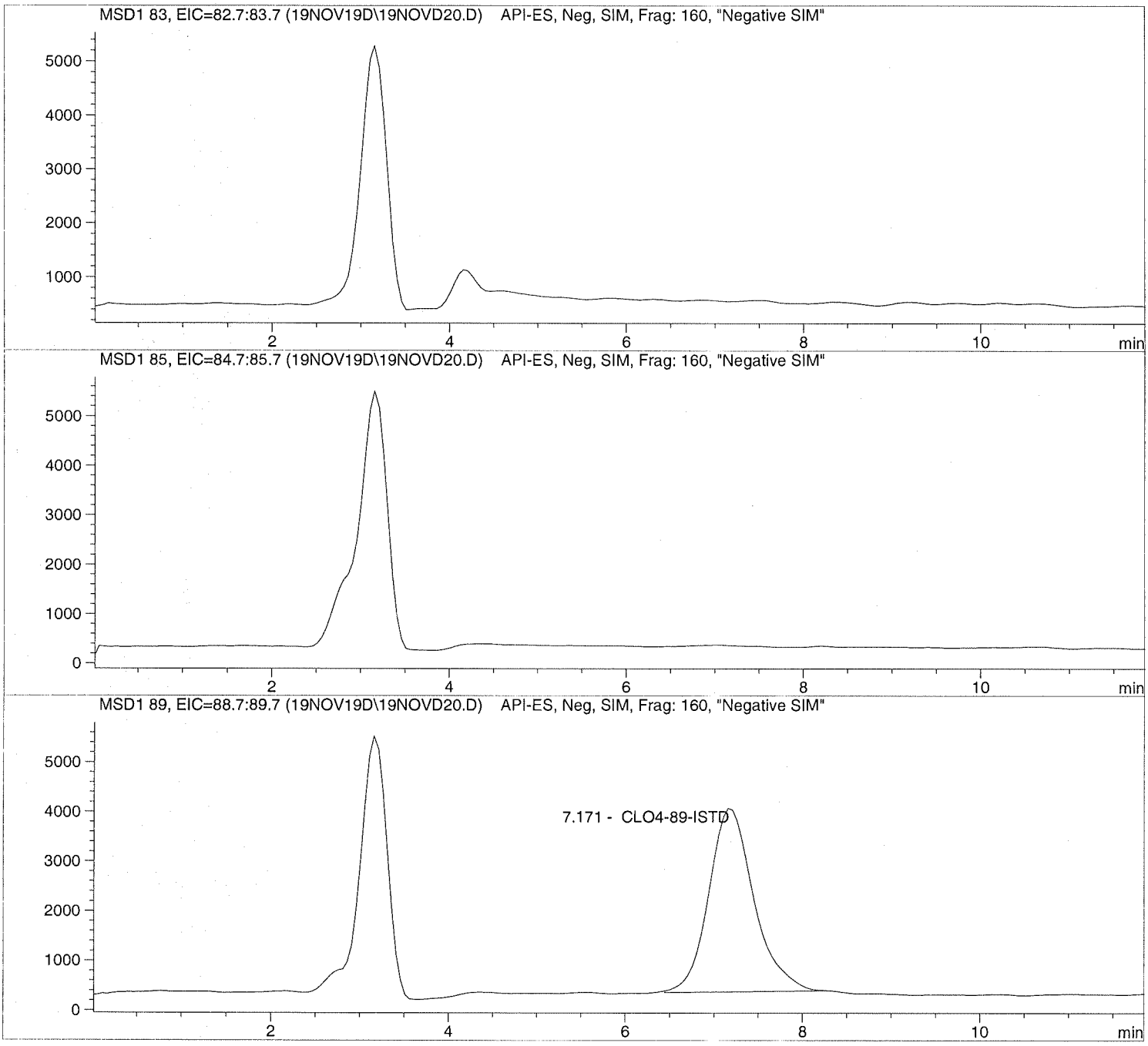
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD20.D Sample Name: 1932010002

Injection Date:	11/19/2019 13:12:42	Seq Line:	20
Sample Name:	1932010002	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD20.D Sample Name: 1932010002

Injection Date:	11/19/2019 13:12:42	Seq Line:	20
Sample Name:	1932010002	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
7.171	BBA	130569.2	5.0000	CLO4-89-ISTD

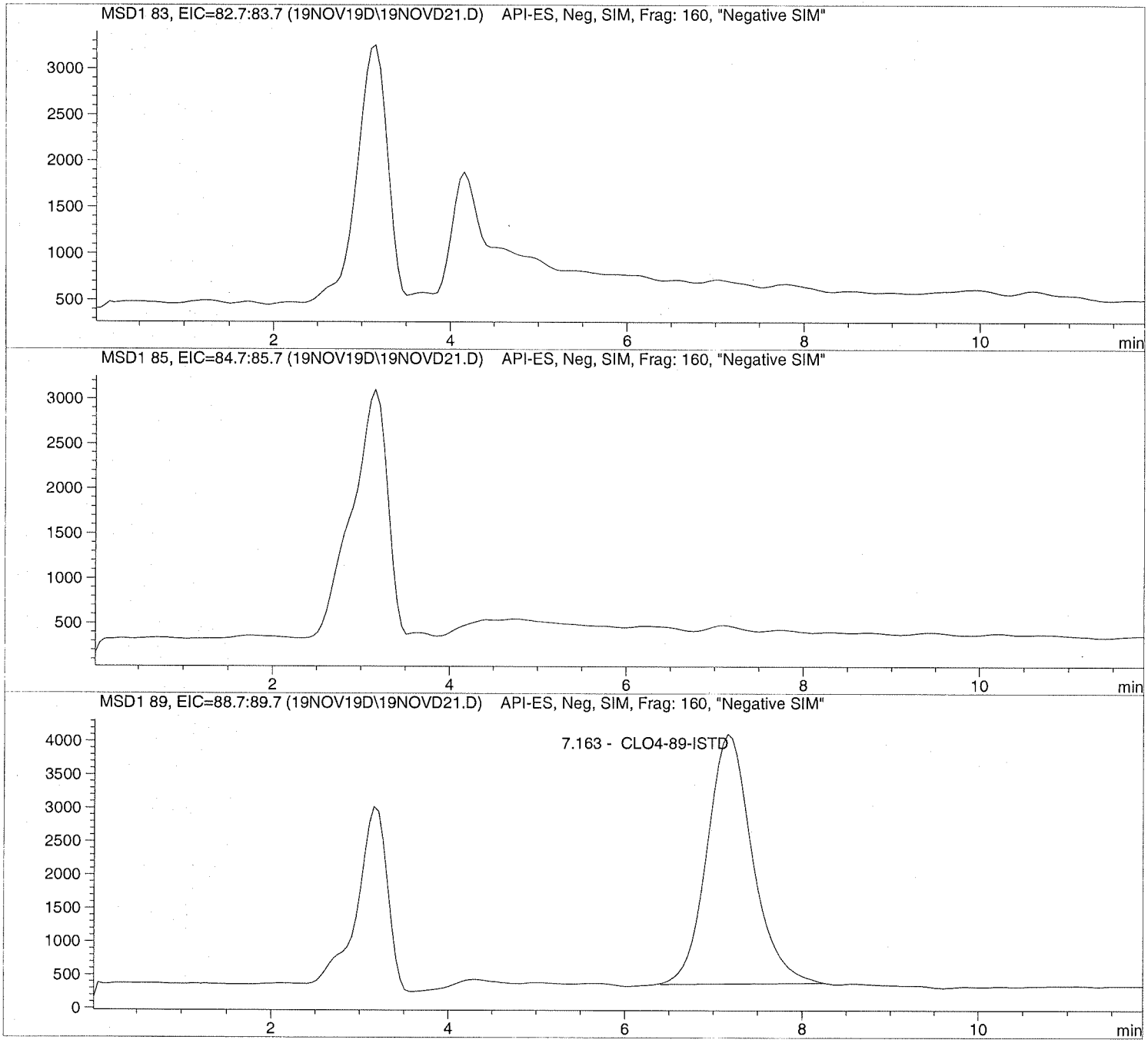
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD21.D Sample Name: 1932010003

Injection Date:	11/19/2019 13:26:30	Seq Line:	21
Sample Name:	1932010003	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD21.D Sample Name: 1932010003

Injection Date:	11/19/2019 13:26:30	Seq Line:	21
Sample Name:	1932010003	Location:	Vial 90
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
7.163	PBA	133641.2	5.0000	CLO4-89-ISTD

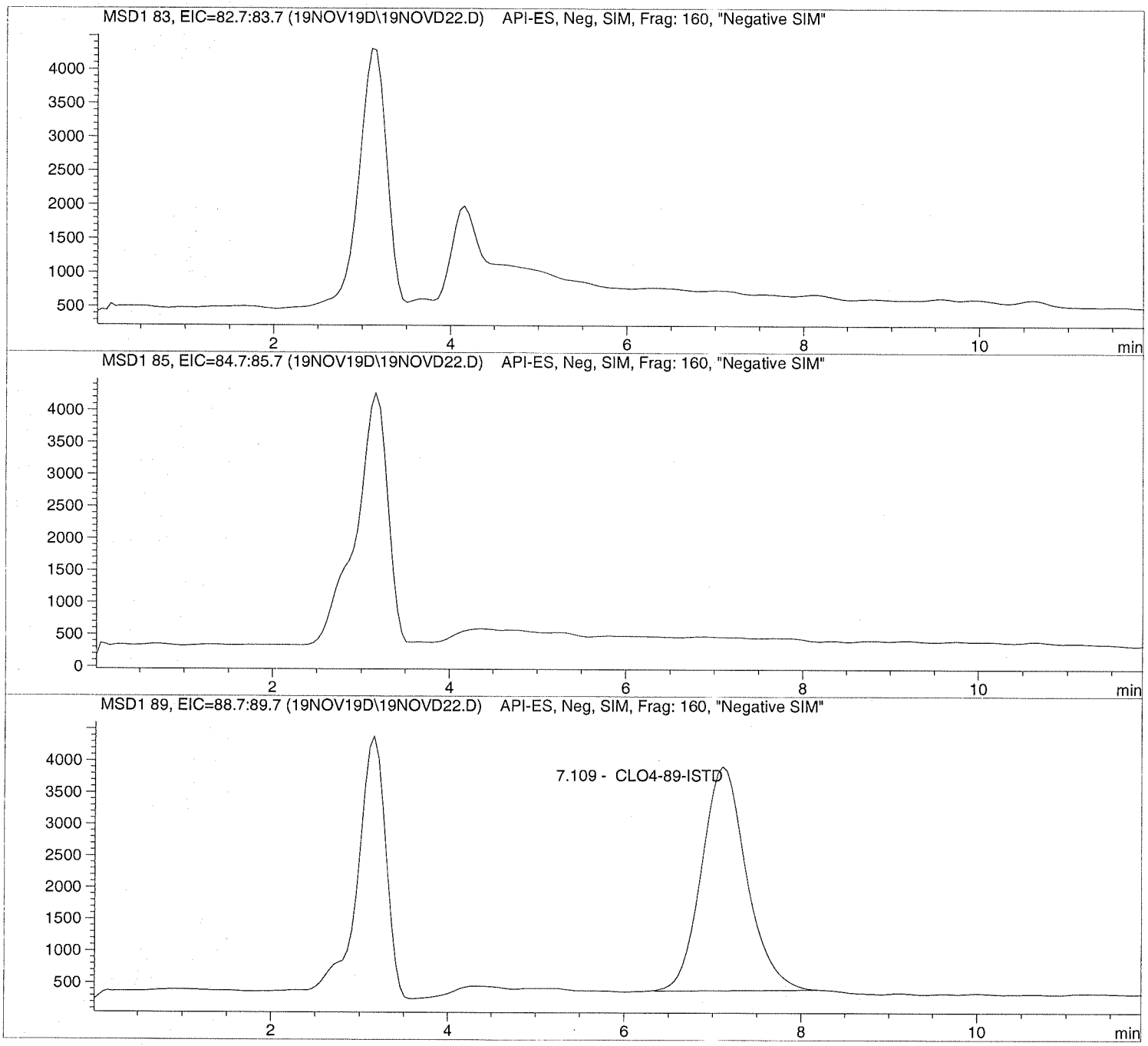
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD22.D Sample Name: 1932010004

Injection Date:	11/19/2019 13:40:18	Seq Line:	22
Sample Name:	1932010004	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD22.D Sample Name: 1932010004

Injection Date:	11/19/2019 13:40:18	Seq Line:	22
Sample Name:	1932010004	Location:	Vial 91
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.109	BBA	124695.0	5.0000	CLO4-89-ISTD

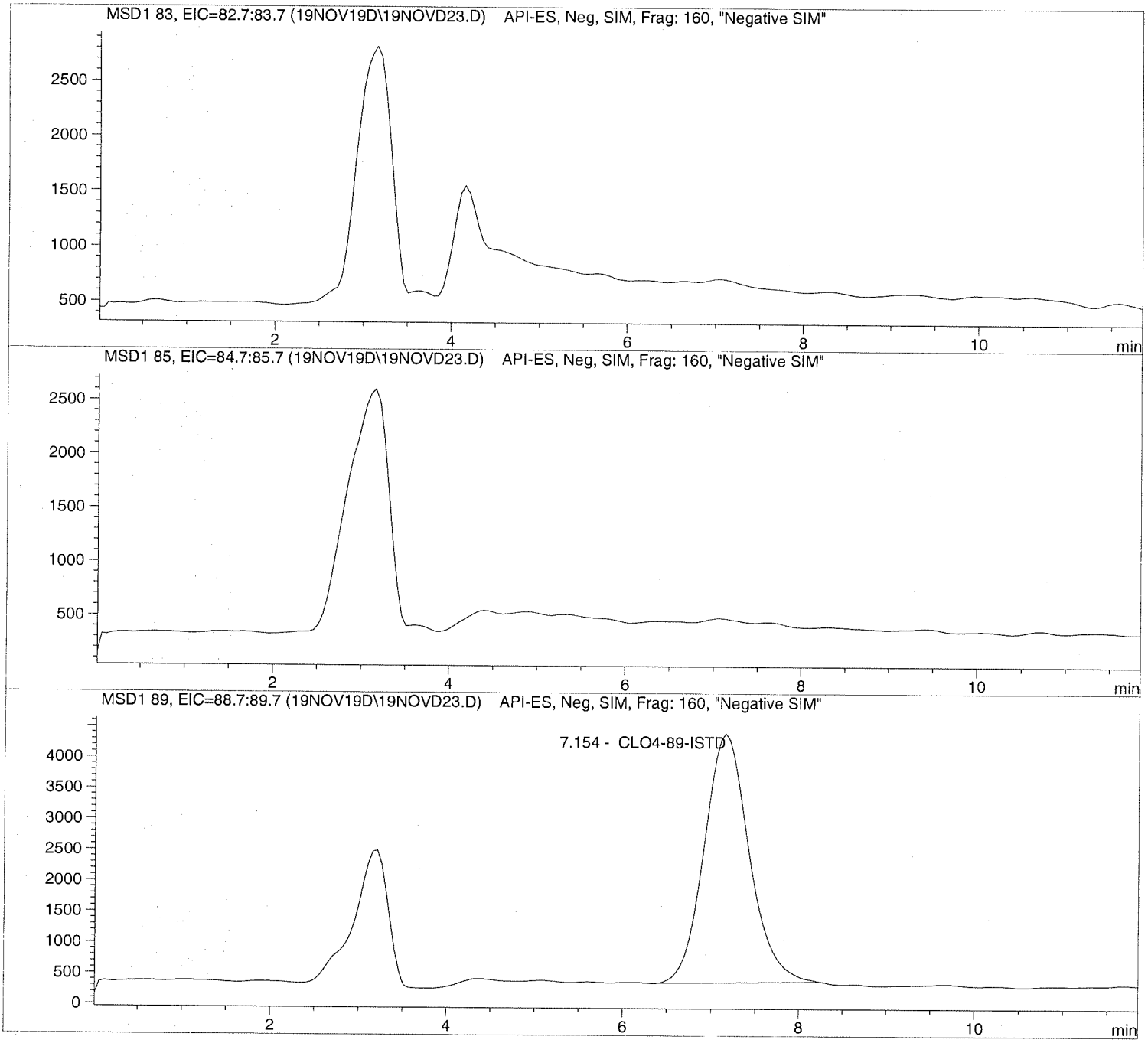
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD23.D Sample Name: 1932010005

Injection Date:	11/19/2019 13:54:05	Seq Line:	23
Sample Name:	1932010005	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD23.D Sample Name: 1932010005

Injection Date:	11/19/2019 13:54:05	Seq Line:	23
Sample Name:	1932010005	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.154	PBA	143110.0	5.0000	CLO4-89-ISTD

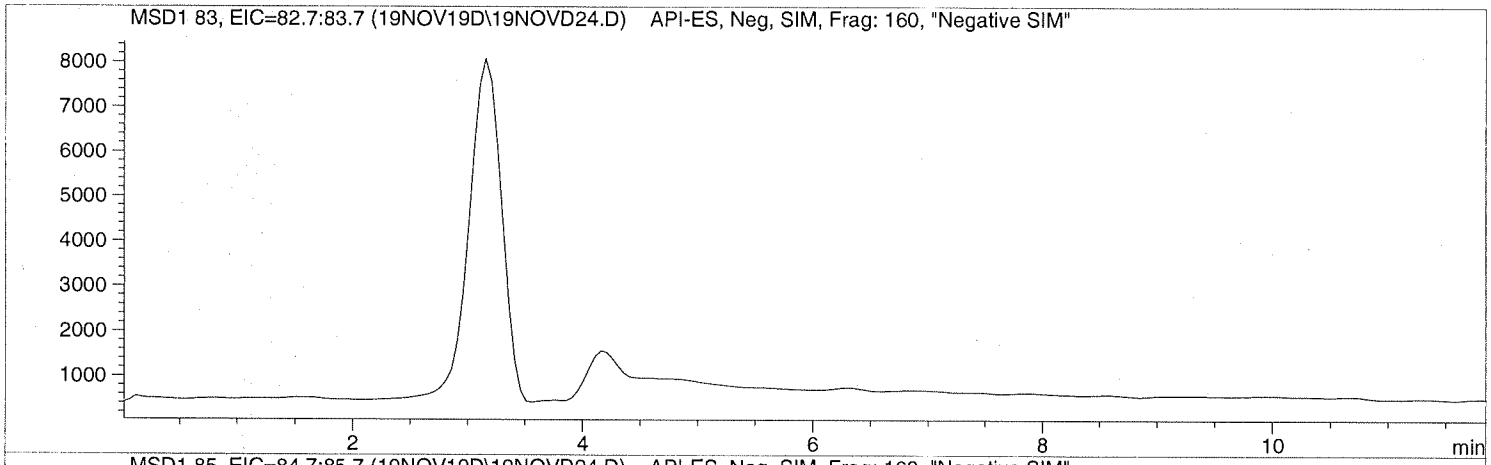
*** End of Report ***

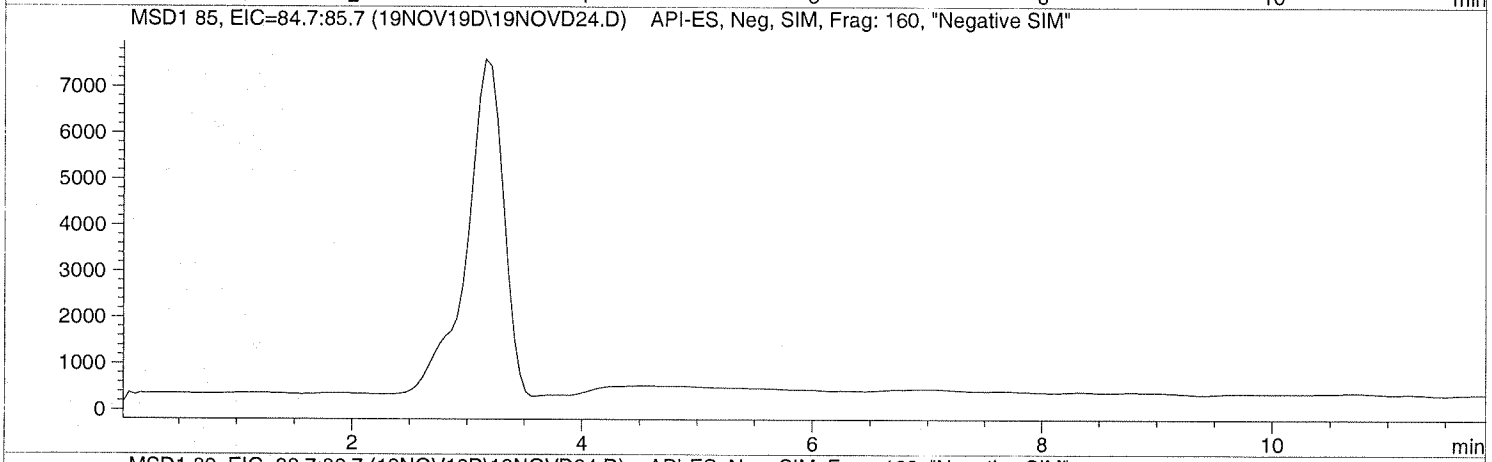
Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD24.D Sample Name: 1932010006

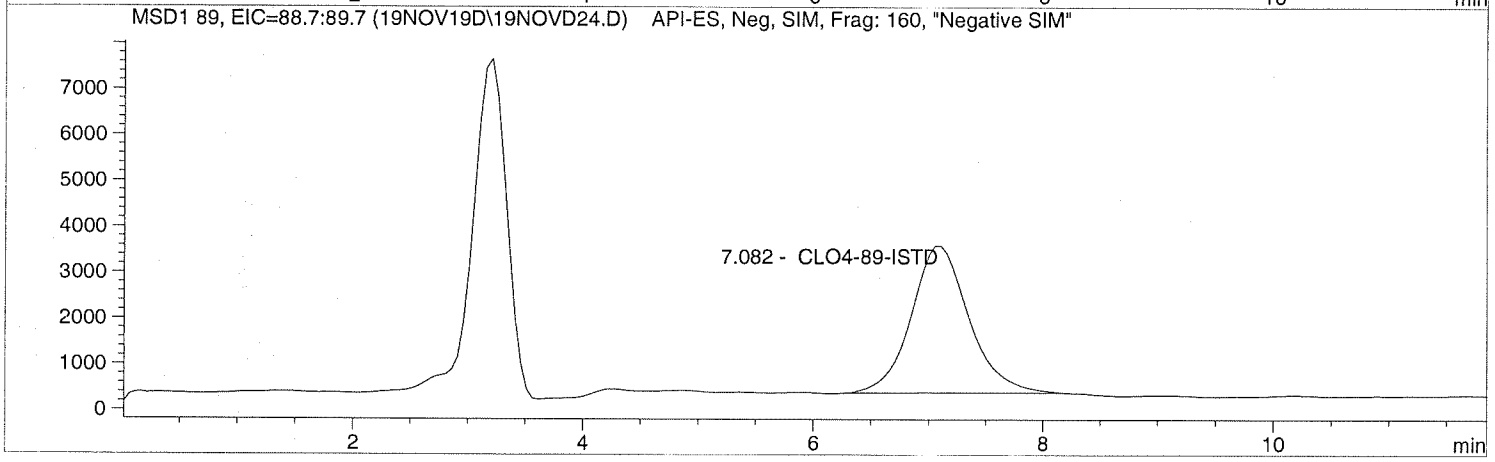
Injection Date:	11/19/2019 14:07:50	Seq Line:	24
Sample Name:	1932010006	Location:	Vial 93
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD24.D Sample Name: 1932010006

Injection Date:	11/19/2019 14:07:50	Seq Line:	24
Sample Name:	1932010006	Location:	Vial 93
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 23. Sep. 2019,00:20:59 pm
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
7.082	BBA	112592.4	5.0000	CLO4-89-ISTD

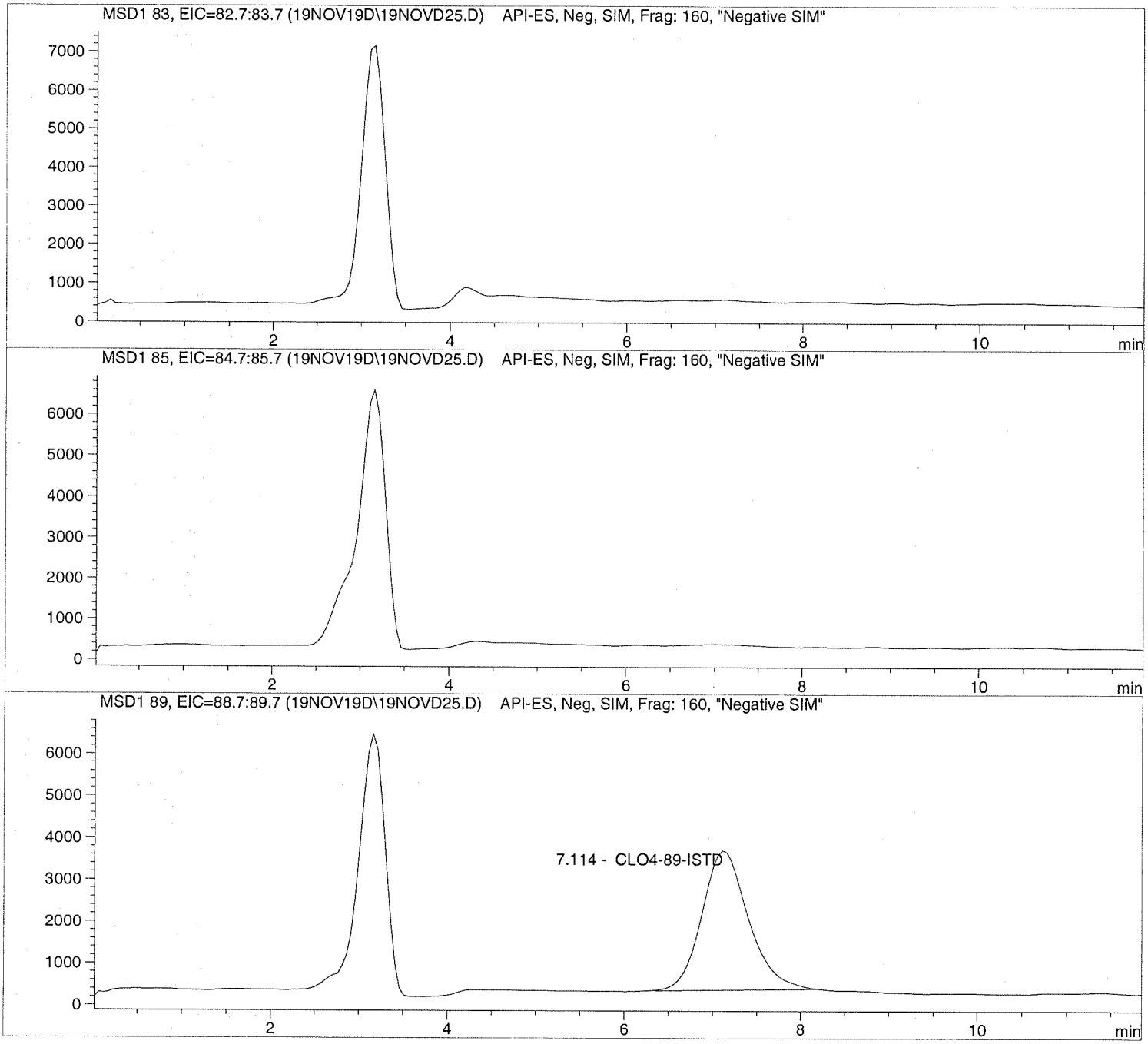
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD25.D Sample Name: 1932010007

Injection Date:	11/19/2019 14:21:39	Seq Line:	25
Sample Name:	1932010007	Location:	Vial 94
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD25.D Sample Name: 1932010007

Injection Date:	11/19/2019 14:21:39	Seq Line:	25
Sample Name:	1932010007	Location:	Vial 94
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.114	BBA	122347.6	5.0000	CLO4-89-ISTD

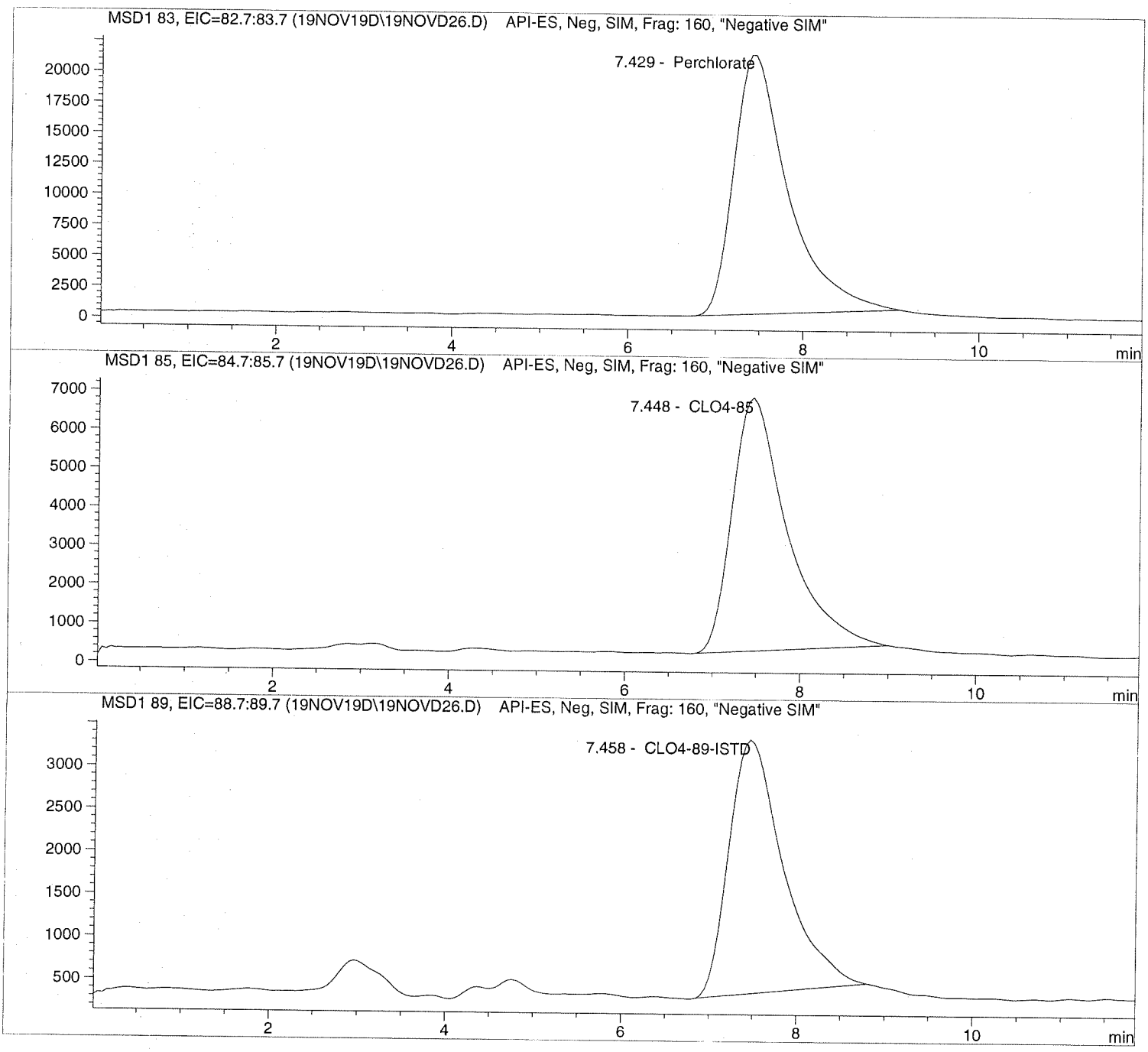
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD26.D Sample Name: 684810 CCV@25

Injection Date:	11/19/2019 14:35:25	Seq Line:	26
Sample Name:	684810 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD26.D Sample Name: 684810 CCV@25

Injection Date:	11/19/2019 14:35:25	Seq Line:	26
Sample Name:	684810 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.429	PBA	908551.0	24.2316	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.448	PBA	285244.9	24.8806	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.458	PBA	128522.3	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Calibration Table

Perchlorate

Calib. Data Modified : 9/23/2019 12:20:59 PM

Calculate : Internal Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : No recalibration if peaks missing

Curve Type : Quadratic (some peaks differ, see below)
Origin : Ignored (some peaks differ, see below)
Weight : Linear (Amnt) (some peaks differ, see below)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

Default Sample ISTD Information (if not set in sample table):

ISTD #	ISTD Amount	Name
1	5.00000	CLO4-89-ISTD

Signal 1: MSD1 83, EIC=82.7:83.7
Signal 2: MSD1 85, EIC=84.7:85.7
Signal 3: MSD1 89, EIC=88.7:89.7

RetTime [min]	Lvl Sig		Amount	Area	Amt/Area	Ref	Grp	Name
7.750	1	3	1.00000	5.39218e4	1.85454e-5		1	Perchlorate
		4	2.00000	1.32825e5	1.50574e-5			
		5	5.00000	2.76271e5	1.80982e-5			
		6	10.00000	5.61298e5	1.78159e-5			
		7	25.00000	1.51820e6	1.64669e-5			
		8	50.00000	3.31156e6	1.50986e-5			
		9	75.00000	5.23914e6	1.43153e-5			
7.767	3	3	5.00000	2.14568e5	2.33026e-5	+I1		CLO4-89-ISTD
		4	5.00000	2.04758e5	2.44190e-5			
		5	5.00000	2.13407e5	2.34294e-5			
		6	5.00000	2.09246e5	2.38953e-5			
		7	5.00000	2.07403e5	2.41077e-5			
		8	5.00000	2.02929e5	2.46391e-5			
		9	5.00000	1.97933e5	2.52611e-5			
7.778	2	3	1.00000	1.70436e4	5.86732e-5		1	CLO4-85
		4	2.00000	4.20754e4	4.75337e-5			
		5	5.00000	9.24707e4	5.40712e-5			
		6	10.00000	1.68622e5	5.93041e-5			
		7	25.00000	4.63724e5	5.39114e-5			
		8	50.00000	9.95933e5	5.02042e-5			

Method C:\HPCHEM\1\METHODS\CLO4-DP3.M

RetTime [min]	Lvl	Sig	Amount	Area	Amt/Area	Ref	Grp	Name
	9		75.00000	1.58066e6	4.74484e-5			

More compound-specific settings:

Compound: Perchlorate
- Time Window : From 3.581 min To 11.899 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 3 : 1
  - Level 4 : 0.5
  - Level 5 : 0.2
  - Level 6 : 0.1
  - Level 7 : 0.04
  - Level 8 : 0.02
  - Level 9 : 0.013333

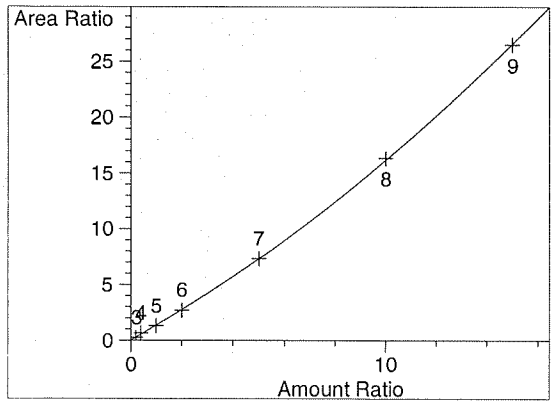
Compound: CLO4-89-ISTD
- Time Window : From 3.581 min To 11.896 min
- Curve Type : Linear
- Origin : Included
- Calibration Level Weights:/
  - Level 3 : 1
  - Level 4 : 1
  - Level 5 : 1
  - Level 6 : 1
  - Level 7 : 1
  - Level 8 : 1
  - Level 9 : 1

Compound: CLO4-85
- Time Window : From 3.601 min To 11.913 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 3 : 1
  - Level 4 : 0.5
  - Level 5 : 0.2
  - Level 6 : 0.1
  - Level 7 : 0.04
  - Level 8 : 0.02
  - Level 9 : 0.013333

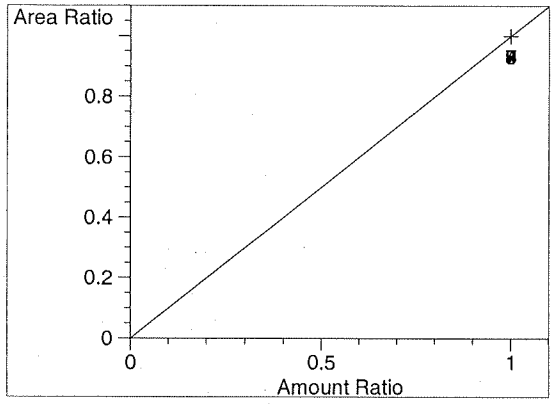
Peak Sum Table

No Entries in table

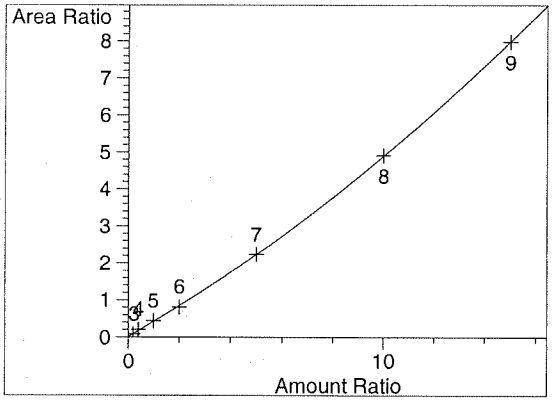
Calibration Curves



Perchlorate at exp. RT: 7.750
MSD1 83, EIC=82.7:83.7
Correlation: 0.99975
Residual Std. Dev.: 0.10284
Formula: $y = ax^2 + bx + c$
a: 3.10463e-2
b: 1.30369
c: 2.19496e-2
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 3 : 1
Level 4 : 0.5
Level 5 : 0.2
Level 6 : 0.1
Level 7 : 0.04
Level 8 : 0.02
Level 9 : 0.013333



CLO4-89-ISTD at exp. RT: 7.767
MSD1 89, EIC=88.7:89.7
Correlation: 1.00000
Residual Std. Dev.: 0.00000
Formula: $y = mx + b$
m: 1.00000
b: 0.00000
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 3 : 1
Level 4 : 1
Level 5 : 1
Level 6 : 1
Level 7 : 1
Level 8 : 1
Level 9 : 1



CLO4-85 at exp. RT: 7.778
MSD1 85, EIC=84.7:85.7
Correlation: 0.99969
Residual Std. Dev.: 0.02601
Formula: $y = ax^2 + bx + c$
a: 8.85207e-3
b: 3.99283e-1
c: 1.33505e-2
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 3 : 1
Level 4 : 0.5
Level 5 : 0.2
Level 6 : 0.1
Level 7 : 0.04
Level 8 : 0.02
Level 9 : 0.013333

Batch Report: C:\HPCHEM\1\DATA\20SEP19I\20SEP19D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DP3.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	5.39218e4	7.750	8.75982e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	1.32825e5	7.797	2.37682
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	2.76271e5	7.770	4.77237
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	5.61298e5	7.785	9.75097
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	1.51820e6	7.741	25.01082
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	3.31156e6	7.775	50.40300
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	5.23914e6	7.736	74.79107
#*	ICAL Verf@10ug/L	Vial 80	1	Control	11	5.74879e5	7.756	10.11855

#	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	2.14568e5	7.767	5.00000
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	2.04758e5	7.816	5.00000
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	2.13407e5	7.793	5.00000
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	2.09246e5	7.798	5.00000
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	2.07403e5	7.763	5.00000
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	2.02929e5	7.800	5.00000
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	1.97933e5	7.765	5.00000
#*	ICAL Verf@10ug/L	Vial 80	1	Control	11	2.06243e5	7.776	5.00000

#	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
#*	CLO4@ 1.0ug/L	Vial 73	1	Control	3	1.70436e4	7.778	8.24488e-1
#*	CLO4@ 2.0ug/L	Vial 74	1	Control	4	4.20754e4	7.805	2.38090
#*	CLO4@ 5.0ug/L	Vial 75	1	Control	5	9.24707e4	7.787	5.14166
#*	CLO4@ 10.ug/L	Vial 76	1	Control	6	1.68622e5	7.781	9.52209
#*	CLO4@ 25.ug/L	Vial 77	1	Control	7	4.63724e5	7.760	25.04916
#*	CLO4@ 50.ug/L	Vial 78	1	Control	8	9.95933e5	7.793	50.14223
#*	CLO4@ 75.ug/L	Vial 79	1	Control	9	1.58066e6	7.758	74.93659
#*	ICAL Verf@10ug/L	Vial 80	1	Control	11	1.71000e5	7.760	9.79043

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

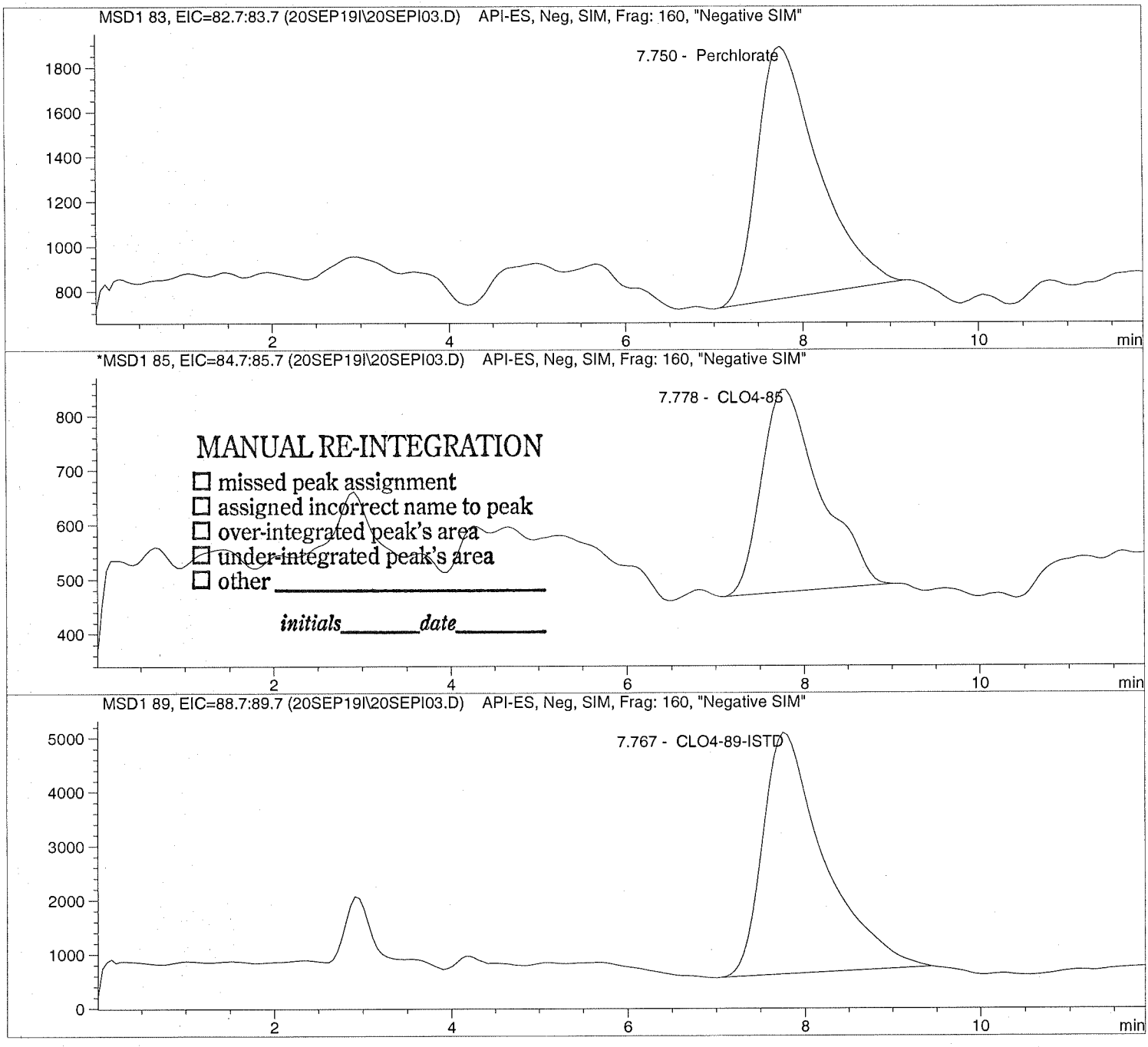
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	CLO4@ 0.2ug/L	CLO4-AQN	1	Ctrl Samp		
2	Vial 72	CLO4@ 0.5ug/L	CLO4-AQN	1	Ctrl Samp		
3	Vial 73	CLO4@ 1.0ug/L	CLO4-AQN	1	Ctrl Samp		
4	Vial 74	CLO4@ 2.0ug/L	CLO4-AQN	1	Ctrl Samp		
5	Vial 75	CLO4@ 5.0ug/L	CLO4-AQN	1	Ctrl Samp		
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 71	CLO4@ 0.2ug/L	CLO4-AQN	1	Ctrl Samp		
11	Vial 80	ICAL Verf@10ug/L	CLO4-AQN	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	9/20/2019 09:24:05	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	9/20/2019 09:24:05	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.750	PBA	53921.8	0.8760	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.778	MM	17043.6	0.8245	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.767	PBA	214568.1	5.0000	CLO4-89-ISTD

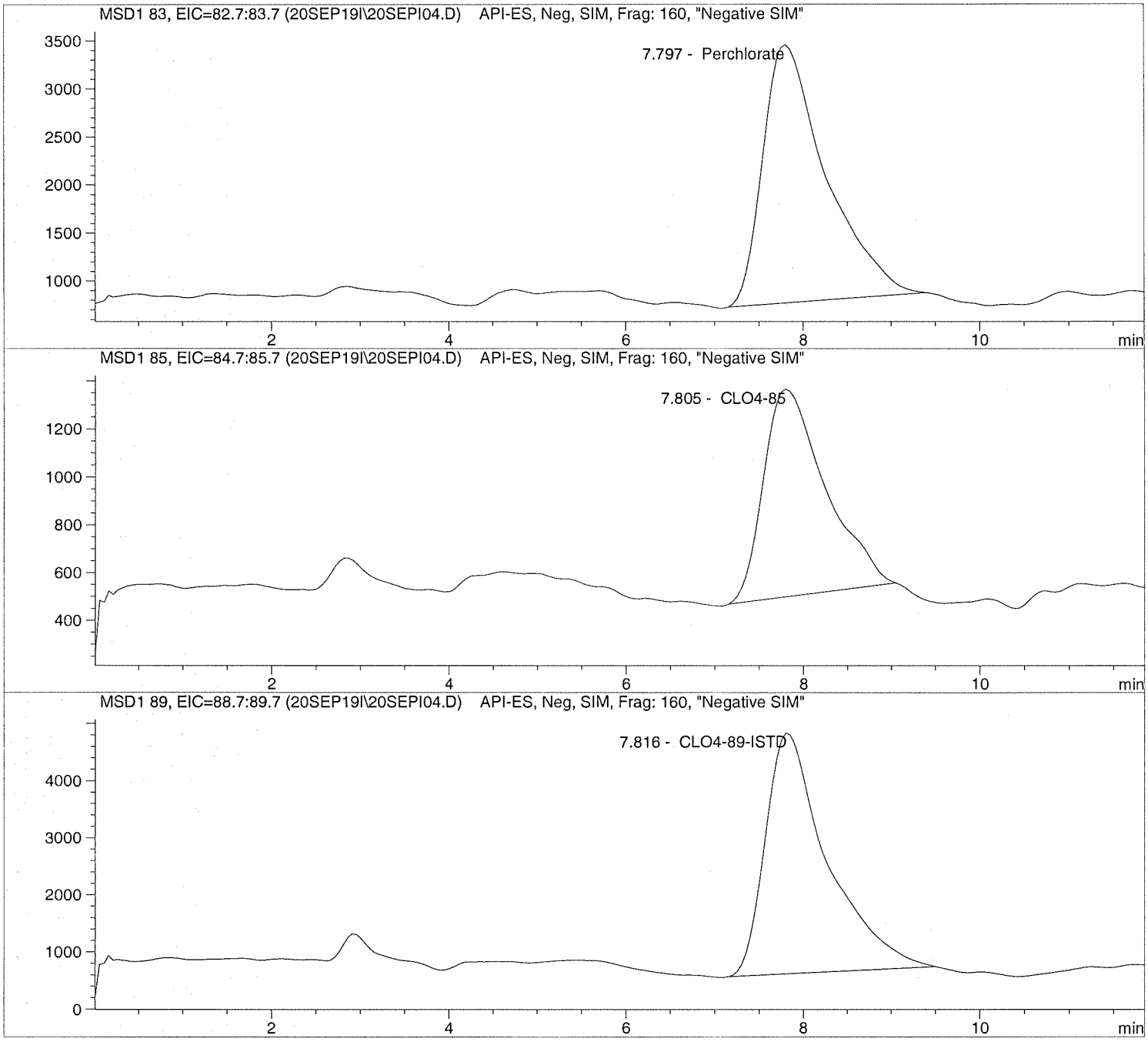
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	9/20/2019 09:37:58	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI04.D Sample Name: CLO4@ 2.0ug/L

Injection Date:	9/20/2019 09:37:58	Seq Line:	4
Sample Name:	CLO4@ 2.0ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.797	PBA	132825.2	2.3768	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.805	PBA	42075.4	2.3809	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.816	PBA	204758.3	5.0000	CLO4-89-ISTD

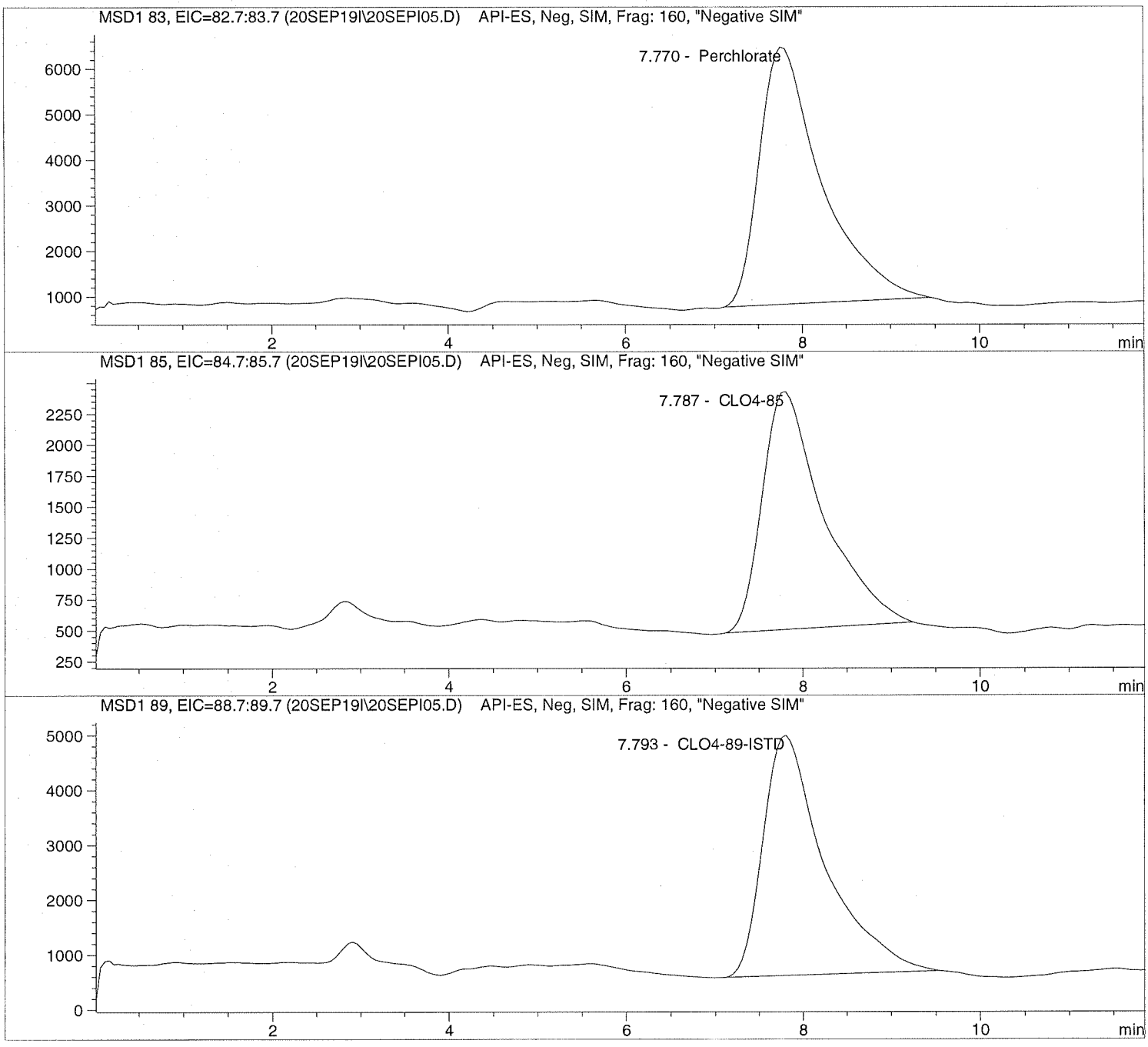
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	9/20/2019 09:51:49	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI05.D Sample Name: CLO4@ 5.0ug/L

Injection Date:	9/20/2019 09:51:49	Seq Line:	5
Sample Name:	CLO4@ 5.0ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed:	9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.770	PBA	276270.7	4.7724	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.787	PBA	92470.7	5.1417	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.793	PBA	213407.0	5.0000	CLO4-89-ISTD

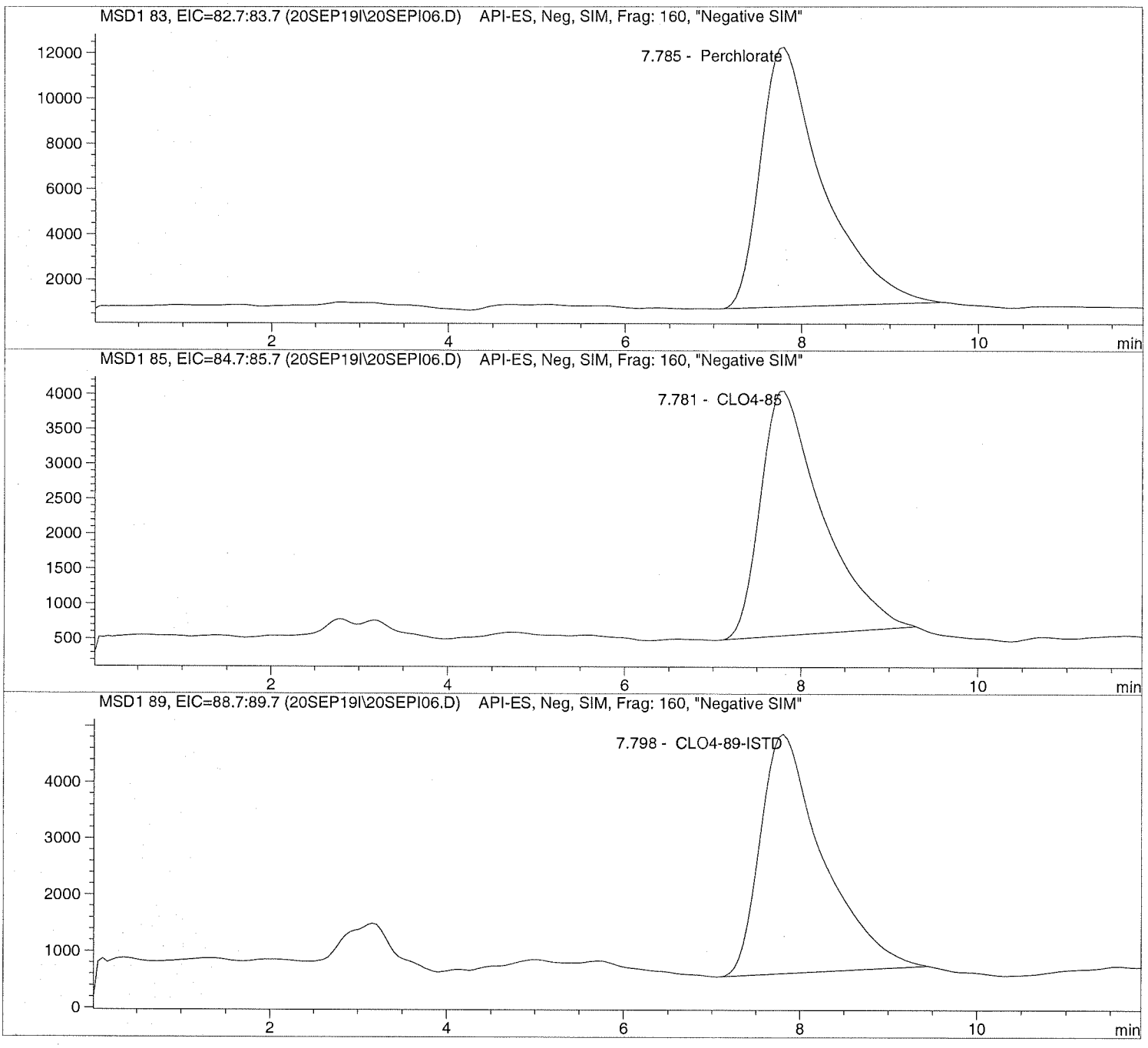
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	9/20/2019 10:05:36	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI06.D Sample Name: CLO4@ 10.ug/L

Injection Date:	9/20/2019 10:05:36	Seq Line:	6
Sample Name:	CLO4@ 10.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.785	PBA	561297.7	9.7510	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.781	PBA	168622.4	9.5221	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.798	PBA	209246.3	5.0000	CLO4-89-ISTD

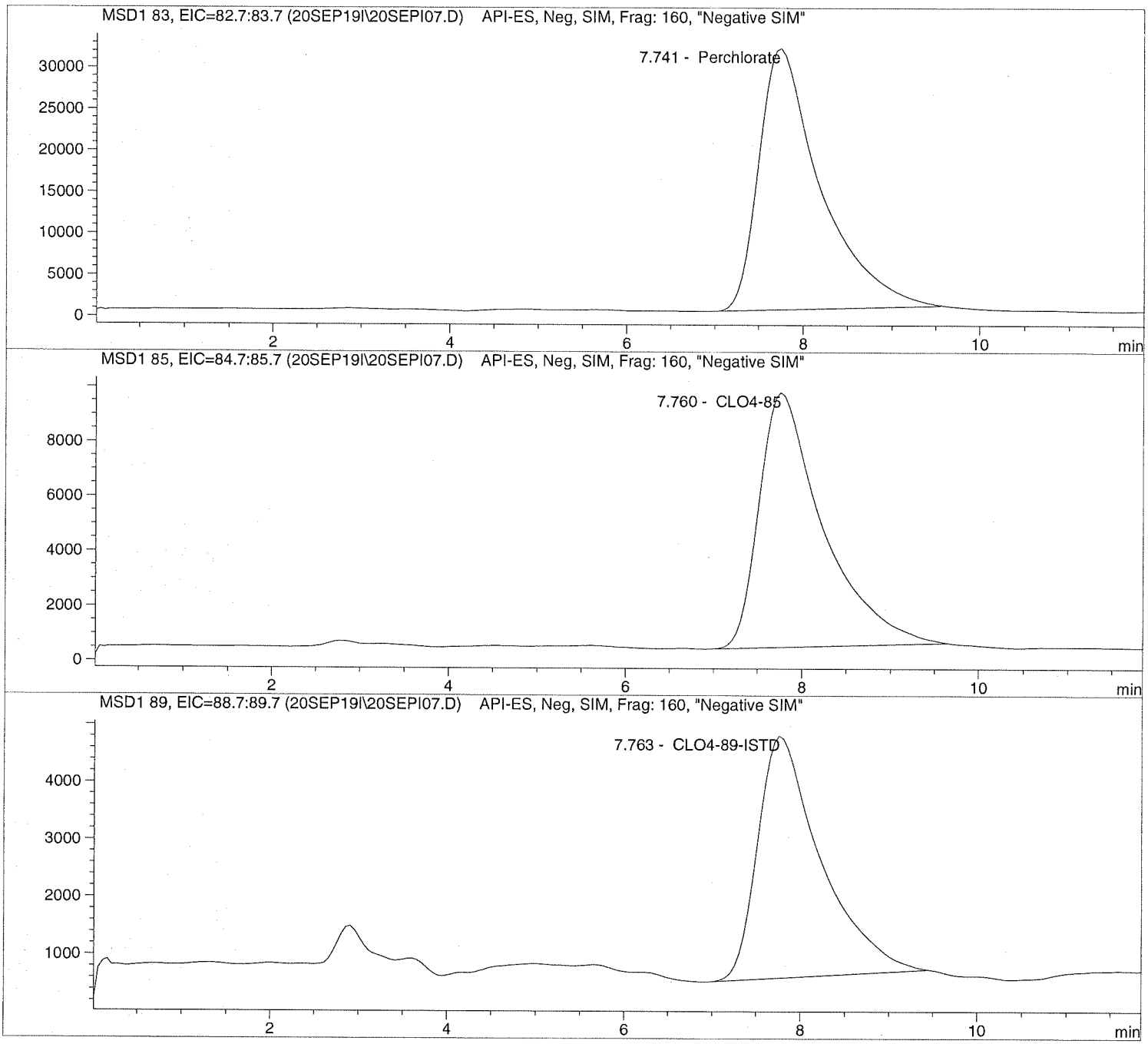
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	9/20/2019 10:19:23	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI07.D Sample Name: CLO4@ 25.ug/L

Injection Date:	9/20/2019 10:19:23	Seq Line:	7
Sample Name:	CLO4@ 25.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.741	PBA	1518197.9	25.0108	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.760	PBA	463724.0	25.0492	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.763	PBA	207402.8	5.0000	CLO4-89-ISTD

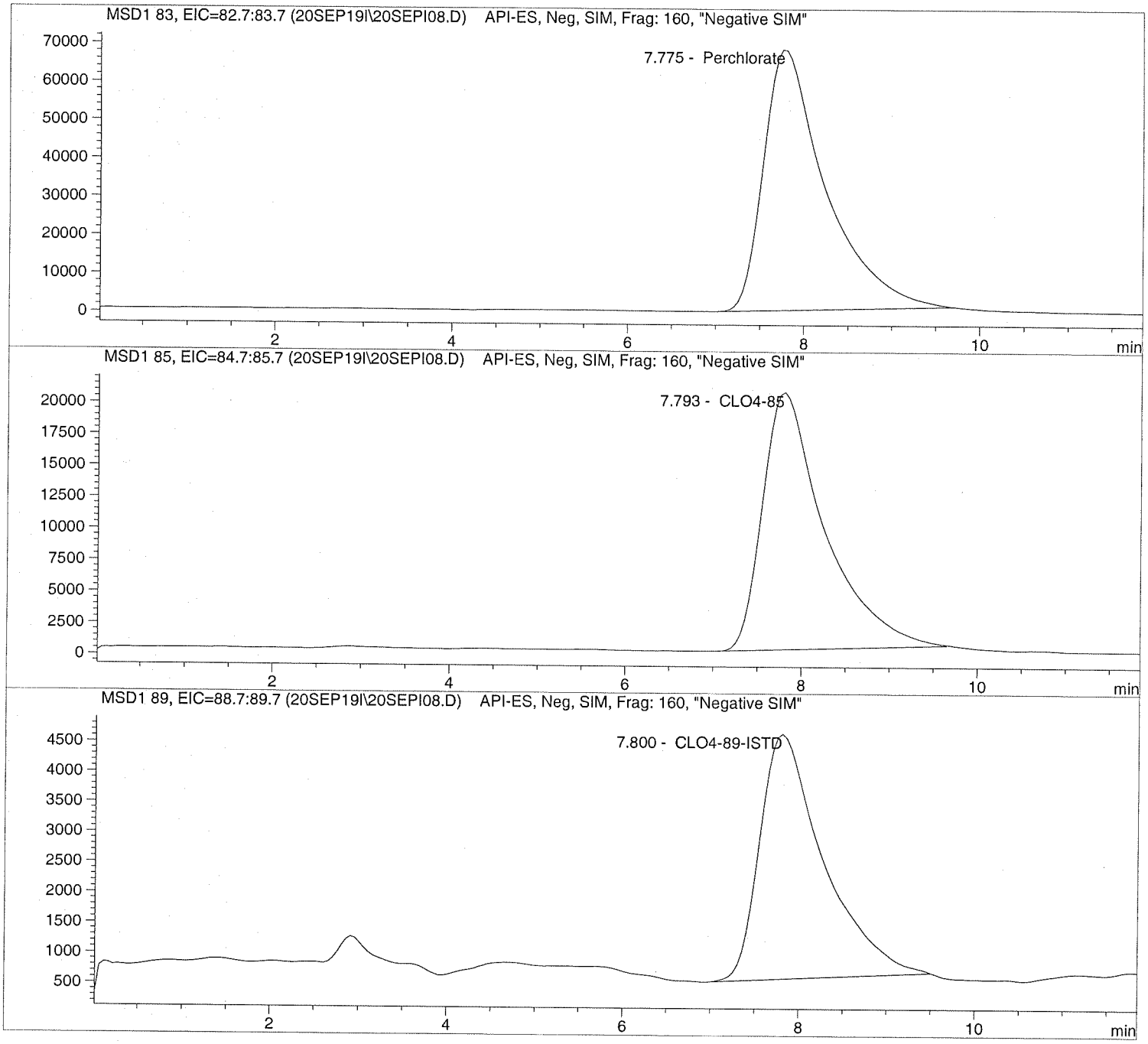
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	9/20/2019 10:33:18	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI08.D Sample Name: CLO4@ 50.ug/L

Injection Date:	9/20/2019 10:33:18	Seq Line:	8
Sample Name:	CLO4@ 50.ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.775	PBA	3311559.2	50.4030	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.793	PBA	995933.0	50.1422	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.800	PBA	202929.2	5.0000	CLO4-89-ISTD

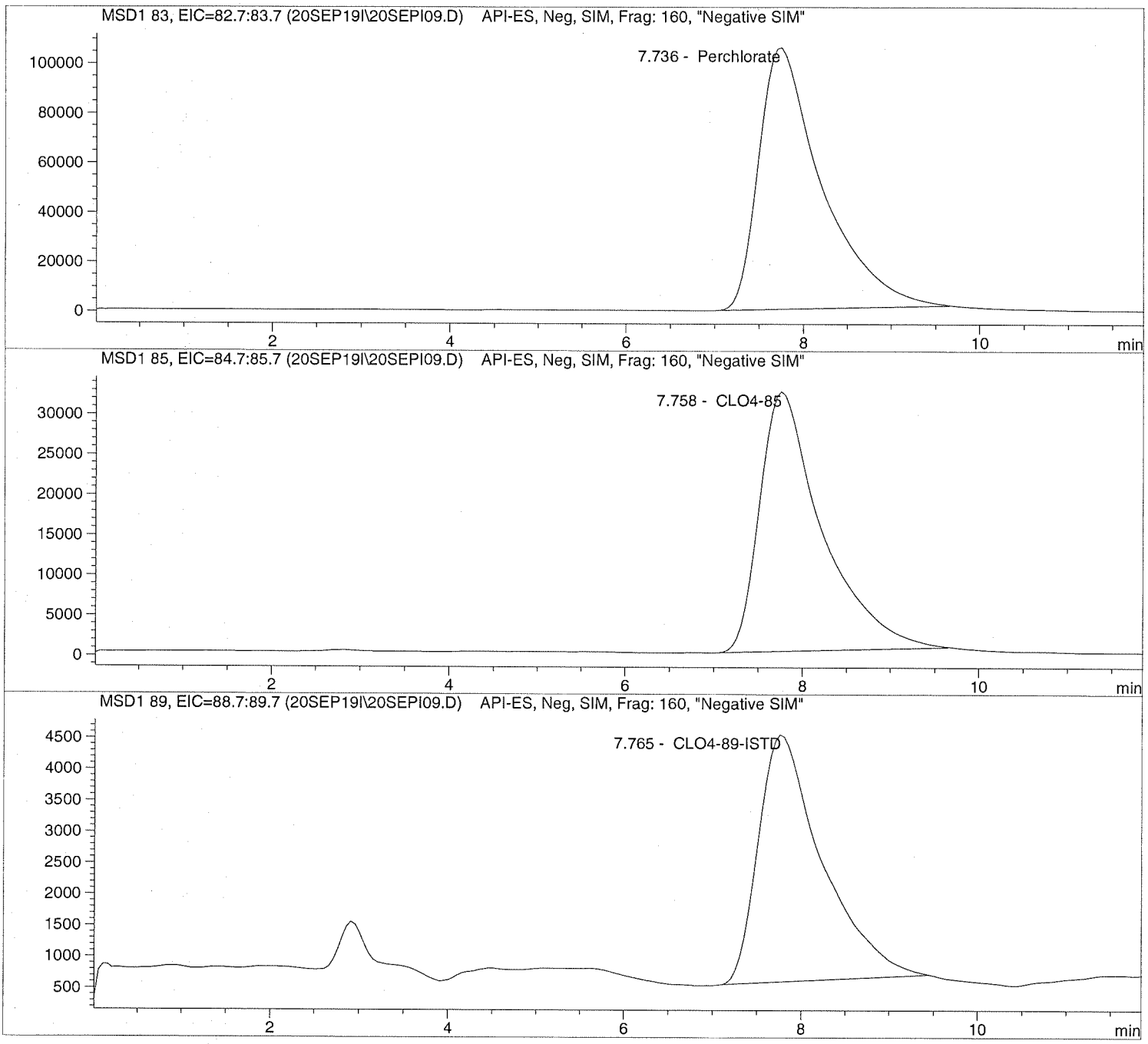
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	9/20/2019 10:47:05	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI09.D Sample Name: CLO4@ 75.ug/L

Injection Date:	9/20/2019 10:47:05	Seq Line:	9
Sample Name:	CLO4@ 75.ug/L	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method:	CLO4-AQN.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed:	9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.736	PBA	5239145.0	74.7911	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.758	PBA	1580664.2	74.9366	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.765	PBA	197932.5	5.0000	CLO4-89-ISTD

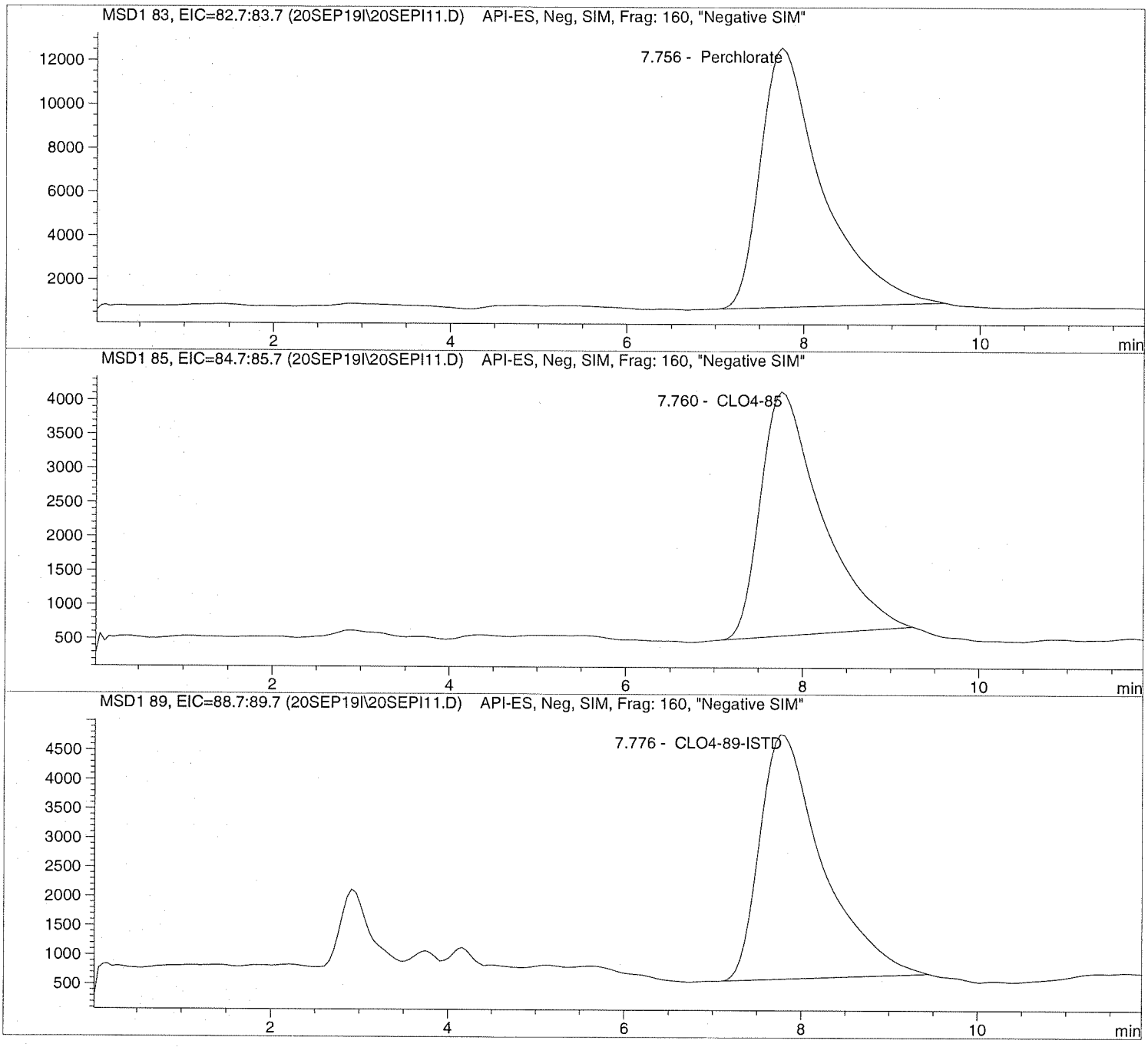
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI11.D Sample Name: ICAL Verf@10ug/L

Injection Date:	9/20/2019 11:14:45	Seq Line:	11
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI11.D Sample Name: ICAL Verf@10ug/L

Injection Date:	9/20/2019 11:14:45	Seq Line:	11
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:21:47

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.756	PBA	574879.4	10.1185	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.760	PBA	171000.4	9.7904	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.776	PBA	206243.3	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

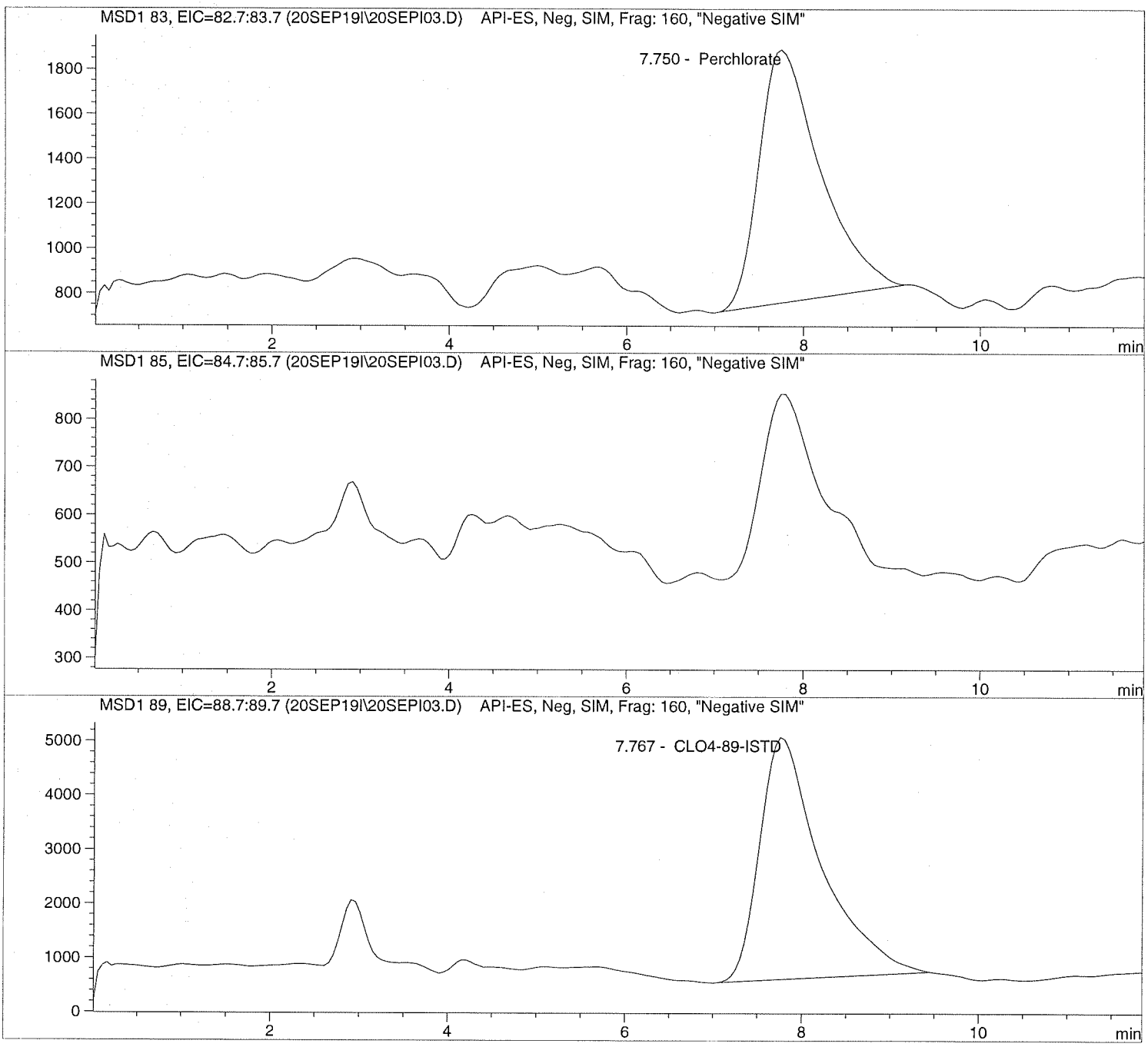
Unmodified

Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	9/20/2019 09:24:05	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:27:11

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\20SEP19I\20SEPI03.D Sample Name: CLO4@ 1.0ug/L

Injection Date:	9/20/2019 09:24:05	Seq Line:	3
Sample Name:	CLO4@ 1.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 9/23/2019 12:27:11

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
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
7.750	PBA	53921.8	0.8760	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
7.767	PBA	214568.1	5.0000	CLO4-89-ISTD

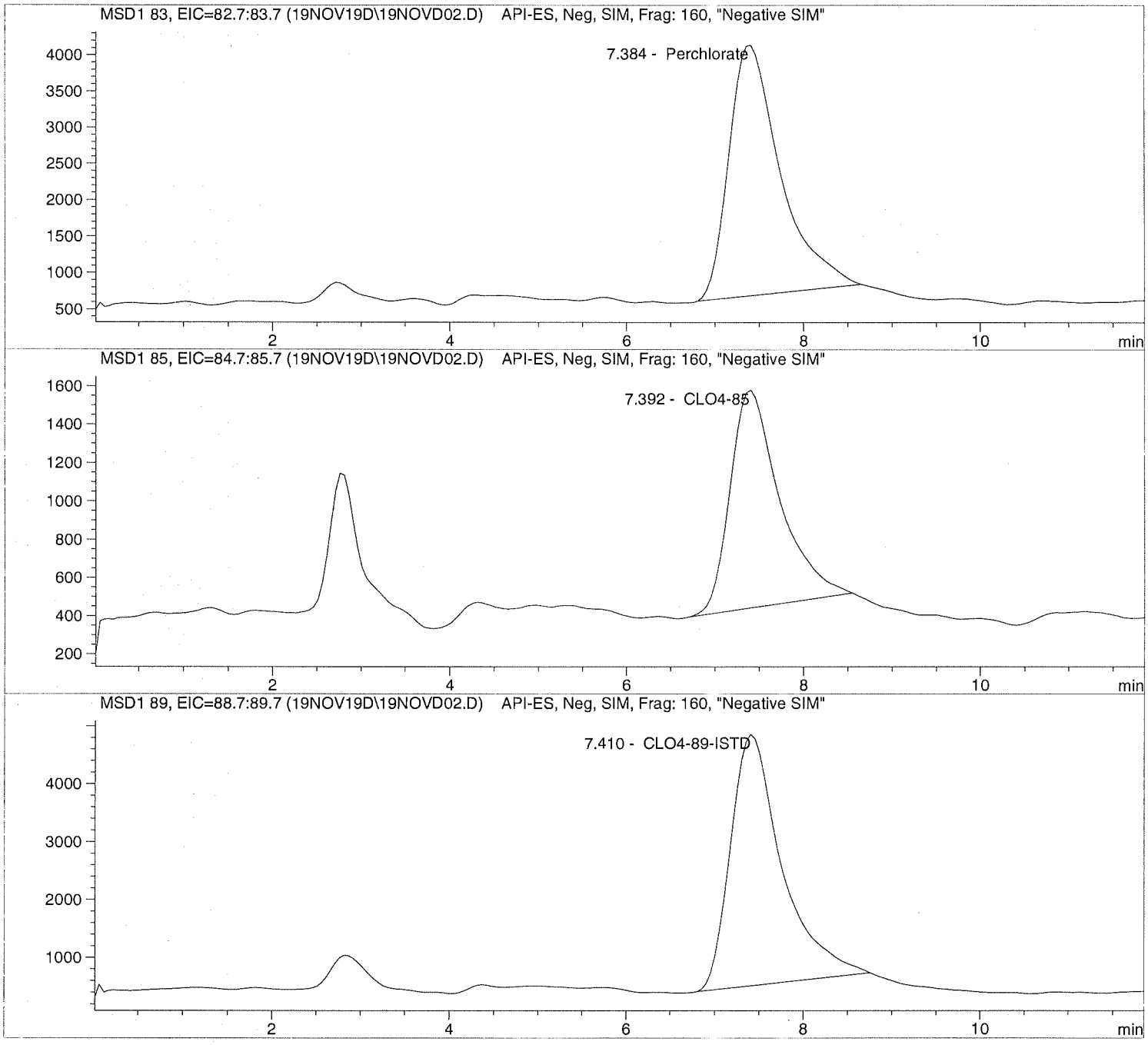
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD02.D Sample Name: 684805 QC@3.0

Injection Date:	11/19/2019 09:04:34	Seq Line:	2
Sample Name:	684805 QC@3.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19NOV19D\19NOVD02.D Sample Name: 684805 QC@3.0

Injection Date:	11/19/2019 09:04:34	Seq Line:	2
Sample Name:	684805 QC@3.0	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	30 µl

Acq. Method: CLO4-AQN.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DP3.M
Last Changed: 11/5/2019 08:44:45

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 23. Sep. 2019,00:20:59 pm
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	3.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.384	PBA	139068.9	2.9298	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.392	PBA	44210.1	2.9647	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
7.410	PBA	174596.2	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
www.alsglobal.com

WorkOrder: HS19110796

LHAAP-50 501032

Aptim Environmental & Infrastucture, Inc.

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

03-Dec-2019

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

December 03, 2019

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

Work Order: **HS19110796**

Laboratory Results for: **LHAAP-50 501032**

Dear Susan,

ALS Environmental received 4 sample(s) on Nov 15, 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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-50 501032
Work Order: HS19110796

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS19110796-01	04WW09-191113-Post-inj	GW		13-Nov-2019 13:35	15-Nov-2019 08:45	☐
HS19110796-02	04WW05-191113-Post-inj	GW		13-Nov-2019 14:30	15-Nov-2019 08:45	☐
HS19110796-03	04WW07-191113-Post-inj	GW		13-Nov-2019 15:20	15-Nov-2019 08:45	☐
HS19110796-04	04WW010-191113-Post-inj	GW		13-Nov-2019 16:20	15-Nov-2019 08:45	☐

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-50 501032
Work Order: HS19110796

CASE NARRATIVE

Work Order Comments

- The analysis for TOC was subcontracted to ALS Kelso WA. Final report attached.

Client: Aptim Environmental & Infrastucture, Inc.
ANALYTICAL REPORT
Project: LHAAP-50 501032 WorkOrder:HS19110796
Sample ID: 04WW09-191113-Post-inj Lab ID:HS19110796-01
Collection Date: 13-Nov-2019 13:35 Matrix:GW

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	03-Dec-2019 09:38

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

Client: Aptim Environmental & Infrastucture, Inc.
ANALYTICAL REPORT
Project: LHAAP-50 501032 WorkOrder:HS19110796
Sample ID: 04WW05-191113-Post-inj Lab ID:HS19110796-02
Collection Date: 13-Nov-2019 14:30 Matrix:GW

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	03-Dec-2019 09:38

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-50 501032
Sample ID: 04WW07-191113-Post-inj
Collection Date: 13-Nov-2019 15:20

ANALYTICAL REPORT
WorkOrder:HS19110796
Lab ID:HS19110796-03
Matrix:GW

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	03-Dec-2019 09:38

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

Client: Aptim Environmental & Infrastucture, Inc.
ANALYTICAL REPORT
Project: LHAAP-50 501032 WorkOrder:HS19110796
Sample ID: 04WW010-191113-Post-inj Lab ID:HS19110796-04
Collection Date: 13-Nov-2019 16:20 Matrix:GW

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - TOC ANALYSIS		**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	03-Dec-2019 09:38

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

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-50 501032
WorkOrder: HS19110796

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R351628 (0)	**Test Name :** SUBCONTRACT ANALYSIS - TOC ANALYSIS				**Matrix:** GW	
HS19110796-01	04WW09-191113-Post-inj	13 Nov 2019 13:35			03 Dec 2019 09:38	1
HS19110796-02	04WW05-191113-Post-inj	13 Nov 2019 14:30			03 Dec 2019 09:38	1
HS19110796-03	04WW07-191113-Post-inj	13 Nov 2019 15:20			03 Dec 2019 09:38	1
HS19110796-04	04WW010-191113-Post-inj	13 Nov 2019 16:20			03 Dec 2019 09:38	1

Client: Aptim Environmental & Infrastucture, Inc.
Project: LHAAP-50 501032
WorkOrder: **HS19110796**

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
Arkansas	19-028-0	27-Mar-2020
California	2919, 2019-2020	30-Apr-2020
Dept of Defense	ANAB L2231	20-Dec-2021
Florida	E87611-28	30-Jun-2020
Illinois	2000322019-2	09-May-2020
Kansas	E-10352 2019-2020	31-Jul-2020
Kentucky	123043, 2019-2020	30-Apr-2020
Louisiana	03087, 2019-2020	30-Jun-2020
Maryland	343, 2019-2020	30-Jun-2020
North Carolina	624-2019	31-Dec-2019
North Dakota	R-193 2019-2020	30-Apr-2020
Oklahoma	2019-067	31-Aug-2020
Texas	TX104704231-19-23	30-Apr-2020

Sample Receipt Checklist

Client Name: CBI-Houston
Work Order: HS19110796

Date/Time Received: **15-Nov-2019 08:45**
Received by: **AC**

Checklist completed by: *Asad Chaudhry* eSignature — 15-Nov-2019 Date

Reviewed by: *RJ Modashia* eSignature — 15-Nov-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):	0.9c U/C	IR 25	
Cooler(s)/Kit(s):	42935		
Date/Time sample(s) sent to storage:	11/15/2019 15:00		
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:

APTIM

Page 1 of 1

COC ID: LHAAP04 Post Injection Nov 2019-191113 TURNAROUND TIME: Standard RUSH: No

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-50			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, Suite 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

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Sample Container and Preservatives: 2-40ml Amber/H2SO4 — ANALYSIS: TOC by SM5310C
04WW09-191113-Post-Inj	LHAAP04 / 04WW09	3.81	4.1	FT	GW	11/13/2019	1335	2	2
04WW05-191113-Post-Inj	LHAAP04 / 04WW05	7.65	7.83	FT	GW	11/13/2019	1430	2	2
04WW07-191113-Post-Inj	LHAAP04 / 04WW07	8.85	9.26	FT	GW	11/13/2019	1520	2	2
04WW10-191113-Post-Inj	LHAAP04 / 04WW19	4.75	5.5	FT	GW	11/13/2019	1620	2	2

HS19110796

Aptim Environmental & Infrastucture, Inc.

LHAAP-50 501032

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	[illegible] APTIM/LHAAP		AC.	11/15/19 0830

AC.
4293S 0.90
412
Chloride

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

42935

CUSTODY SEAL

Date: 11-14-19 Time: 1825
Name: [illegible]
Company: [illegible]

Seal Broken By: SM
Date: 11/15/19

42935

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

42935

CUSTODY SEAL

Date: 11-14-19 Time: 1825
Name: [illegible]
Company: [illegible]

Seal Broken By: SM
Date: 11/15/19

Must Deliver Next Business Day
Time and Temperature Sensitive!

42935

ORIGIN ID:SGRA (903) 930-6193
SCOTT BEESINGER
APTIM ENVIRONMENTAL & INFASTRUCTURE
1203-B EAST GRAND AVE
PMB 202
MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 07FEB19
ACTWGT: 1.00 LB MAN
CAD: 3001307CAFF3108

TO CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: LHAAP-37-RJ
RMA:

FedEx Express

FedEx
TRK# 0221 7376 9752 2644

FRI - 15 NOV 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US IAH

#475878 11/14 5671J/F338/05A2

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

December 02, 2019 **Analytical Report for Service Request No:** K1910847

RJ Modashia
ALS Laboratory Group
10450 Stancliff Road
Suite 210
Houston, TX 77099-4338

RE: HS19110796

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory November 16, 2019
For your reference, these analyses have been assigned our service request number **K1910847.**

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

RIGHT SOLUTIONS | RIGHT PARTNER

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
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

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Client: ALS Environmental - US
Project: HS19110796
Sample Matrix: Ground Water

Service Request: K1910847
Date Received: 11/16/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

Four ground water samples were received for analysis at ALS Environmental on 11/16/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 12/02/2019

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

KL9110847

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

SAMPLING STATE: **Texas** **COC ID:** **12645**

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:	HS19110796
TSR:	Sonia West

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS19110796-01**	**04WW09-191113-Post-inj**	**GW**	**13 Nov 2019 13:35**
	TOC Analysis with DOD Level IV/EQuIS APTIM EDD			03 Dec 2019
2.	**HS19110796-02**	**04WW05-191113-Post-inj**	**GW**	**13 Nov 2019 14:30**
	TOC Analysis with DOD Level IV/EQuIS APTIM EDD			03 Dec 2019
3.	**HS19110796-03**	**04WW07-191113-Post-inj**	**GW**	**13 Nov 2019 15:20**
	TOC Analysis with DOD Level IV/EQuIS APTIM EDD			03 Dec 2019
4.	**HS19110796-04**	**04WW010-191113-Post-inj**	**GW**	**13 Nov 2019 16:20**
	TOC Analysis with DOD Level IV/EQuIS APTIM EDD			03 Dec 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: 11/15/19 1800

Received By: A Rodersky Date/Time: 11/16/19 1025

Cooler ID(s): _____ Temperature(s): _____

PC KL

Cooler Receipt and Preservation Form

lient ALS Houston Service Request *K19* 10847

eceived: 11/16/19 Opened: 11/16/19 By: AP Unloaded: 11/16/19 By: AP

Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*

Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*

Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 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
-0.8	-0.6	0.2	0.4	0.2	402		1251 0791 6844	
						12645		
						12642		

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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1317 South 13th Avenue, Kelso, WA 98626
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Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K1910847
Project:	HS19110796	**Date Collected:**	11/13/19
Sample Matrix:	Ground Water	**Date Received:**	11/16/19
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
04WW09-191113-Post-inj	K1910847-001	**680**	10	4	2	20	11/23/19 22:55	
04WW05-191113-Post-inj	K1910847-002	**32.8**	0.50	0.20	0.07	1	11/23/19 23:23	
04WW07-191113-Post-inj	K1910847-003	**35.3**	0.50	0.20	0.07	1	11/23/19 23:51	
04WW010-191113-Post-inj	K1910847-004	**65**	10	4	2	20	11/26/19 13:58	
Method Blank	K1910847-MB1	ND U	0.50	0.20	0.07	1	11/23/19 17:14	
Method Blank	K1910847-MB2	ND U	0.50	0.20	0.07	1	11/26/19 13:13	

QA/QC Report

Client:	ALS Environmental - US	**Service Request:**	K1910847
Project	HS19110796	**Date Collected:**	11/13/19
Sample Matrix:	Ground Water	**Date Received:**	11/16/19
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
04WW09-191113-Post-inj	K1910847-001DUP	10	4	2	680	676	678	<1	10	11/23/19
04WW05-191113-Post-inj	K1910847-002DUP	0.50	0.20	0.07	32.8	32.4	32.6	1	10	11/23/19
04WW07-191113-Post-inj	K1910847-003DUP	0.50	0.20	0.07	35.3	34.8	35.0	1	10	11/23/19
04WW010-191113-Post-inj	K1910847-004DUP	10	4	2	65	65	64.9	<1	10	11/26/19

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.

Client:	ALS Environmental - US	**Service Request:**	K1910847
Project:	HS19110796	**Date Analyzed:**	11/23/19
Sample Matrix:	Ground 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:	661076

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1910847-LCS1	24.7	25.0	99	83-117

Client:	ALS Environmental - US	**Service Request:**	K1910847
Project:	HS19110796	**Date Analyzed:**	11/26/19
Sample Matrix:	Ground 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:	661464

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1910847-LCS2	25.0	25.0	100	83-117

Client: ALS Environmental - US **Service Request:** K1910847
Project: HS19110796

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	661076	KQ1917446-01	11/23/19 16:45	25.0	24.5	98	90-110
CCV2	661076	KQ1917446-02	11/23/19 21:01	25.0	24.6	98	90-110
CCV3	661076	KQ1917446-03	11/24/19 02:11	25.0	24.6	98	90-110
CCV4	661076	KQ1917446-04	11/24/19 06:54	25.0	24.2	97	90-110
CCV5	661464	KQ1917720-01	11/26/19 12:44	25.0	24.4	98	90-110
CCV6	661464	KQ1917720-02	11/26/19 17:01	25.0	24.8	99	90-110
CCV7	661464	KQ1917720-03	11/26/19 22:11	25.0	24.4	97	90-110
CCV8	661464	KQ1917720-04	11/27/19 02:54	25.0	24.6	98	90-110

Client: ALS Environmental - US **Service Request:**K1910847
Project: HS19110796

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	661076	KQ1917446-05	11/23/19 16:59	0.50	0.20	0.07	ND	U
CCB2	661076	KQ1917446-06	11/23/19 21:15	0.50	0.20	0.07	ND	U
CCB3	661076	KQ1917446-07	11/24/19 02:26	0.50	0.20	0.07	ND	U
CCB4	661076	KQ1917446-08	11/24/19 07:09	0.50	0.20	0.07	ND	U
CCB5	661464	KQ1917720-05	11/26/19 12:59	0.50	0.20	0.07	ND	U
CCB6	661464	KQ1917720-06	11/26/19 17:15	0.50	0.20	0.07	ND	U
CCB7	661464	KQ1917720-07	11/26/19 22:26	0.50	0.20	0.07	ND	U
CCB8	661464	KQ1917720-08	11/27/19 03:09	0.50	0.20	0.07	ND	U

Raw Data

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1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

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Work Request # Original ( ) K1910680, 796, 847, 861, 929, 959, 11031, 11032, 11033, 10803, 11028, 11032, 11047, 11049, 975, 11043

Tier: II IV IV II II I IV IV IV IV V IV II II I II

Date Analyzed: 11/23/19

Analyst: BCV

Run # TOC: 661076, 661077, 661078 DOC: 661079

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
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: K1910847-4/4d, K1910903-2/2d, 803-4/4d sent for CA due to being above calibration curve.
K1910903-3/3d, 803-5/5d sent for CA due to sample carry over.
K1911043-2 sent for CA due to being overdiluted.
K1910680-2/2d, 680-4/4d, 680-5/5d, 796-2/2d, 929-2/2d, 11031-1/1d, 11028-3/3d, and 10975-1/1d report a high %RSD. However these samples are less than 5x the MRL.
K1911033-6/6d, 11033-7/7d, 10803-3, 10803-5, 11047-1/1d report a high %RSD due to suspected non-homogenous samples.

Final Approved by: _____ Date: 11/26/19

DQREPORT

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 661076 **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?
K1910680-001	Carbon, Total Organic	N/A		Water	0.36 mg/L	10 ml	0.36 mg/L J	1	0.07	0.50			11/23/19 17:58	N
K1910680-002	Carbon, Total Organic	N/A		Water	0.30 mg/L	10 ml	0.30 mg/L J	1	0.07	0.50			11/23/19 18:26	N
K1910680-003	Carbon, Total Organic	N/A		Water	0.63 mg/L	10 ml	0.63 mg/L	1	0.07	0.50			11/23/19 18:54	N
K1910680-004	Carbon, Total Organic	N/A		Water	0.56 mg/L	10 ml	0.56 mg/L	1	0.07	0.50			11/23/19 19:22	N
K1910680-005	Carbon, Total Organic	N/A		Water	0.17 mg/L	10 ml	0.17 mg/L J	1	0.07	0.50			11/23/19 19:50	N
K1910796-001	Carbon, Total Organic	N/A		Ground Water	1.05 mg/L	10 ml	1.05 mg/L	1	0.07	0.50			11/23/19 21:30	N
K1910796-002	Carbon, Total Organic	N/A		Ground Water	0.88 mg/L	10 ml	0.88 mg/L	1	0.07	0.50			11/23/19 21:59	N
K1910796-003	Carbon, Total Organic	N/A		Ground Water	1.78 mg/L	10 ml	1.78 mg/L	1	0.07	0.50			11/23/19 22:27	N
K1910796-004	Carbon, Total Organic	N/A		Ground Water	0.20 mg/L	10 ml	0.20 mg/L J	1	0.07	0.50			11/23/19 20:18	Y
K1910847-001	Carbon, Total Organic	N/A		Ground Water	34.01 mg/L	10 ml	680 mg/L	20	2	10			11/23/19 22:55	N
K1910847-002	Carbon, Total Organic	N/A		Ground Water	32.82 mg/L	10 ml	32.8 mg/L	1	0.07	0.50			11/23/19 23:23	N
K1910847-003	Carbon, Total Organic	N/A		Ground Water	35.27 mg/L	10 ml	35.3 mg/L	1	0.07	0.50			11/23/19 23:51	N
K1910847-004	Carbon, Total Organic	N/A		Ground Water	61.27 mg/L	10 ml	61.3 mg/L	1	0.07	0.50			11/24/19 00:19	N
K1910861-001	Carbon, Total Organic	N/A		Water	7.26 mg/L	10 ml	726 mg/L	100	7	50			11/24/19 00:47	N
K1910861-002	Carbon, Total Organic	N/A		Water	5.98 mg/L	10 ml	598 mg/L	100	7	50			11/24/19 01:15	N
K1910861-003	Carbon, Total Organic	N/A		Water	5.96 mg/L	10 ml	596 mg/L	100	7	50			11/24/19 01:43	N
K1910861-004	Carbon, Total Organic	N/A		Water	7.78 mg/L	10 ml	778 mg/L	100	7	50			11/24/19 03:10	N
K1910861-005	Carbon, Total Organic	N/A		Water	7.46 mg/L	10 ml	746 mg/L	100	7	50			11/24/19 03:38	N
K1910861-006	Carbon, Total Organic	N/A		Water	10.75 mg/L	10 ml	1080 mg/L	100	7	50			11/24/19 04:06	N
K1910861-007	Carbon, Total Organic	N/A		Water	8.35 mg/L	10 ml	835 mg/L	100	7	50			11/24/19 04:34	N
KQ1917446-01	Carbon, Total Organic	CCV		Water	24.53 mg/L	10 ml	24.5 mg/L	1					11/23/19 16:45	N
KQ1917446-02	Carbon, Total Organic	CCV		Water	24.61 mg/L	10 ml	24.6 mg/L	1					11/23/19 21:01	N
KQ1917446-03	Carbon, Total Organic	CCV		Water	24.56 mg/L	10 ml	24.6 mg/L	1					11/24/19 02:11	N
KQ1917446-04	Carbon, Total Organic	CCV		Water	24.22 mg/L	10 ml	24.2 mg/L	1					11/24/19 06:54	N
KQ1917446-05	Carbon, Total Organic	CCB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/23/19 16:59	N
KQ1917446-06	Carbon, Total Organic	CCB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/23/19 21:15	N
KQ1917446-07	Carbon, Total Organic	CCB		Water	-0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 02:26	N
KQ1917446-08	Carbon, Total Organic	CCB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 07:09	N
KQ1917446-09	Carbon, Total Organic	MB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/23/19 17:14	N
KQ1917446-10	Carbon, Total Organic	LCS		Water	24.74 mg/L	10 ml	24.7 mg/L	1	0.07	0.50	99		11/23/19 17:29	N
KQ1917446-11	Carbon, Total Organic	MS	K1910796-004	Ground Water	22.48 mg/L	10 ml	22.5 mg/L	1	0.07	0.50	89		11/23/19 20:46	N

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

11/26/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 661076 **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?	Ti
KQ1917446-12	Carbon, Total Organic	DUP	K1910680-001	Water	0.36 mg/L	10 ml	0.36 mg/L J	1	0.07	0.50		2	11/23/19 17:58	N	
KQ1917446-13	Carbon, Total Organic	DUP	K1910680-002	Water	0.26 mg/L	10 ml	0.26 mg/L J	1	0.07	0.50		13*	11/23/19 18:26	N	
KQ1917446-14	Carbon, Total Organic	DUP	K1910680-003	Water	0.61 mg/L	10 ml	0.61 mg/L	1	0.07	0.50		3	11/23/19 18:54	N	
KQ1917446-15	Carbon, Total Organic	DUP	K1910680-004	Water	0.67 mg/L	10 ml	0.67 mg/L	1	0.07	0.50		17*	11/23/19 19:22	N	
KQ1917446-16	Carbon, Total Organic	DUP	K1910680-005	Water	0.20 mg/L	10 ml	0.20 mg/L J	1	0.07	0.50		15*	11/23/19 19:50	N	
KQ1917446-17	Carbon, Total Organic	DUP	K1910796-002	Ground Water	0.77 mg/L	10 ml	0.77 mg/L	1	0.07	0.50		14*	11/23/19 21:59	N	
KQ1917446-18	Carbon, Total Organic	DUP	K1910796-001	Ground Water	1.14 mg/L	10 ml	1.14 mg/L	1	0.07	0.50		8	11/23/19 21:30	N	
KQ1917446-19	Carbon, Total Organic	DUP	K1910796-003	Ground Water	1.75 mg/L	10 ml	1.75 mg/L	1	0.07	0.50		1	11/23/19 22:27	N	
KQ1917446-20	Carbon, Total Organic	DUP	K1910796-004	Ground Water	0.21 mg/L	10 ml	0.21 mg/L J	1	0.07	0.50		6	11/23/19 20:18	N	
KQ1917446-21	Carbon, Total Organic	DUP	K1910847-002	Ground Water	32.44 mg/L	10 ml	32.4 mg/L	1	0.07	0.50		1	11/23/19 23:23	N	
KQ1917446-22	Carbon, Total Organic	DUP	K1910847-001	Ground Water	33.78 mg/L	10 ml	676 mg/L	20	2	10		<1	11/23/19 22:55	N	
KQ1917446-23	Carbon, Total Organic	DUP	K1910847-003	Ground Water	34.76 mg/L	10 ml	34.8 mg/L	1	0.07	0.50		1	11/23/19 23:51	N	
KQ1917446-24	Carbon, Total Organic	DUP	K1910847-004	Ground Water	60.91 mg/L	10 ml	60.9 mg/L	1	0.07	0.50		<1	11/24/19 00:19	N	
KQ1917446-25	Carbon, Total Organic	DUP	K1910861-001	Water	6.74 mg/L	10 ml	674 mg/L	100	7	50		7	11/24/19 00:47	N	
KQ1917446-26	Carbon, Total Organic	DUP	K1910861-002	Water	5.82 mg/L	10 ml	582 mg/L	100	7	50		3	11/24/19 01:15	N	
KQ1917446-27	Carbon, Total Organic	DUP	K1910861-003	Water	5.90 mg/L	10 ml	590 mg/L	100	7	50		1	11/24/19 01:43	N	
KQ1917446-28	Carbon, Total Organic	DUP	K1910861-004	Water	7.76 mg/L	10 ml	776 mg/L	100	7	50		<1	11/24/19 03:10	N	
KQ1917446-29	Carbon, Total Organic	DUP	K1910861-005	Water	7.41 mg/L	10 ml	741 mg/L	100	7	50		<1	11/24/19 03:38	N	
KQ1917446-30	Carbon, Total Organic	DUP	K1910861-006	Water	10.62 mg/L	10 ml	1060 mg/L	100	7	50		1	11/24/19 04:06	N	
KQ1917446-31	Carbon, Total Organic	DUP	K1910861-007	Water	8.16 mg/L	10 ml	816 mg/L	100	7	50		2	11/24/19 04:34	N	

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Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 661077 **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?	Ti
K1910929-001	Carbon, Total Organic	N/A		Water	1.49 mg/L	10 ml	1.49 mg/L	1	0.07	0.50			11/24/19 05:02	N	
K1910929-002	Carbon, Total Organic	N/A		Water	0.79 mg/L	10 ml	0.79 mg/L	1	0.07	0.50			11/24/19 05:30	N	
K1910929-003	Carbon, Total Organic	N/A		Water	1.91 mg/L	10 ml	1.91 mg/L	1	0.07	0.50			11/24/19 05:58	N	
K1910969-002	Carbon, Total Organic	N/A		Drinking Water	1.16 mg/L	10 ml	1.16 mg/L	1	0.07	0.50			11/24/19 06:26	N	
K1911031-001	Carbon, Total Organic	N/A		Water	0.90 mg/L	10 ml	0.90 mg/L	1	0.07	0.50			11/24/19 12:50	N	
K1911032-001	Carbon, Total Organic	N/A		Ground Water	1.54 mg/L	10 ml	1.54 mg/L	1	0.07	0.50			11/24/19 13:19	N	
K1911032-002	Carbon, Total Organic	N/A		Ground Water	1.55 mg/L	10 ml	1.55 mg/L	1	0.07	0.50			11/24/19 13:47	N	
K1911032-003	Carbon, Total Organic	N/A		Ground Water	1.59 mg/L	10 ml	1.59 mg/L	1	0.07	0.50			11/24/19 14:15	N	
K1911032-004	Carbon, Total Organic	N/A		Ground Water	2.02 mg/L	10 ml	2.02 mg/L	1	0.07	0.50			11/24/19 14:43	N	
K1911032-005	Carbon, Total Organic	N/A		Ground Water	4.63 mg/L	10 ml	1850 mg/L	400	30	200			11/24/19 15:11	N	
K1911032-006	Carbon, Total Organic	N/A		Ground Water	1.99 mg/L	10 ml	1.99 mg/L	1	0.07	0.50			11/24/19 15:39	N	
K1911033-001	Carbon, Total Organic	N/A		Ground Water	3.66 mg/L	10 ml	3.66 mg/L	1	0.07	0.50			11/24/19 07:24	N	
K1911033-002	Carbon, Total Organic	N/A		Ground Water	2.81 mg/L	10 ml	2.81 mg/L	1	0.07	0.50			11/24/19 07:52	N	
K1911033-003	Carbon, Total Organic	N/A		Ground Water	2.80 mg/L	10 ml	2.80 mg/L	1	0.07	0.50			11/24/19 08:20	N	
K1911033-004	Carbon, Total Organic	N/A		Ground Water	2.38 mg/L	10 ml	2.38 mg/L	1	0.07	0.50			11/24/19 08:48	N	
K1911033-005	Carbon, Total Organic	N/A		Ground Water	39.57 mg/L	10 ml	791 mg/L	20	2	10			11/24/19 09:16	N	
K1911033-006	Carbon, Total Organic	N/A		Ground Water	4.37 mg/L	10 ml	4.37 mg/L	1	0.07	0.50			11/24/19 09:44	N	
K1911033-007	Carbon, Total Organic	N/A		Ground Water	2.51 mg/L	10 ml	2.51 mg/L	1	0.07	0.50			11/24/19 10:12	N	
K1911033-008	Carbon, Total Organic	N/A		Ground Water	7.82 mg/L	10 ml	7820 mg/L	1000	70	500			11/24/19 10:41	N	
K1911033-009	Carbon, Total Organic	N/A		Ground Water	3.94 mg/L	10 ml	3.94 mg/L	1	0.07	0.50			11/24/19 11:09	Y	
KQ1917447-01	Carbon, Total Organic	CCV		Water	24.56 mg/L	10 ml	24.6 mg/L	1					11/24/19 02:11	N	
KQ1917447-02	Carbon, Total Organic	CCV		Water	24.22 mg/L	10 ml	24.2 mg/L	1					11/24/19 06:54	N	
KQ1917447-03	Carbon, Total Organic	CCV		Water	24.73 mg/L	10 ml	24.7 mg/L	1					11/24/19 11:51	N	
KQ1917447-04	Carbon, Total Organic	CCV		Water	24.32 mg/L	10 ml	24.3 mg/L	1					11/24/19 16:22	N	
KQ1917447-05	Carbon, Total Organic	CCB		Water	-0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 02:26	N	
KQ1917447-06	Carbon, Total Organic	CCB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 07:09	N	
KQ1917447-07	Carbon, Total Organic	CCB		Water	0.23 mg/L	10 ml	0.23 mg/L J	1	0.07	0.50			11/24/19 12:06	N	
KQ1917447-08	Carbon, Total Organic	CCB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 16:36	N	

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Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 661077 **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?	Ti
KQ1917447-09	Carbon, Total Organic	MB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 02:41	N	
KQ1917447-10	Carbon, Total Organic	LCS		Water	25.09 mg/L	10 ml	25.1 mg/L	1	0.07	0.50	100		11/24/19 02:55	N	
KQ1917447-11	Carbon, Total Organic	MS	K1911033-009	Ground Water	26.11 mg/L	10 ml	52.2 mg/L	2	0.2	1.0	97		11/24/19 11:37	N	
KQ1917447-12	Carbon, Total Organic	DUP	K1910929-001	Water	1.39 mg/L	10 ml	1.39 mg/L	1	0.07	0.50		7	11/24/19 05:02	N	
KQ1917447-13	Carbon, Total Organic	DUP	K1910929-002	Water	0.88 mg/L	10 ml	0.88 mg/L	1	0.07	0.50		11*	11/24/19 05:30	N	
KQ1917447-14	Carbon, Total Organic	DUP	K1910929-003	Water	1.94 mg/L	10 ml	1.94 mg/L	1	0.07	0.50		2	11/24/19 05:58	N	
KQ1917447-15	Carbon, Total Organic	DUP	K1910969-002	Drinking Water	1.11 mg/L	10 ml	1.11 mg/L	1	0.07	0.50		5	11/24/19 06:26	N	
KQ1917447-16	Carbon, Total Organic	DUP	K1911031-001	Water	0.79 mg/L	10 ml	0.79 mg/L	1	0.07	0.50		13*	11/24/19 12:50	N	
KQ1917447-17	Carbon, Total Organic	DUP	K1911032-002	Ground Water	1.60 mg/L	10 ml	1.60 mg/L	1	0.07	0.50		3	11/24/19 13:47	N	
KQ1917447-18	Carbon, Total Organic	DUP	K1911032-001	Ground Water	1.42 mg/L	10 ml	1.42 mg/L	1	0.07	0.50		8	11/24/19 13:19	N	
KQ1917447-19	Carbon, Total Organic	DUP	K1911032-003	Ground Water	1.50 mg/L	10 ml	1.50 mg/L	1	0.07	0.50		5	11/24/19 14:15	N	
KQ1917447-20	Carbon, Total Organic	DUP	K1911032-004	Ground Water	1.87 mg/L	10 ml	1.87 mg/L	1	0.07	0.50		8	11/24/19 14:43	N	
KQ1917447-21	Carbon, Total Organic	DUP	K1911032-005	Ground Water	4.83 mg/L	10 ml	1930 mg/L	400	30	200		4	11/24/19 15:11	N	
KQ1917447-22	Carbon, Total Organic	DUP	K1911032-006	Ground Water	1.82 mg/L	10 ml	1.82 mg/L	1	0.07	0.50		9	11/24/19 15:39	N	
KQ1917447-23	Carbon, Total Organic	DUP	K1911033-001	Ground Water	3.65 mg/L	10 ml	3.65 mg/L	1	0.07	0.50		<1	11/24/19 07:24	N	
KQ1917447-24	Carbon, Total Organic	DUP	K1911033-002	Ground Water	2.74 mg/L	10 ml	2.74 mg/L	1	0.07	0.50		3	11/24/19 07:52	N	
KQ1917447-25	Carbon, Total Organic	DUP	K1911033-003	Ground Water	2.76 mg/L	10 ml	2.76 mg/L	1	0.07	0.50		1	11/24/19 08:20	N	
KQ1917447-26	Carbon, Total Organic	DUP	K1911033-004	Ground Water	2.31 mg/L	10 ml	2.31 mg/L	1	0.07	0.50		3	11/24/19 08:48	N	
KQ1917447-27	Carbon, Total Organic	DUP	K1911033-005	Ground Water	38.77 mg/L	10 ml	775 mg/L	20	2	10		2	11/24/19 09:16	N	
KQ1917447-28	Carbon, Total Organic	DUP	K1911033-006	Ground Water	3.18 mg/L	10 ml	3.18 mg/L	1	0.07	0.50		31*	11/24/19 09:44	N	
KQ1917447-29	Carbon, Total Organic	DUP	K1911033-007	Ground Water	2.24 mg/L	10 ml	2.24 mg/L	1	0.07	0.50		11*	11/24/19 10:12	N	
KQ1917447-30	Carbon, Total Organic	DUP	K1911033-008	Ground Water	8.01 mg/L	10 ml	8010 mg/L	1000	70	500		2	11/24/19 10:41	N	
KQ1917447-31	Carbon, Total Organic	DUP	K1911033-009	Ground Water	3.61 mg/L	10 ml	3.61 mg/L	1	0.07	0.50		9	11/24/19 11:09	N	

# 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:** 661078 **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?	T
K1910803-001	Carbon, Total Organic	N/A		Water	43.43 mg/L	10 ml	43.4 mg/L	1	0.07	0.50			11/24/19 17:19	N	
K1910803-002	Carbon, Total Organic	N/A		Water	119.98 mg/L	10 ml	120 mg/L	1	0.07	0.50			11/24/19 17:47	N	
K1910803-003	Carbon, Total Organic	N/A		Water	21.79 mg/L	10 ml	21.8 mg/L	1	0.07	0.50			11/24/19 18:15	N	
K1910803-004	Carbon, Total Organic	N/A		Water	67.32 mg/L	10 ml	67.3 mg/L	1	0.07	0.50			11/24/19 18:43	N	
K1910803-005	Carbon, Total Organic	N/A		Water	39.95 mg/L	10 ml	39.9 mg/L	1	0.07	0.50			11/24/19 19:11	N	
K1910803-006	Carbon, Total Organic	N/A		Water	14.93 mg/L	10 ml	14.9 mg/L	1	0.07	0.50			11/24/19 19:40	N	
K1911028-001	Carbon, Total Organic	N/A		Water	0.89 mg/L	10 ml	0.89 mg/L	1	0.07	0.50			11/25/19 00:24	N	
K1911028-002	Carbon, Total Organic	N/A		Water	22.10 mg/L	10 ml	22.1 mg/L	1	0.07	0.50			11/25/19 00:52	N	
K1911028-003	Carbon, Total Organic	N/A		Water	0.73 mg/L	10 ml	0.73 mg/L	1	0.07	0.50			11/25/19 01:21	N	
K1911028-004	Carbon, Total Organic	N/A		Water	1.41 mg/L	10 ml	1.41 mg/L	1	0.07	0.50			11/25/19 02:18	N	
K1911028-005	Carbon, Total Organic	N/A		Water	1.44 mg/L	10 ml	1.44 mg/L	1	0.07	0.50			11/25/19 02:47	N	
K1911032-007	Carbon, Total Organic	N/A		Ground Water	4.08 mg/L	10 ml	4.08 mg/L	1	0.07	0.50			11/24/19 16:51	Y	
K1911047-001	Carbon, Total Organic	N/A		Water	3.61 mg/L	10 ml	361 mg/L	100	7	50			11/24/19 20:08	N	
K1911047-002	Carbon, Total Organic	N/A		Water	26.84 mg/L	10 ml	2680 mg/L	100	7	50			11/24/19 20:36	N	
K1911049-001	Carbon, Total Organic	N/A		Water	4.21 mg/L	10 ml	84 mg/L	20	2	10			11/24/19 21:04	N	
K1911049-002	Carbon, Total Organic	N/A		Water	9.04 mg/L	10 ml	181 mg/L	20	2	10			11/24/19 22:31	Y	
K1911049-003	Carbon, Total Organic	N/A		Water	11.75 mg/L	10 ml	11.7 mg/L	1	0.07	0.50			11/24/19 23:28	N	
K1911049-004	Carbon, Total Organic	N/A		Water	1.62 mg/L	10 ml	1.62 mg/L	1	0.07	0.50			11/24/19 23:56	N	
KQ1917448-01	Carbon, Total Organic	CCV		Ground Water	24.73 mg/L	10 ml	24.7 mg/L	1					11/24/19 11:51	N	
KQ1917448-02	Carbon, Total Organic	CCV		Ground Water	24.32 mg/L	10 ml	24.3 mg/L	1					11/24/19 16:22	N	
KQ1917448-03	Carbon, Total Organic	CCV		Ground Water	24.63 mg/L	10 ml	24.6 mg/L	1					11/24/19 21:32	N	
KQ1917448-04	Carbon, Total Organic	CCV		Ground Water	24.22 mg/L	10 ml	24.2 mg/L	1					11/25/19 01:49	N	
KQ1917448-05	Carbon, Total Organic	CCV		Ground Water	24.12 mg/L	10 ml	24.1 mg/L	1					11/25/19 06:19	N	
KQ1917448-06	Carbon, Total Organic	CCB		Ground Water	0.23 mg/L	10 ml	0.23 mg/L J	1	0.07	0.50			11/24/19 12:06	N	
KQ1917448-07	Carbon, Total Organic	CCB		Ground Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 16:36	N	
KQ1917448-08	Carbon, Total Organic	CCB		Ground Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/24/19 21:47	N	
KQ1917448-09	Carbon, Total Organic	CCB		Ground Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/25/19 02:04	N	
KQ1917448-10	Carbon, Total Organic	CCB		Ground Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/25/19 06:34	N	
KQ1917448-11	Carbon, Total Organic	MB		Ground Water	0.14 mg/L	10 ml	0.14 mg/L J	1	0.07	0.50			11/24/19 12:21	N	

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11/26/19

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 661078 **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?	T
KQ1917448-12	Carbon, Total Organic	LCS		Ground Water	24.93 mg/L	10 ml	24.9 mg/L	1	0.07	0.50	100		11/24/19 12:36	N	
KQ1917448-13	Carbon, Total Organic	MS	K1911032-007	Ground Water	26.35 mg/L	10 ml	52.7 mg/L	2	0.2	1.0	97		11/24/19 16:07	N	
KQ1917448-14	Carbon, Total Organic	MS	K1911049-002	Water	29.03 mg/L	10 ml	2900 mg/L	100	7	50	109		11/24/19 22:59	N	
KQ1917448-15	Carbon, Total Organic	DUP	K1910803-002	Water	122.07 mg/L	10 ml	122 mg/L	1	0.07	0.50		2	11/24/19 17:47	N	
KQ1917448-16	Carbon, Total Organic	DUP	K1910803-003	Water	18.16 mg/L	10 ml	18.2 mg/L	1	0.07	0.50		18*	11/24/19 18:15	N	
KQ1917448-17	Carbon, Total Organic	DUP	K1910803-004	Water	69.64 mg/L	10 ml	69.6 mg/L	1	0.07	0.50		3	11/24/19 18:43	N	
KQ1917448-18	Carbon, Total Organic	DUP	K1910803-005	Water	22.58 mg/L	10 ml	22.6 mg/L	1	0.07	0.50		56*	11/24/19 19:11	N	
KQ1917448-19	Carbon, Total Organic	DUP	K1910803-006	Water	13.68 mg/L	10 ml	13.7 mg/L	1	0.07	0.50		9	11/24/19 19:40	N	
KQ1917448-20	Carbon, Total Organic	DUP	K1910803-001	Water	44.82 mg/L	10 ml	44.8 mg/L	1	0.07	0.50		3	11/24/19 17:19	N	
KQ1917448-21	Carbon, Total Organic	DUP	K1911028-003	Water	0.66 mg/L	10 ml	0.66 mg/L	1	0.07	0.50		11*	11/25/19 01:21	N	
KQ1917448-22	Carbon, Total Organic	DUP	K1911028-004	Water	1.38 mg/L	10 ml	1.38 mg/L	1	0.07	0.50		2	11/25/19 02:18	N	
KQ1917448-23	Carbon, Total Organic	DUP	K1911028-005	Water	1.42 mg/L	10 ml	1.42 mg/L	1	0.07	0.50		1	11/25/19 02:47	N	
KQ1917448-24	Carbon, Total Organic	DUP	K1911028-001	Water	0.82 mg/L	10 ml	0.82 mg/L	1	0.07	0.50		9	11/25/19 00:24	N	
KQ1917448-25	Carbon, Total Organic	DUP	K1911028-002	Water	21.52 mg/L	10 ml	21.5 mg/L	1	0.07	0.50		3	11/25/19 00:52	N	
KQ1917448-26	Carbon, Total Organic	DUP	K1911032-007	Ground Water	4.18 mg/L	10 ml	4.18 mg/L	1	0.07	0.50		2	11/24/19 16:51	N	
KQ1917448-27	Carbon, Total Organic	DUP	K1911047-001	Water	3.03 mg/L	10 ml	303 mg/L	100	7	50		18*	11/24/19 20:08	N	
KQ1917448-28	Carbon, Total Organic	DUP	K1911047-002	Water	26.76 mg/L	10 ml	2680 mg/L	100	7	50		<1	11/24/19 20:36	N	
KQ1917448-29	Carbon, Total Organic	DUP	K1911049-001	Water	3.99 mg/L	10 ml	80 mg/L	20	2	10		5	11/24/19 21:04	N	
KQ1917448-30	Carbon, Total Organic	DUP	K1911049-002	Water	8.98 mg/L	10 ml	179 mg/L	20	2	10		<1	11/24/19 22:31	N	
KQ1917448-31	Carbon, Total Organic	DUP	K1911049-003	Water	11.81 mg/L	10 ml	11.8 mg/L	1	0.07	0.50		<1	11/24/19 23:28	N	
KQ1917448-32	Carbon, Total Organic	DUP	K1911049-004	Water	1.50 mg/L	10 ml	1.50 mg/L	1	0.07	0.50		8	11/24/19 23:56	N	

# 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:** 661079 **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?
K1910975-001	Carbon, Dissolved Organic (DOC)	N/A		Water	0.89 mg/L	10 ml	0.89 mg/L	1	0.07	0.50			11/25/19 05:08	N
K1910975-002	Carbon, Dissolved Organic (DOC)	N/A		Water	7.97 mg/L	10 ml	79.7 mg/L	10	0.7	5.0			11/25/19 04:40	N
K1911043-001	Carbon, Dissolved Organic (DOC)	N/A		Water	11.72 mg/L	10 ml	11700 mg/L	1000	70	500			11/25/19 03:44	N
K1911043-002.R01	Carbon, Dissolved Organic (DOC)	N/A		Water	-0.04 mg/L	10 ml	500 mg/L U	1000	70	500			11/25/19 04:12	N
KQ1917449-01	Carbon, Dissolved Organic (DOC)	CCV		Water	-0.04 mg/L	10 ml	-0.0368 mg/L	1					11/24/19 22:01	N
KQ1917449-02	Carbon, Dissolved Organic (DOC)	CCV		Water	24.12 mg/L	10 ml	24.1 mg/L	1					11/25/19 06:19	N
KQ1917449-03	Carbon, Dissolved Organic (DOC)	CCB		Water	24.68 mg/L	10 ml	24.7 mg/L	1	0.07	0.50			11/24/19 22:16	N
KQ1917449-04	Carbon, Dissolved Organic (DOC)	CCB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/25/19 06:34	N
KQ1917449-05	Carbon, Dissolved Organic (DOC)	MB		Water	-0.04 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/25/19 01:49	N
KQ1917449-06	Carbon, Dissolved Organic (DOC)	LCS		Water	24.22 mg/L	10 ml	24.2 mg/L	1	0.07	0.50	97		11/25/19 02:04	N
KQ1917449-07	Carbon, Dissolved Organic (DOC)	MS	K1910975-001	Water	26.58 mg/L	10 ml	26.6 mg/L	1	0.07	0.50	103		11/25/19 05:36	N
KQ1917449-08	Carbon, Dissolved Organic (DOC)	DUP	K1910975-001	Water	0.72 mg/L	10 ml	0.72 mg/L	1	0.07	0.50		21*	11/25/19 05:08	N
KQ1917449-09	Carbon, Dissolved Organic (DOC)	DUP	K1910975-002	Water	8.27 mg/L	10 ml	82.7 mg/L	10	0.7	5.0		4	11/25/19 04:40	N
KQ1917449-10	Carbon, Dissolved Organic (DOC)	DUP	K1911043-001	Water	11.71 mg/L	10 ml	11700 mg/L	1000	70	500		<1	11/25/19 03:44	N
KQ1917449-11	Carbon, Dissolved Organic (DOC)	DUP	K1911043-002	Water	-0.04 mg/L	10 ml	500 mg/L U	1000	70	500		NC	11/25/19 04:12	N

11/26/19

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

0.031	0.031	#DIV/0!	#DIV/0!	OBSERVATIONS	13	0.031
0.000				STD Deviation	0.08537	0
0.000				AVERAGE	0.03675	0
0.000				UCL	0.12213	0
0.000				LCL	-0.04862	0
0.000						0
0.270						ABOVE
0.177				OBSERVATIONS	1	ABOVE
0.000				STD Deviation	#DIV/0!	0
0.000				AVERAGE	0.03100	0
0.000				UCL	#DIV/0!	0
0.000				LCL	#DIV/0!	0
0.000						0
						0
				OBSERVATIONS	0	0
				STD Deviation	#DIV/0!	0
				AVERAGE	#DIV/0!	0
				UCL	#DIV/0!	0
				LCL	#DIV/0!	0
						0
						0
				OBSERVATIONS	0	0
				STD Deviation	#DIV/0!	0
				AVERAGE	#DIV/0!	0
						0
						0
						0
						0
						0
						0

11/26/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
CBA	RB	1			0.0000	0	<0.5	
2	ccv	1	24.567	0.0368	24.5300	24.52995	24.5	11/23/2019
3	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/23/2019
4	mb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/23/2019
5	lcs	1	24.774	0.0368	24.7370	24.73695	24.7	11/23/2019
6	K1910680-001	1	0.394	0.0368	0.3575	0.35745	<0.5	11/23/2019
7	K1910680-001	1	0.400	0.0368	0.3632	0.36315	<0.5	11/23/2019
8	K1910680-002	1	0.336	0.0368	0.2995	0.29945	<0.5	11/23/2019
9	K1910680-002	1	0.301	0.0368	0.2638	0.26375	<0.5	11/23/2019
10	K1910680-003	1	0.665	0.0368	0.6281	0.62805	0.63	11/23/2019
11	K1910680-003	1	0.645	0.0368	0.6085	0.60845	0.6	11/23/2019
12	K1910680-004	1	0.598	0.0368	0.5611	0.56105	0.56	11/23/2019
13	K1910680-004	1	0.704	0.0368	0.6673	0.66725	0.67	11/23/2019
14	K1910680-005	1	0.209	0.0368	0.1722	0.17215	<0.5	11/23/2019
15	K1910680-005	1	0.237	0.0368	0.1999	0.19985	<0.5	11/23/2019
16	K1910796-004	1	0.235	0.0368	0.1982	0.19815	<0.5	11/23/2019
17	K1910796-004	1	0.247	0.0368	0.2103	0.21025	<0.5	11/23/2019
18	KQ1917446-11	1	22.520	0.0368	22.4829	22.48285	22.5	11/23/2019
19	ccv	1	24.651	0.0368	24.6140	24.61395	24.6	11/23/2019
20	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/23/2019
21	K1910796-001	1	1.085	0.0368	1.0481	1.04805	1.05	11/23/2019
22	K1910796-001	1	1.173	0.0368	1.1367	1.13665	1.1	11/23/2019
23	K1910796-002	1	0.917	0.0368	0.8806	0.88055	0.9	11/23/2019
24	K1910796-002	1	0.803	0.0368	0.7659	0.76585	0.77	11/23/2019
25	K1910796-003	1	1.814	0.0368	1.7772	1.77715	1.78	11/23/2019

ICAL Date 10/20/16 ICAL ID#:11-GEN-05-51A

LCS =24.0 ppm APG 4013 Lot #010615 (REF# 11-GEN-05-50N)

CCV = 25.0 ppm (Ref.#11-GEN-05-52E)

Spike: 0.05 ml of 5000 ppm stock ----> 10.0 ml =25.0 ppm x Dilution Factor (Ref.# 11-GEN-05-51M)

23 Bad Points date time

Analyzed By: BKP	Date Analyzed 11/26/19
Reviewed By:	Date Reviewed 11/26/19

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
26	K1910796-003	1	1.791	0.0368	1.7545	1.75445	1.75	11/23/2019
27	K1910847-001	20	34.048	0.0368	34.0116	680.231	680.23	11/23/2019
28	K1910847-001	20	33.816	0.0368	33.7788	675.575	675.6	11/23/2019
29	K1910847-002	1	32.858	0.0368	32.8211	32.82105	32.8	11/23/2019
30	K1910847-002	1	32.481	0.0368	32.4447	32.44465	32.4	11/23/2019
31	K1910847-003	1	35.302	0.0368	35.2656	35.26555	35.3	11/23/2019
32	K1910847-003	1	34.801	0.0368	34.7641	34.76405	34.8	11/23/2019
33	K1910847-004	1	61.309	0.0368	61.2726	61.27255	61.3	11/24/2019
34	K1910847-004	1	60.948	0.0368	60.9109	60.91085	60.9	11/24/2019
35	K1910861-001	100	7.292	0.0368	7.2555	725.545	725.5	11/24/2019
36	K1910861-001	100	6.781	0.0368	6.7447	674.465	674.5	11/24/2019
37	K1910861-002	100	6.013	0.0368	5.9758	597.575	597.6	11/24/2019
38	K1910861-002	100	5.852	0.0368	5.8151	581.505	581.5	11/24/2019
39	K1910861-003	100	5.998	0.0368	5.9616	596.155	596.2	11/24/2019
40	K1910861-003	100	5.934	0.0368	5.8973	589.725	589.7	11/24/2019
41	ccv	1	24.592	0.0368	24.5555	24.55545	24.6	11/24/2019
42	ccb	1	0.031	0.0368	-0.0058	-0.00575	<0.5	11/24/2019
43	K1910861-004	100	7.819	0.0368	7.7823	778.225	778.2	11/24/2019
44	K1910861-004	100	7.801	0.0368	7.7640	776.395	776.4	11/24/2019
45	K1910861-005	100	7.497	0.0368	7.4601	746.005	746.0	11/24/2019
46	K1910861-005	100	7.442	0.0368	7.4053	740.525	740.5	11/24/2019
47	K1910861-006	100	10.791	0.0368	10.7546	1075.455	1075.5	11/24/2019
48	K1910861-006	100	10.652	0.0368	10.6153	1061.525	1061.5	11/24/2019
49	K1910861-007	100	8.384	0.0368	8.3476	834.755	834.8	11/24/2019
50	K1910861-007	100	8.194	0.0368	8.1568	815.675	815.7	11/24/2019

Analyzed By: BCD	Date Analyzed 11/23/19
Reviewed By:	Date Reviewed 11/26/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
51	ccv	1	24.259	0.0368	24.2227	24.22265	24.22	11/24/2019
52	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/24/2019
53		1		0.0000	0.0000	0	<0.5	
54		1		0.0000	0.0000	0	<0.5	
55		1		0.0000	0.0000	0	<0.5	
56		1		0.0000	0.0000	0	<0.5	
57		1		0.0000	0.0000	0	<0.5	
58		1		0.0000	0.0000	0	<0.5	
59		1		0.0000	0.0000	0	<0.5	
60		1		0.0000	0.0000	0	<0.5	
61		1		0.0000	0.0000	0	<0.5	
62		1		0.0000	0.0000	0	<0.5	
63		1		0.0000	0.0000	0	<0.5	
64		1		0.0000	0.0000	0	<0.5	
65		1		0.0000	0.0000	0	<0.5	
66		1		0.0000	0.0000	0	<0.5	
67		1		0.0000	0.0000	0	<0.5	
68		1		0.0000	0.0000	0	<0.5	
69		1		0.0000	0.0000	0	<0.5	
70		1		0.0000	0.0000	0	<0.5	
71		1		0.0000	0.0000	0	<0.5	
72		1		0.0000	0.0000	0	<0.5	
73		1		0.0000	0.0000	0	<0.5	
74		1		0.0000	0.0000	0	<0.5	
75		1		0.0000	0.0000	0	<0.5	

Analyzed By: BCP	Date Analyzed 11/25/19
Reviewed By: [signature]	Date Reviewed 11/26/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
CBA	RB	1			0.0000	0	<0.5	
2	ccv	1	24.592	0.0368	24.5555	24.55545	24.6	11/24/2019
3	ccb	1	0.031	0.0368	-0.0058	-0.00575	<0.5	11/24/2019
4	mb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/24/2019
5	lcs	1	25.123	0.0368	25.0866	25.08655	25.1	11/24/2019
6	K1910929-001	1	1.527	0.0368	1.4898	1.48975	1.49	11/24/2019
7	K1910929-001	1	1.429	0.0368	1.3918	1.39175	1.4	11/24/2019
8	K1910929-002	1	0.827	0.0368	0.7902	0.79015	1	11/24/2019
9	K1910929-002	1	0.919	0.0368	0.8820	0.88195	0.88	11/24/2019
10	K1910929-003	1	1.943	0.0368	1.9064	1.90635	1.91	11/24/2019
11	K1910929-003	1	1.976	0.0368	1.9391	1.93905	1.9	11/24/2019
12	K1910969-002	1	1.201	0.0368	1.1638	1.16375	1.16	11/24/2019
13	K1910969-002	1	1.147	0.0368	1.1100	1.10995	1.11	11/24/2019
14	ccv	1	24.259	0.0368	24.2227	24.22265	24.22	11/24/2019
15	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/24/2019
16	K1911033-001	1	3.696	0.0368	3.6588	3.65875	3.7	11/24/2019
17	K1911033-001	1	3.684	0.0368	3.6472	3.64715	3.65	11/24/2019
18	K1911033-002	1	2.845	0.0368	2.8083	2.80825	2.8	11/24/2019
19	K1911033-002	1	2.775	0.0368	2.7385	2.73845	2.7	11/24/2019
20	K1911033-003	1	2.836	0.0368	2.7992	2.79915	2.80	11/24/2019
21	K1911033-003	1	2.795	0.0368	2.7582	2.75815	2.76	11/24/2019
22	K1911033-004	1	2.422	0.0368	2.3849	2.38485	2.4	11/24/2019
23	K1911033-004	1	2.347	0.0368	2.3104	2.31035	2.3	11/24/2019
24	K1911033-005	20	39.603	0.0368	39.5660	791.319	791.32	11/24/2019
25	K1911033-005	20	38.802	0.0368	38.7653	775.305	775.31	11/24/2019

ICAL Date 10/20/16 ICAL ID#:11-GEN-05-51A

LCS =24.0 ppm APG 4013 Lot #010615 (REF# 11-GEN-05-50N)

CCV = 25.0 ppm (Ref.#11-GEN-05-52E)

Spike: 0.05 ml of 5000 ppm stock ----> 10.0 ml =25.0 ppm x Dilution Factor (Ref.# 11-GEN-05-51M)

		date	time
Analyzed By: BCP		Date Analyzed 11/23/19	
Reviewed By: [signature]		Date Reviewed 11/26/19	

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
26	K1911033-006	1	4.402	0.0368	4.3652	4.36515	4.37	11/24/2019
27	K1911033-006	1	3.221	0.0368	3.1843	3.18425	3.18	11/24/2019
28	K1911033-007	1	2.543	0.0368	2.5060	2.50595	2.5	11/24/2019
29	K1911033-007	1	2.273	0.0368	2.2363	2.23625	2.2	11/24/2019
30	K1911033-008	1000	7.861	0.0368	7.8241	7824.05	7824.1	11/24/2019
31	K1911033-008	1000	8.044	0.0368	8.0074	8007.35	8007.4	11/24/2019
32	K1911033-009	1	3.972	0.0368	3.9355	3.93545	3.9	11/24/2019
33	K1911033-009	1	3.647	0.0368	3.6099	3.60985	3.6	11/24/2019
34	KQ1917447-11	2	26.144	0.0368	26.1076	52.2151	52.2	11/24/2019
35	ccv	1	24.762	0.0368	24.7255	24.72545	24.7	11/24/2019
36	ccb	1	0.270	0.0368	0.2328	0.23275	<0.5	11/24/2019
37	K1911031-001	1	0.934	0.0368	0.8970	0.89695	0.9	11/24/2019
38	K1911031-001	1	0.826	0.0368	0.7890	0.78895	0.8	11/24/2019
39	K1911032-001	1	1.580	0.0368	1.5437	1.54365	1.5	11/24/2019
40	K1911032-001	1	1.458	0.0368	1.4216	1.42155	1.4	11/24/2019
41	K1911032-002	1	1.585	0.0368	1.5487	1.54865	1.5	11/24/2019
42	K1911032-002	1	1.638	0.0368	1.6012	1.60115	1.6	11/24/2019
43	K1911032-003	1	1.623	0.0368	1.5864	1.58635	1.6	11/24/2019
44	K1911032-003	1	1.541	0.0368	1.5038	1.50375	1.5	11/24/2019
45	K1911032-004	1	2.055	0.0368	2.0187	2.01865	2.0	11/24/2019
46	K1911032-004	1	1.904	0.0368	1.8668	1.86675	1.9	11/24/2019
47	K1911032-005	400	4.671	0.0368	4.6341	1853.62	1853.6	11/24/2019
48	K1911032-005	400	4.867	0.0368	4.8300	1931.98	1932.0	11/24/2019
49	K1911032-006	1	2.028	0.0368	1.9917	1.99165	2.0	11/24/2019
50	K1911032-006	1	1.861	0.0368	1.8238	1.82375	1.8	11/24/2019

Analyzed By:	BCD	Date Analyzed	11/23/19
Reviewed By:		Date Reviewed	11/26/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
51	ccv	1	24.356	0.0368	24.3194	24.31935	24.32	11/24/2019
52	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/24/2019
53		1		0.0000	0.0000	0	<0.5	
54		1		0.0000	0.0000	0	<0.5	
55		1		0.0000	0.0000	0	<0.5	
56		1		0.0000	0.0000	0	<0.5	
57		1		0.0000	0.0000	0	<0.5	
58		1		0.0000	0.0000	0	<0.5	
59		1		0.0000	0.0000	0	<0.5	
60		1		0.0000	0.0000	0	<0.5	
61		1		0.0000	0.0000	0	<0.5	
62		1		0.0000	0.0000	0	<0.5	
63		1		0.0000	0.0000	0	<0.5	
64		1		0.0000	0.0000	0	<0.5	
65		1		0.0000	0.0000	0	<0.5	
66		1		0.0000	0.0000	0	<0.5	
67		1		0.0000	0.0000	0	<0.5	
68		1		0.0000	0.0000	0	<0.5	
69		1		0.0000	0.0000	0	<0.5	
70		1		0.0000	0.0000	0	<0.5	
71		1		0.0000	0.0000	0	<0.5	
72		1		0.0000	0.0000	0	<0.5	
73		1		0.0000	0.0000	0	<0.5	
74		1		0.0000	0.0000	0	<0.5	
75		1		0.0000	0.0000	0	<0.5	

Analyzed By: BR	Date Analyzed 11/23/19
Reviewed By:	Date Reviewed 11/26/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
CBA	RB	1			0.0000	0	<0.5	
2	ccv	1	24.762	0.0368	24.7255	24.72545	24.7	11/24/2019
3	ccb	1	0.270	0.0368	0.2328	0.23275	<0.5	11/24/2019
4	mb	1	0.177	0.0368	0.1406	0.14055	<0.5	11/24/2019
5	lcs	1	24.962	0.0368	24.9254	24.92535	24.9	11/24/2019
6	KQ1917448-13	2	26.387	0.0368	26.3507	52.7013	52.70	11/24/2019
7	ccv	1	24.356	0.0368	24.3194	24.31935	24.3	11/24/2019
8	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/24/2019
9	K1911032-007	1	4.121	0.0368	4.0838	4.08375	4.08	11/24/2019
10	K1911032-007	1	4.215	0.0368	4.1781	4.17805	4.18	11/24/2019
11	K1910803-001	1	43.462	0.0368	43.4256	43.42555	43.4	11/24/2019
12	K1910803-001	1	44.855	0.0368	44.8186	44.81855	44.82	11/24/2019
13	K1910803-002	1	120.019	0.0368	119.9820	119.98195	119.98	11/24/2019
14	K1910803-002	1	122.103	0.0368	122.0664	122.06635	122.07	11/24/2019
15	K1910803-003	1	21.826	0.0368	21.7893	21.78925	21.8	11/24/2019
16	K1910803-003	1	18.201	0.0368	18.1638	18.16375	18.2	11/24/2019
17	K1910803-004	1	67.352	0.0368	67.3154	67.31535	67.32	11/24/2019
18	K1910803-004	1	69.680	0.0368	69.6435	69.64345	69.6	11/24/2019
19	K1910803-005	1	39.984	0.0368	39.9477	39.94765	39.9	11/24/2019
20	K1910803-005	1	22.612	0.0368	22.5756	22.57555	22.58	11/24/2019
21	K1910803-006	1	14.967	0.0368	14.9307	14.93065	14.93	11/24/2019
22	K1910803-006	1	13.722	0.0368	13.6848	13.68475	13.7	11/24/2019
23	K1911047-001	100	3.650	0.0368	3.6131	361.305	361.3	11/24/2019
24	K1911047-001	100	3.066	0.0368	3.0297	302.965	302.97	11/24/2019
25	K1911047-002	100	26.873	0.0368	26.8364	2683.635	2683.64	11/24/2019

ICAL Date 10/20/16 ICAL ID#:11-GEN-05-51A

LCS =24.0 ppm APG 4013 Lot #010615 (REF# 11-GEN-05-50N)

CCV = 25.0 ppm (Ref.#11-GEN-05-52E)

Spike: 0.05 ml of 5000 ppm stock ----> 10.0 ml =25.0 ppm x Dilution Factor (Ref.# 11-GEN-05-51M)

		date	time
Analyzed By: BOP	Date Analyzed	11/23/19	
Reviewed By:	Date Reviewed	11/26/19	

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
26	K1911047-002	100	26.799	0.0368	26.7618	2676.175	2676.18	11/24/2019
27	K1911049-001	20	4.249	0.0368	4.2124	84.247	84.25	11/24/2019
28	K1911049-001	20	4.029	0.0368	3.9925	79.849	79.8	11/24/2019
29	ccv	1	24.669	0.0368	24.6320	24.63195	24.6	11/24/2019
30	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/24/2019
31	K1911049-002	20	9.079	0.0368	9.0426	180.851	180.9	11/24/2019
32	K1911049-002	20	9.012	0.0368	8.9750	179.499	179.5	11/24/2019
33	KQ1917448-14	100	29.072	0.0368	29.0348	2903.475	2903.5	11/24/2019
34	K1911049-003	1	11.784	0.0368	11.7471	11.74705	11.7	11/24/2019
35	K1911049-003	1	11.848	0.0368	11.8116	11.81155	11.8	11/24/2019
36	K1911049-004	1	1.659	0.0368	1.6225	1.62245	1.6	11/24/2019
37	K1911049-004	1	1.541	0.0368	1.5039	1.50385	1.5	11/24/2019
38	K1911028-001	1	0.932	0.0368	0.8949	0.89485	0.9	11/25/2019
39	K1911028-001	1	0.858	0.0368	0.8217	0.82165	0.8	11/25/2019
40	K1911028-002	1	22.140	0.0368	22.1030	22.10295	22.1	11/25/2019
41	K1911028-002	1	21.561	0.0368	21.5239	21.52385	21.5	11/25/2019
42	K1911028-003	1	0.771	0.0368	0.7346	0.73455	0.7	11/25/2019
43	K1911028-003	1	0.696	0.0368	0.6592	0.65915	0.7	11/25/2019
44	ccv	1	24.254	0.0368	24.2171	24.21705	24.2	11/25/2019
45	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/25/2019
46	K1911028-004	1	1.442	0.0368	1.4057	1.40565	1.4	11/25/2019
47	K1911028-004	1	1.412	0.0368	1.3753	1.37525	1.4	11/25/2019
48	K1911028-005	1	1.478	0.0368	1.4409	1.44085	1.4	11/25/2019
49	K1911028-005	1	1.461	0.0368	1.4244	1.42435	1.4	11/25/2019
50	ccv	1	24.161	0.0368	24.1246	24.12455	24.1	11/25/2019

Analyzed By: BH	Date Analyzed 11/23/19
Reviewed By:	Date Reviewed 11/26/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
51	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/25/2019
52		1		0.0000	0.0000	0	<0.5	
53		1		0.0000	0.0000	0	<0.5	
54		1		0.0000	0.0000	0	<0.5	
55		1		0.0000	0.0000	0	<0.5	
56		1		0.0000	0.0000	0	<0.5	
57		1		0.0000	0.0000	0	<0.5	
58		1		0.0000	0.0000	0	<0.5	
59		1		0.0000	0.0000	0	<0.5	
60		1		0.0000	0.0000	0	<0.5	
61		1		0.0000	0.0000	0	<0.5	
62		1		0.0000	0.0000	0	<0.5	
63		1		0.0000	0.0000	0	<0.5	
64		1		0.0000	0.0000	0	<0.5	
65		1		0.0000	0.0000	0	<0.5	
66		1		0.0000	0.0000	0	<0.5	
67		1		0.0000	0.0000	0	<0.5	
68		1		0.0000	0.0000	0	<0.5	
69		1		0.0000	0.0000	0	<0.5	
70		1		0.0000	0.0000	0	<0.5	
71		1		0.0000	0.0000	0	<0.5	
72		1		0.0000	0.0000	0	<0.5	
73		1		0.0000	0.0000	0	<0.5	
74		1		0.0000	0.0000	0	<0.5	
75		1		0.0000	0.0000	0	<0.5	

Analyzed By: BKP	Date Analyzed 11/27/19
Reviewed By:	Date Reviewed 11/26/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
CBA	RB	1			0.0000	0	<0.5	
2	mb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/24/2019
3	lcs	1	24.714	0.0368	24.6774	24.67735	24.7	11/24/2019
4	ccv	1	24.254	0.0368	24.2171	24.21705	24.2	11/25/2019
5	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/25/2019
6	K1911043-001	1000	11.760	0.0368	11.7231	11723.05	11723.05	11/25/2019
7	K1911043-001	1000	11.743	0.0368	11.7062	11706.15	11706.2	11/25/2019
8	K1911043-002	1000	0.000	0.0368	-0.0368	-36.75	<0.5	11/25/2019
9	K1911043-002	1000	0.000	0.0368	-0.0368	-36.75	<0.5	11/25/2019
10	K1910975-002	10	8.002	0.0368	7.9657	79.6565	79.66	11/25/2019
11	K1910975-002	10	8.302	0.0368	8.2651	82.6505	82.7	11/25/2019
12	K1910975-001	1	0.922	0.0368	0.8852	0.88515	0.89	11/25/2019
13	K1910975-001	1	0.756	0.0368	0.7189	0.71885	0.72	11/25/2019
14	KQ1917449-07	1	26.613	0.0368	26.5764	26.57635	26.58	11/25/2019
15	ccv	1	24.161	0.0368	24.1246	24.12455	24.1	11/25/2019
16	ccb	1	0.000	0.0368	-0.0368	-0.03675	<0.5	11/25/2019
17		1		0.0000	0.0000	0	<0.5	
18		1		0.0000	0.0000	0	<0.5	
19		1		0.0000	0.0000	0	<0.5	
20		1		0.0000	0.0000	0	<0.5	
21		1		0.0000	0.0000	0	<0.5	
22		1		0.0000	0.0000	0	<0.5	
23		1		0.0000	0.0000	0	<0.5	
24		1		0.0000	0.0000	0	<0.5	
25		1		0.0000	0.0000	0	<0.5	

ICAL Date 10/20/16 ICAL ID#:11-GEN-05-51A

LCS =24.0 ppm APG 4013 Lot #010615 (REF# 11-GEN-05-50N)

CCV = 25.0 ppm (Ref.#11-GEN-05-52E)

Spike: 0.05 ml of 5000 ppm stock ----> 10.0 ml =25.0 ppm x Dilution Factor (Ref.# 11-GEN-05-51M)

		date	time
Analyzed By: BW		Date Analyzed	11/23/19
Reviewed By:		Date Reviewed	11/26/19

TOC: 661076,
661077,
661078
DOC: 661079

Schedule: 11232019

Version: 8
Instrument: Fusion1
Last Saved by: Fusion1 (Fusion1)
Last Saved on: 2019/11/23 17:20 - Saturday

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	K1910680-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
4	Sample	K1910680-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
5	Sample	K1910680-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
6	Sample	K1910680-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
7	Sample	K1910680-005.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
8	Sample	K1910796-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
9	Sample	K1910796-004.01 ms	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
10	Sample	K1910796-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
11	Sample	K1910796-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
12	Sample	K1910796-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
13	Sample	K1910847-001.01 20x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
14	Sample	K1910847-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
15	Sample	K1910847-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
16	Sample	K1910847-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
17	Sample	K1910861-001.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
18	Sample	K1910861-002.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
19	Sample	K1910861-003.01 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	K1910861-004.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
22	Sample	K1910861-005.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
23	Sample	K1910861-006.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
24	Sample	K1910861-007.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
25	Sample	K1910929-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
26	Sample	K1910929-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
27	Sample	K1910929-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
28	Sample	K1910969-002.01	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	K1911033-001.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
30	Sample	K1911033-002.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
31	Sample	K1911033-003.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
32	Sample	K1911033-004.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
33	Sample	K1911033-005.03 20x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
34	Sample	K1911033-006.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
35	Sample	K1911033-007.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
36	Sample	K1911033-008.03 1000x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
37	Sample	K1911033-009.08	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
38	Sample	K1911033-009.08 ms 2x	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

Schedule: 11232019

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 [25.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
40	Sample	K1911031-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
41	Sample	K1911032-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
42	Sample	K1911032-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
43	Sample	K1911032-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
44	Sample	K1911032-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
45	Sample	K1911032-005.01 400x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
46	Sample	K1911032-006.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
47	Sample	K1911032-007.03 ms 2x	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	K1911032-007.03	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
49	Sample	K1910803-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
50	Sample	K1910803-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
51	Sample	K1910803-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
52	Sample	K1910803-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
53	Sample	K1910803-005.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
54	Sample	K1910803-006.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
55	Sample	K1911047-001.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
56	Sample	K1911047-002.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
57	Sample	K1911049-001.01 20x	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	True	Ready
C	Check Standard	[TOC] LCS [25.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
59	Sample	K1911049-002.01 20x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
60	Sample	K1911049-002.01 ms 100x	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
61	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
62	Sample	K1911049-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
63	Sample	K1911049-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
64	Sample	K1911028-001.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
65	Sample	K1911028-002.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
66	Sample	K1911028-003.04	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	K1911028-004.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
68	Sample	K1911028-005.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
69	Sample	FB 11/21/19	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
70	Sample	FB 11/22/19	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
71	Sample	K1911043-001.01 doc 1000x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
72	Sample	K1911043-002.01 doc 1000x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
73	Sample	K1910975-002.01 doc 10x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
74	Sample	K1910975-001.01 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
75	Sample	K1910975-001.01 ms doc	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
61	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 - 11232019
Saturday, November 23, 2019 02:23 PM

(View - Reps, Unused Reps, Meta-Data, Signature, History)
Printed on 2019/11/26 09:09 - Tuesday

Report Summary Information

Company Location:	Gen Chem Lab		
Schedule Name:	11232019	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:			

11/26/19

Report Results

Sample Type: Clean — From Schedule Version 2

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/11/23 14:23

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	13.02	17.16	4.14	49.59	05:26
2	TC Clean	7.50	10.99	3.49	49.85	07:19
3	TC Clean	2.01	5.61	3.60	49.88	07:04
4	TC Clean	1.40	5.11	3.71	49.85	07:02

Sample Type: Clean — From Schedule Version 3

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/11/23 14:55

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	11.72	15.29	3.57	49.65	05:23

2	TC Clean	3.64	7.23	3.59	49.87	07:17
3	TC Clean	1.59	5.34	3.74	49.87	07:02
4	TC Clean	1.19	4.93	3.74	49.91	07:02

Sample Type: Clean From Schedule Version 4

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/11/23 15:34

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	11.48	15.13	3.65	49.68	05:24
2	TC Clean	3.90	7.40	3.51	50.02	04:07
3	TC Clean	1.55	5.07	3.52	50.06	03:50
4	TC Clean	1.18	4.74	3.56	50.06	03:48

Sample Type: Blank (Creating v1323) From Schedule Version 5

	Pos	Analysis Type	Sample ID	Start Time
◆	(blank)		Reagent/Acid Blank	2019/11/23 15:56

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	11.31	14.93	3.62	49.60	05:13
2	TC Clean	3.39	7.01	3.62	50.04	04:06
3	TC Clean	1.31	4.93	3.61	50.06	03:48
4	TC Clean	1.45	4.95	3.50	50.05	03:47
5	Reagent Blank	4.02	7.68	3.66	50.07	05:09
6	Acid Blank	1.14	4.93	3.79	49.74	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	0.0324 ppm	0.0000 ppm	0.0000%	2019/11/23 16:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0324	0.3238	9.00	12.79	3.79	50.19	10:34

Dilution **Blank Contribution** **Method** **Calibration**

1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.5667 ppm (PASS)	0.0000 ppm	0%	2019/11/23 16:45

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.5667	245.6673	176.22	180.09	3.87	50.19	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 7

	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%	2019/11/23 16:59

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	7.20	10.93	3.73	50.19	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 7

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	1	TOC	MB1	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/23 17:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.91	9.77	3.86	50.22	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — From Schedule Version 8

	Pos	BAT	Concentration	Dil	Sample ID	Min / Max	Result	Std. Dev.	RSD	Start Time

			(ppm)			(% dev)				
◈	C	TOC	25.0000	1:1	[TOC] LCS [24.0 ppm]	0 / infinity (NA / NA)	24.7737 ppm (PASS)	0.0000 ppm	0%	2019/11/23 17:29

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.7737	247.7372	177.62	181.34	3.71	50.22	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	2	TOC	ICS	0.0515 ppm	0.0000 ppm	0.0000%	2019/11/23 17:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0515	0.5154	9.13	12.75	3.61	50.28	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	3	TOC	K1910680-001.01	0.3971 ppm	0.0041 ppm	1.0200%	2019/11/23 17:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3942	3.9420	11.46	15.12	3.66	50.22	10:23
2	TOC	0.3999	3.9995	11.50	15.20	3.70	50.24	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	4	TOC	K1910680-002.01	0.3183 ppm	0.0252 ppm	7.9200%	2019/11/23 18:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3362	3.3616	11.07	14.56	3.49	50.27	10:28
2	TOC	0.3005	3.0051	10.82	14.32	3.50	50.24	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	5	TOC	K1910680-003.01	0.6550 ppm	0.0139 ppm	2.1200%	2019/11/23 18:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6648	6.6483	13.30	17.08	3.79	50.23	10:28
2	TOC	0.6452	6.4524	13.16	16.93	3.77	50.22	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	6	TOC	K1910680-004.01	0.6509 ppm	0.0751 ppm	11.5400%	2019/11/23 19:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5978	5.9780	12.84	16.55	3.71	50.24	10:25
2	TOC	0.7040	7.0402	13.56	17.06	3.50	50.21	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	7	TOC	K1910680-005.03	0.2227 ppm	0.0196 ppm	8.7900%	2019/11/23 19:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2089	2.0887	10.20	13.79	3.59	50.22	10:27
2	TOC	0.2366	2.3657	10.39	13.99	3.60	50.18	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	8	TOC	K1910796-004.01	0.2410 ppm	0.0085 ppm	3.5400%	2019/11/23 20:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2349	2.3495	10.38	14.07	3.70	50.17	10:30
2	TOC	0.2470	2.4703	10.46	14.10	3.64	50.21	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	9	TOC	K1910796-004.01 ms	22.5196 ppm	0.0000 ppm	0.0000%	2019/11/23 20:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	22.5196	225.1962	161.65	165.26	3.61	50.18	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.6507 ppm (PASS)	0.0000 ppm	0%	2019/11/23 21:01

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.6507	246.5070	176.79	180.47	3.68	50.17	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 8

	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%	2019/11/23 21:15

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	7.20	10.96	3.76	50.20	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	10	TOC	K1910796-001.01	1.1291 ppm	0.0626 ppm	5.5400%	2019/11/23 21:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0848	10.8484	16.15	19.70	3.56	50.19	10:28
2	TOC	1.1734	11.7338	16.75	20.53	3.78	50.20	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	11	TOC	K1910796-002.01	0.8600 ppm	0.0811 ppm	9.4400%	2019/11/23 21:59

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9173	9.1734	15.01	18.72	3.71	50.17	10:29

2	TOC	0.8026	8.0257	14.23	17.85	3.62	50.21	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	12	TOC	K1910796-003.01	1.8026 ppm	0.0160 ppm	0.8900%	2019/11/23 22:27

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.8139	18.1393	21.10	24.61	3.52	50.15	10:27
2	TOC	1.7912	17.9124	20.94	24.64	3.70	50.17	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	13	TOC	K1910847-001.01 20x	33.9319 ppm	0.1646 ppm	0.4900%	2019/11/23 22:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	34.0483	340.4830	239.90	243.51	3.61	50.13	10:25
2	TOC	33.8155	338.1553	238.32	242.06	3.74	50.17	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	14	TOC	K1910847-002.01	32.6696 ppm	0.2662 ppm	0.8100%	2019/11/23 23:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	32.8578	328.5780	231.82	235.44	3.62	50.13	10:29
2	TOC	32.4814	324.8140	229.27	232.83	3.57	50.16	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	15	TOC	K1910847-003.01	35.0515 ppm	0.3546 ppm	1.0100%	2019/11/23 23:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	35.3023	353.0229	248.41	251.92	3.51	50.15	10:24
2	TOC	34.8008	348.0081	245.01	248.71	3.70	50.19	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◆	16	TOC	K1910847-004.01	61.1285 ppm	0.2557 ppm	0.4200%	2019/11/24 00:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	61.3093	613.0929	424.95	428.74	3.79	50.16	10:26
2	TOC	60.9476	609.4762	422.49	426.28	3.78	50.18	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	17	TOC	K1910861-001.01 100x	7.0368 ppm	0.3612 ppm	5.1300%	2019/11/24 00:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.2922	72.9217	58.28	62.10	3.82	50.15	10:27
2	TOC	6.7814	67.8141	54.82	58.35	3.54	50.11	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	18	TOC	K1910861-002.01 100x	5.9322 ppm	0.1137 ppm	1.9200%	2019/11/24 01:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.0125	60.1255	49.60	53.26	3.66	50.14	10:29
2	TOC	5.8518	58.5182	48.51	52.12	3.61	50.05	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	19	TOC	K1910861-003.01 100x	5.9661 ppm	0.0454 ppm	0.7600%	2019/11/24 01:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.9983	59.9826	49.50	53.04	3.54	50.09	10:26
2	TOC	5.9340	59.3403	49.06	52.60	3.54	50.03	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.5922 ppm (PASS)	0.0000 ppm	0%	2019/11/24 02:11

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.5922	245.9222	176.39	179.84	3.44	50.03	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 8

	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)	0.0310 ppm (PASS)	0.0000 ppm	0%	2019/11/24 02:26

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0310	0.3101	9.67	13.33	3.66	50.08	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	20	TOC	MB2	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/24 02:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.75	12.48	3.72	49.99	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS 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 [24.0 ppm]	0 / infinity (NA / NA)	25.1233 ppm (PASS)	0.0000 ppm	0%	2019/11/24 02:55

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	25.1233	251.2331	180.00	183.53	3.53	50.03	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	21	TOC	K1910861-004.01 100x	7.8099 ppm	0.0129 ppm	0.1700%	2019/11/24 03:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.8190	78.1899	61.86	65.43	3.57	50.08	10:27
2	TOC	7.8007	78.0072	61.74	65.35	3.62	50.02	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	22	TOC	K1910861-005.01 100x	7.4694 ppm	0.0388 ppm	0.5200%	2019/11/24 03:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.4968	74.9680	59.67	63.39	3.72	50.08	10:26
2	TOC	7.4420	74.4200	59.30	62.89	3.59	50.04	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	23	TOC	K1910861-006.01 100x	10.7216 ppm	0.0985 ppm	0.9200%	2019/11/24 04:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	10.7913	107.9132	82.04	85.66	3.63	50.12	10:29
2	TOC	10.6520	106.5195	81.09	84.72	3.63	50.06	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	24	TOC	K1910861-007.01 100x	8.2889 ppm	0.1349 ppm	1.6300%	2019/11/24 04:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.3843	83.8426	65.70	69.24	3.54	50.09	10:26
2	TOC	8.1935	81.9348	64.40	67.94	3.54	50.10	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	25	TOC	K1910929-001.01	1.4775 ppm	0.0693 ppm	4.6900%	2019/11/24 05:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5265	15.2651	19.15	22.67	3.52	50.08	10:26
2	TOC	1.4285	14.2854	18.48	22.07	3.59	50.12	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	26	TOC	K1910929-002.01	0.8728 ppm	0.0649 ppm	7.4400%	2019/11/24 05:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.8269	8.2688	14.40	17.92	3.52	50.11	10:29
2	TOC	0.9187	9.1866	15.02	18.57	3.55	50.11	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	27	TOC	K1910929-003.01	1.9595 ppm	0.0231 ppm	1.1800%	2019/11/24 05:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.9431	19.4313	21.97	25.45	3.48	50.14	10:29
2	TOC	1.9758	19.7583	22.20	25.88	3.69	50.11	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	28	TOC	K1910969-002.01	1.1736 ppm	0.0380 ppm	3.2400%	2019/11/24 06:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2005	12.0049	16.93	20.49	3.56	50.15	10:28
2	TOC	1.1467	11.4671	16.57	20.16	3.59	50.15	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.2594 ppm (PASS)	0.0000 ppm	0%	2019/11/24 06:54

Pos	Base Analysis	ID	Rep	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run

	Type		#							Time
B	TOC	25 ppm	1	24.2594	242.5942	174.13	177.81	3.67	50.11	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 8

	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%	2019/11/24 07:09

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	7.62	11.38	3.76	50.13	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	29	TOC	K1911033-001.03	3.6897 ppm	0.0082 ppm	0.2200%	2019/11/24 07:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.6955	36.9550	33.87	37.44	3.58	50.10	10:30
2	TOC	3.6839	36.8386	33.79	37.44	3.65	50.12	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	30	TOC	K1911033-002.03	2.8101 ppm	0.0494 ppm	1.7600%	2019/11/24 07:52

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.8450	28.4502	28.10	31.78	3.68	50.13	10:24
2	TOC	2.7752	27.7519	27.62	31.38	3.76	50.10	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	31	TOC	K1911033-003.03	2.8154 ppm	0.0290 ppm	1.0300%	2019/11/24 08:20

Rep	Base			Adjusted		Baseline	Pressure	Run

#	Analysis Type	ppm	µg	(Abs)	NDIR (Abs)	(Abs)	(psig)	Time
1	TOC	2.8359	28.3589	28.03	31.72	3.68	50.10	10:27
2	TOC	2.7949	27.9493	27.76	31.45	3.69	50.12	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	32	TOC	K1911033-004.03	2.3843 ppm	0.0527 ppm	2.2100%	2019/11/24 08:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.4216	24.2162	25.22	28.84	3.62	50.11	10:29
2	TOC	2.3471	23.4708	24.72	28.28	3.57	50.10	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	33	TOC	K1911033-005.03 20x	39.2024 ppm	0.5662 ppm	1.4400%	2019/11/24 09:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	39.6027	396.0271	277.60	281.33	3.73	50.11	10:27
2	TOC	38.8020	388.0202	272.17	276.09	3.92	50.14	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	34	TOC	K1911033-006.03	3.8114 ppm	0.8350 ppm	21.9100%	2019/11/24 09:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.4019	44.0190	38.66	42.53	3.86	50.11	10:29
2	TOC	3.2210	32.2098	30.65	34.21	3.56	50.10	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	35	TOC	K1911033-007.03	2.4078 ppm	0.1907 ppm	7.9200%	2019/11/24 10:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.5427	25.4272	26.04	29.72	3.67	50.12	10:29
2	TOC	2.2730	22.7298	24.21	27.75	3.54	50.10	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	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	7.8608	78.6083	62.14	65.77	3.63	50.14	10:31
2	TOC	8.0441	80.4409	63.39	67.04	3.65	50.09	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	37	TOC	K1911033-009.08	3.8094 ppm	0.2302 ppm	6.0400%	2019/11/24 11:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.9722	39.7217	35.75	39.38	3.63	50.12	10:30
2	TOC	3.6466	36.4659	33.54	37.02	3.49	50.11	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	38	TOC	K1911033-009.08 ms 2x	26.1443 ppm	0.0000 ppm	0.0000%	2019/11/24 11:37

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	26.1443	261.4428	186.25	189.80	3.55	50.11	10:33

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.7622 ppm (PASS)	0.0000 ppm	0%	2019/11/24 11:51

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.7622	247.6222	177.55	181.02	3.47	50.15	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 8

	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)	0.2695 ppm (PASS)	0.0000 ppm	0%	2019/11/24 12:06

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.2695	2.6952	11.29	14.85	3.56	50.13	10:34

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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	39	TOC	MB3	0.1773 ppm	0.0000 ppm	0.0000%	2019/11/24 12:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1773	1.7735	9.99	13.72	3.73	50.13	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS 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 [25.0 ppm]	0 / infinity (NA / NA)	24.9621 ppm (PASS)	0.0000 ppm	0%	2019/11/24 12:36

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.9621	249.6214	178.90	182.70	3.80	50.17	10:37

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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	40	TOC	K1911031-001.01	0.8797 ppm	0.0764 ppm	8.6800%	2019/11/24 12:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time

1	TOC	0.9337	9.3369	15.12	18.87	3.75	50.14	10:29
2	TOC	0.8257	8.2570	14.39	18.18	3.79	50.17	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	41	TOC	K1911032-001.01	1.5194 ppm	0.0864 ppm	5.6800%	2019/11/24 13:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5804	15.8042	19.51	23.29	3.78	50.19	10:28
2	TOC	1.4583	14.5830	18.68	22.26	3.58	50.20	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	42	TOC	K1911032-002.01	1.6117 ppm	0.0371 ppm	2.3000%	2019/11/24 13:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5854	15.8543	19.55	22.98	3.44	50.25	10:28
2	TOC	1.6379	16.3788	19.90	23.42	3.52	50.20	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	43	TOC	K1911032-003.01	1.5818 ppm	0.0584 ppm	3.6900%	2019/11/24 14:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6231	16.2315	19.80	23.26	3.46	50.22	10:25
2	TOC	1.5405	15.4050	19.24	22.79	3.54	50.25	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	44	TOC	K1911032-004.01	1.9794 ppm	0.1074 ppm	5.4300%	2019/11/24 14:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.0554	20.5538	22.74	26.37	3.63	50.21	10:30
2	TOC	1.9035	19.0350	21.70	25.32	3.61	50.22	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	45	TOC	K1911032-005.01 400x	4.7687 ppm	0.1385 ppm	2.9100%	2019/11/24 15:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.6708	46.7076	40.49	43.95	3.46	50.26	10:28
2	TOC	4.8667	48.6669	41.82	45.56	3.74	50.27	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	46	TOC	K1911032-006.01	1.9445 ppm	0.1188 ppm	6.1100%	2019/11/24 15:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.0284	20.2842	22.55	26.14	3.58	50.27	10:31
2	TOC	1.8605	18.6048	21.41	25.06	3.65	50.23	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	47	TOC	K1911032-007.03 ms 2x	26.3874 ppm	0.0000 ppm	0.0000%	2019/11/24 16:07

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	26.3874	263.8736	187.90	191.52	3.62	50.24	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.3561 ppm (PASS)	0.0000 ppm	0%	2019/11/24 16:22

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.3561	243.5606	174.79	178.42	3.63	50.26	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 8

	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%	2019/11/24 16:36

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	7.48	11.05	3.57	50.24	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	48	TOC	K1911032-007.03	4.1677 ppm	0.0667 ppm	1.6000%	2019/11/24 16:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.1205	41.2052	36.75	40.48	3.73	50.22	10:28
2	TOC	4.2148	42.1480	37.39	40.98	3.59	50.25	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	49	TOC	K1910803-001.01	44.1588 ppm	0.9849 ppm	2.2300%	2019/11/24 17:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	43.4623	434.6235	303.80	307.50	3.70	50.24	10:26
2	TOC	44.8553	448.5526	313.26	317.05	3.79	50.20	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	50	TOC	K1910803-002.01	121.0609 ppm	1.4739 ppm	1.2200%	2019/11/24 17:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	120.0187	1200.1870	823.46	827.29	3.83	50.25	10:28
2	TOC	122.1031	1221.0313	837.61	842.19	4.58	50.24	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◆	51	TOC	K1910803-003.01	20.0133 ppm	2.5636 ppm	12.8100%	2019/11/24 18:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	21.8260	218.2603	156.94	161.38	4.44	50.17	10:27
2	TOC	18.2005	182.0049	132.33	136.43	4.11	50.22	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	52	TOC	K1910803-004.01	68.5161 ppm	1.6462 ppm	2.4000%	2019/11/24 18:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	67.3521	673.5207	465.97	469.89	3.93	50.19	10:27
2	TOC	69.6802	696.8016	481.77	488.04	6.27	50.15	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	53	TOC	K1910803-005.01	31.2983 ppm	12.2840 ppm	39.2500%	2019/11/24 19:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	39.9844	399.8441	280.20	285.79	5.59	50.18	10:30
2	TOC	22.6123	226.1228	162.27	166.53	4.26	50.14	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	54	TOC	K1910803-006.01	14.3445 ppm	0.8810 ppm	6.1400%	2019/11/24 19:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	14.9674	149.6740	110.38	114.24	3.86	50.18	10:28
2	TOC	13.7215	137.2151	101.92	105.81	3.89	50.14	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	55	TOC	K1911047-001.01 100x	3.3581 ppm	0.4125 ppm	12.2800%	2019/11/24 20:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.6498	36.4983	33.56	37.32	3.76	50.14	10:27
2	TOC	3.0664	30.6644	29.60	33.16	3.56	50.17	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	56	TOC	K1911047-002.01 100x	26.8358 ppm	0.0527 ppm	0.2000%	2019/11/24 20:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	26.8731	268.7307	191.20	194.84	3.64	50.13	10:25
2	TOC	26.7985	267.9853	190.69	194.42	3.73	50.17	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	57	TOC	K1911049-001.01 20x	4.1392 ppm	0.1555 ppm	3.7600%	2019/11/24 21:04

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.2491	42.4913	37.63	41.27	3.65	50.16	10:28
2	TOC	4.0292	40.2918	36.13	39.75	3.61	50.12	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm — 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.6687 ppm (PASS)	0.0000 ppm	0%	2019/11/24 21:32

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.6687	246.6868	176.91	180.57	3.66	50.17	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 8

	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%	2019/11/24 21:47

Pos	Base Analysis	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

	Type									
D	TOC	0 ppm	1	0.0000	0.0000	8.80	12.38	3.58	50.14	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	58	TOC	MB4	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/24 22:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	8.03	11.47	3.43	50.10	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — 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 [25.0 ppm]	0 / infinity (NA / NA)	24.7141 ppm (PASS)	0.0000 ppm	0%	2019/11/24 22:16

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.7141	247.1405	177.22	180.81	3.59	50.14	10:30

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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	59	TOC	K1911049-002.01 20x	9.0455 ppm	0.0478 ppm	0.5300%	2019/11/24 22:31

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.0793	90.7931	70.41	74.08	3.66	50.15	10:27
2	TOC	9.0117	90.1169	69.96	73.45	3.50	50.14	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◆	60	TOC	K1911049-002.01 ms 100x	29.0715 ppm	0.0000 ppm	0.0000%	2019/11/24 22:59

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	29.0715	290.7153	206.12	209.76	3.64	50.16	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	61	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/24 23:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	7.92	11.64	3.72	50.14	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	62	TOC	K1911049-003.01	11.8161 ppm	0.0456 ppm	0.3900%	2019/11/24 23:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	11.7838	117.8381	88.77	92.40	3.62	50.11	10:31
2	TOC	11.8483	118.4834	89.21	92.81	3.60	50.16	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	63	TOC	K1911049-004.01	1.5999 ppm	0.0839 ppm	5.2400%	2019/11/24 23:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6592	16.5924	20.05	23.59	3.54	50.11	10:30
2	TOC	1.5406	15.4065	19.24	22.81	3.57	50.13	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	64	TOC	K1911028-001.04	0.8950 ppm	0.0518 ppm	5.7800%	2019/11/25 00:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9316	9.3163	15.11	18.58	3.47	50.15	10:28
2	TOC	0.8584	8.5841	14.61	18.06	3.45	50.11	10:24

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC)	CAS_salt_010711	CAS_salt_010711

(v1323) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	65	TOC	K1911028-002.04	21.8501 ppm	0.4095 ppm	1.8700%	2019/11/25 00:52

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	22.1397	221.3968	159.07	162.59	3.52	50.14	10:29
2	TOC	21.5606	215.6056	155.14	158.84	3.70	50.12	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	66	TOC	K1911028-003.04	0.7336 ppm	0.0533 ppm	7.2700%	2019/11/25 01:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7713	7.7134	14.02	17.61	3.59	50.10	10:26
2	TOC	0.6959	6.9591	13.51	17.14	3.64	50.14	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.2538 ppm (PASS)	0.0000 ppm	0%	2019/11/25 01:49

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.2538	242.5382	174.10	177.84	3.74	50.11	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 8

	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%	2019/11/25 02:04

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	6.19	9.91	3.72	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 8

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	67	TOC	K1911028-004.04	1.4272 ppm	0.0215 ppm	1.5000%	2019/11/25 02:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4424	14.4239	18.58	22.17	3.60	50.13	10:29
2	TOC	1.4120	14.1204	18.37	22.07	3.70	50.12	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	68	TOC	K1911028-005.04	1.4693 ppm	0.0117 ppm	0.7900%	2019/11/25 02:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4776	14.7759	18.81	22.49	3.68	50.15	10:28
2	TOC	1.4611	14.6110	18.70	22.34	3.64	50.11	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	69	TOC	FB 11/21/19	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/25 03:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.76	9.25	3.49	50.12	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	70	TOC	FB 11/22/19	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/25 03:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.79	9.29	3.50	50.13	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◈	71	TOC	K1911043-001.01 doc 1000x	11.7513 ppm	0.0120 ppm	0.1000%	2019/11/25 03:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	11.7598	117.5980	88.61	92.27	3.66	50.11	10:29
2	TOC	11.7429	117.4286	88.49	92.16	3.67	50.11	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	72	TOC	K1911043-002.01 doc 1000x	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/25 04:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	7.79	11.41	3.62	50.11	10:29
2	TOC	0.0000	0.0000	7.15	10.87	3.72	50.09	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	73	TOC	K1910975-002.01 doc 10x	8.1521 ppm	0.2117 ppm	2.6000%	2019/11/25 04:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.0024	80.0240	63.10	66.61	3.51	50.14	10:30
2	TOC	8.3018	83.0176	65.14	68.78	3.64	50.11	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	74	TOC	K1910975-001.01 doc	0.8387 ppm	0.1176 ppm	14.0200%	2019/11/25 05:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9219	9.2190	15.04	18.69	3.65	50.11	10:26
2	TOC	0.7556	7.5558	13.91	17.48	3.57	50.12	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	75	TOC	K1910975-001.01 ms doc	26.6131 ppm	0.0000 ppm	0.0000%	2019/11/25 05:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time

1	TOC	26.6131	266.1305	189.43	193.03	3.60	50.14	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	61	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/25 05:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	7.23	10.93	3.70	50.12	10:28
2	TOC	0.0000	0.0000	6.73	10.14	3.40	50.11	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7842 (IC) (v1323)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm 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 25 ppm [25 ppm]	0 / infinity (NA / NA)	24.1613 ppm (PASS)	0.0000 ppm	0%	2019/11/25 06:19

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.1613	241.6131	173.47	177.17	3.70	50.11	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 8

	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%	2019/11/25 06:34

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	5.86	9.52	3.65	50.12	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

Meta Data Used in this Report

Blanks

Version	Reagent (Abs)	Acid (Abs)	DI IC (Abs)	DI TC (Abs)	DI TOC (Abs)	Save Time	Operator
v1322	1.2997	0.8410	0.0000	0.0000	0.0000	2019/11/21 13:13	Fusion1 (Fusion1)
v1323	1.3397	1.1360	0.0000	0.0000	0.0000	2019/11/23 16:30	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

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

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	2019/11/25 06:49

StarLIMS Run: 661076, 661077, 661078, 661079

Analysis: DOC/TOC

Method: SM 5310 C, 9060A, 415.1, 9060

CCV: 11-GEN-05-82C 50 ppm LCS: 11-GEN-05-79J 25.0 ppm

ICAL Date: 3/6/19

ICAL ID: 11-GEN-05-76H

ICS ID: 11-GEN-05-78M

ICS TV: 25.0 ppm ICS % R < 1

Spike ID: 11-GEN-05-82C 0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-83D

21 % H3PO4: 11-GEN-05-83B

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, 129001F, N11314F, Marge

FILTER ID: 16967789

23 RDP 11/26/19

Analyzed By: RDP	Date Analyzed: 11/26/19
Reviewed By:	Date Reviewed: 11/26/19

Work Request # Original ( ) K1910803, 847, 1037, 1050, 1084, 1085, 1096, 963, 1074, 963, 1043

Tier: IV IV II II II IV II II II II II

Date Analyzed: 11/26/19

Analyst: BeP

Analysis: TOC/DOC

TOC: 661464 661465

Run # DOC: 661466

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
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: K1911037-3,3d report a high %RSD. However, these samples are less than 5x the MRL.

Final Approved by: _____ Date: 12/2/19

DQREPORT

Analytical Results Summary

Instrument Name: K-TOC-03 **Analyst:** BDITZLER **Analysis Lot:** 661464 **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?
K1910803-002	Carbon, Total Organic	N/A		Water	0.90 mg/L	10 ml	180 mg/L	200	20	100			11/26/19 14:26	N
K1910803-003	Carbon, Total Organic	N/A		Water	14.27 mg/L	10 ml	14.3 mg/L	1	0.07	0.50			11/26/19 14:54	N
K1910803-004	Carbon, Total Organic	N/A		Water	13.03 mg/L	10 ml	1300 mg/L	100	7	50			11/26/19 15:22	N
K1910803-005	Carbon, Total Organic	N/A		Water	16.70 mg/L	10 ml	16.7 mg/L	1	0.07	0.50			11/26/19 15:50	N
K1910847-004	Carbon, Total Organic	N/A		Ground Water	3.25 mg/L	10 ml	65 mg/L	20	2	10			11/26/19 13:58	N
K1911037-001	Carbon, Total Organic	N/A		Water	5.79 mg/L	10 ml	5.79 mg/L	1	0.07	0.50			11/26/19 21:43	N
K1911037-002	Carbon, Total Organic	N/A		Water	25.83 mg/L	10 ml	25.8 mg/L	1	0.07	0.50			11/26/19 23:10	N
K1911037-003	Carbon, Total Organic	N/A		Water	0.63 mg/L	10 ml	0.63 mg/L	1	0.07	0.50			11/26/19 23:38	N
K1911050-001	Carbon, Total Organic	N/A		Ground Water	16.22 mg/L	10 ml	16.2 mg/L	1	0.07	0.50			11/27/19 00:06	N
K1911050-005	Carbon, Total Organic	N/A		Ground Water	1.98 mg/L	10 ml	1.98 mg/L	1	0.07	0.50			11/27/19 00:34	N
K1911084-001	Carbon, Total Organic	N/A		Water	0.12 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 19:23	N
K1911084-002	Carbon, Total Organic	N/A		Water	0.18 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 19:51	N
K1911084-003	Carbon, Total Organic	N/A		Water	10.56 mg/L	10 ml	10.6 mg/L	1	0.07	0.50			11/26/19 20:19	N
K1911084-004	Carbon, Total Organic	N/A		Water	0.43 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 20:47	N
K1911084-005	Carbon, Total Organic	N/A		Water	0.14 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 21:15	N
K1911085-001	Carbon, Total Organic	N/A		Ground Water	1.17 mg/L	10 ml	1.17 mg/L	1	0.07	0.50			11/26/19 16:18	N
K1911085-002	Carbon, Total Organic	N/A		Ground Water	1.28 mg/L	10 ml	1.28 mg/L	1	0.07	0.50			11/26/19 17:30	N
K1911085-003	Carbon, Total Organic	N/A		Ground Water	0.73 mg/L	10 ml	0.73 mg/L	1	0.07	0.50			11/26/19 17:58	N
K1911085-004	Carbon, Total Organic	N/A		Ground Water	0.44 mg/L	10 ml	0.44 mg/L J	1	0.07	0.50			11/26/19 18:26	N
K1911096-001	Carbon, Total Organic	N/A		Water	0.79 mg/L	10 ml	0.79 mg/L	1	0.07	0.50			11/26/19 18:54	N
KQ1917720-01	Carbon, Total Organic	CCV		Ground Water	24.38 mg/L	10 ml	24.4 mg/L	1					11/26/19 12:44	N
KQ1917720-02	Carbon, Total Organic	CCV		Ground Water	24.84 mg/L	10 ml	24.8 mg/L	1					11/26/19 17:01	N
KQ1917720-03	Carbon, Total Organic	CCV		Ground Water	24.37 mg/L	10 ml	24.4 mg/L	1					11/26/19 22:11	N
KQ1917720-04	Carbon, Total Organic	CCV		Ground Water	24.59 mg/L	10 ml	24.6 mg/L	1					11/27/19 02:54	N
KQ1917720-05	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 12:59	N
KQ1917720-06	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 17:15	N
KQ1917720-07	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 22:26	N
KQ1917720-08	Carbon, Total Organic	CCB		Ground Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/27/19 03:09	N

# 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:** 661464 **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?
KQ1917720-09	Carbon, Total Organic	MB		Ground Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 13:13	N
KQ1917720-10	Carbon, Total Organic	LCS		Ground Water	25.01 mg/L	10 ml	25.0 mg/L	1	0.07	0.50	100		11/26/19 13:28	N
KQ1917720-11	Carbon, Total Organic	MS	K1911085-001	Ground Water	27.01 mg/L	10 ml	27.0 mg/L	1	0.07	0.50	103		11/26/19 16:46	N
KQ1917720-12	Carbon, Total Organic	DUP	K1910803-002	Water	0.92 mg/L	10 ml	180 mg/L	200	20	100		3	11/26/19 14:26	N
KQ1917720-13	Carbon, Total Organic	DUP	K1910803-003	Water	15.17 mg/L	10 ml	15.2 mg/L	1	0.07	0.50		6	11/26/19 14:54	N
KQ1917720-14	Carbon, Total Organic	DUP	K1910803-004	Water	12.36 mg/L	10 ml	1240 mg/L	100	7	50		5	11/26/19 15:22	N
KQ1917720-15	Carbon, Total Organic	DUP	K1910803-005	Water	16.52 mg/L	10 ml	16.5 mg/L	1	0.07	0.50		1	11/26/19 15:50	N
KQ1917720-16	Carbon, Total Organic	DUP	K1910847-004	Ground Water	3.24 mg/L	10 mL	65 mg/L	20	2	10		<1	11/26/19 13:58:00	N
KQ1917720-17	Carbon, Total Organic	DUP	K1911037-001	Water	5.88 mg/L	10 ml	5.88 mg/L	1	0.07	0.50		1	11/26/19 21:43	N
KQ1917720-18	Carbon, Total Organic	DUP	K1911037-002	Water	26.23 mg/L	10 ml	26.2 mg/L	1	0.07	0.50		2	11/26/19 23:10	N
KQ1917720-19	Carbon, Total Organic	DUP	K1911037-003	Water	0.41 mg/L	10 ml	0.41 mg/L J	1	0.07	0.50		43*	11/26/19 23:38	N
KQ1917720-20	Carbon, Total Organic	DUP	K1911050-001	Ground Water	16.34 mg/L	10 ml	16.3 mg/L	1	0.07	0.50		<1	11/27/19 00:06	N
KQ1917720-21	Carbon, Total Organic	DUP	K1911050-005	Ground Water	1.94 mg/L	10 ml	1.94 mg/L	1	0.07	0.50		2	11/27/19 00:34	N
KQ1917720-22	Carbon, Total Organic	DUP	K1911085-002	Ground Water	1.21 mg/L	10 ml	1.21 mg/L	1	0.07	0.50		5	11/26/19 17:30	N
KQ1917720-23	Carbon, Total Organic	DUP	K1911085-001	Ground Water	1.26 mg/L	10 ml	1.26 mg/L	1	0.07	0.50		8	11/26/19 16:18	N
KQ1917720-24	Carbon, Total Organic	DUP	K1911085-003	Ground Water	0.71 mg/L	10 ml	0.71 mg/L	1	0.07	0.50		3	11/26/19 17:58	N
KQ1917720-25	Carbon, Total Organic	DUP	K1911085-004	Ground Water	0.42 mg/L	10 ml	0.42 mg/L J	1	0.07	0.50		5	11/26/19 18:26	N
KQ1917720-26	Carbon, Total Organic	DUP	K1911084-001	Water	0.13 mg/L	10 ml	0.13 mg/L J	1	0.07	0.50		NC	11/26/19 19:23	N
KQ1917720-27	Carbon, Total Organic	DUP	K1911084-005	Water	0.06 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/26/19 21:15	N
KQ1917720-28	Carbon, Total Organic	DUP	K1911084-002	Water	0.17 mg/L	10 ml	0.17 mg/L J	1	0.07	0.50		NC	11/26/19 19:51	N
KQ1917720-29	Carbon, Total Organic	DUP	K1911084-003	Water	10.56 mg/L	10 ml	10.6 mg/L	1	0.07	0.50		<1	11/26/19 20:19	N
KQ1917720-30	Carbon, Total Organic	DUP	K1911084-004	Water	0.32 mg/L	10 ml	0.32 mg/L J	1	0.07	0.50		NC	11/26/19 20:47	N
KQ1917720-31	Carbon, Total Organic	DUP	K1911096-001	Water	0.83 mg/L	10 ml	0.83 mg/L	1	0.07	0.50		5	11/26/19 18:54	N

# 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:** 661465 **Method/Testcode:** 415.1/TOC T

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?
K1910963-001	Carbon, Total Organic	N/A		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/27/19 06:12	N
K1911034-001	Carbon, Total Organic	N/A		Water	4.16 mg/L	10 ml	4.16 mg/L	1	0.07	0.50			11/27/19 01:02	N
K1911034-002	Carbon, Total Organic	N/A		Water	5.08 mg/L	10 ml	5.08 mg/L	1	0.07	0.50			11/27/19 01:30	N
K1911034-003	Carbon, Total Organic	N/A		Water	4.26 mg/L	10 ml	4.26 mg/L	1	0.07	0.50			11/27/19 01:58	N
K1911034-004	Carbon, Total Organic	N/A		Water	12.66 mg/L	10 ml	12.7 mg/L	1	0.07	0.50			11/27/19 02:26	N
K1911034-005	Carbon, Total Organic	N/A		Water	2.85 mg/L	10 ml	2.85 mg/L	1	0.07	0.50			11/27/19 03:24	N
K1911034-006	Carbon, Total Organic	N/A		Water	6.47 mg/L	10 ml	6.47 mg/L	1	0.07	0.50			11/27/19 03:52	N
K1911034-007	Carbon, Total Organic	N/A		Water	3.58 mg/L	10 ml	3.58 mg/L	1	0.07	0.50			11/27/19 04:20	N
K1911034-008	Carbon, Total Organic	N/A		Water	4.73 mg/L	10 ml	4.73 mg/L	1	0.07	0.50			11/27/19 04:48	N
K1911034-009	Carbon, Total Organic	N/A		Water	3.59 mg/L	10 ml	3.59 mg/L	1	0.07	0.50			11/27/19 05:16	N
K1911034-010	Carbon, Total Organic	N/A		Water	4.73 mg/L	10 ml	4.73 mg/L	1	0.07	0.50			11/27/19 05:44	N
KQ1917721-01	Carbon, Total Organic	CCV		Water	24.37 mg/L	10 ml	24.4 mg/L	1					11/26/19 22:11	N
KQ1917721-02	Carbon, Total Organic	CCV		Water	24.59 mg/L	10 ml	24.6 mg/L	1					11/27/19 02:54	N
KQ1917721-03	Carbon, Total Organic	CCV		Water	24.12 mg/L	10 ml	24.1 mg/L	1					11/27/19 07:24	N
KQ1917721-04	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 22:26	N
KQ1917721-05	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/27/19 03:09	N
KQ1917721-06	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/27/19 07:38	N
KQ1917721-07	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/26/19 22:41	N
KQ1917721-08	Carbon, Total Organic	LCS		Water	24.70 mg/L	10 ml	24.7 mg/L	1	0.07	0.50	99		11/26/19 22:55	N
KQ1917721-09	Carbon, Total Organic	MS	K1910963-001	Water	25.13 mg/L	10 ml	25.1 mg/L	1	0.07	0.50	101		11/27/19 06:40	N
KQ1917721-10	Carbon, Total Organic	DUP	K1910963-001	Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/27/19 06:12	N
KQ1917721-11	Carbon, Total Organic	DUP	K1911034-001	Water	4.16 mg/L	10 ml	4.16 mg/L	1	0.07	0.50		<1	11/27/19 01:02	N
KQ1917721-12	Carbon, Total Organic	DUP	K1911034-002	Water	5.09 mg/L	10 ml	5.09 mg/L	1	0.07	0.50		<1	11/27/19 01:30	N
KQ1917721-13	Carbon, Total Organic	DUP	K1911034-003	Water	4.26 mg/L	10 ml	4.26 mg/L	1	0.07	0.50		<1	11/27/19 01:58	N
KQ1917721-14	Carbon, Total Organic	DUP	K1911034-004	Water	12.37 mg/L	10 ml	12.4 mg/L	1	0.07	0.50		2	11/27/19 02:26	N
KQ1917721-15	Carbon, Total Organic	DUP	K1911034-005	Water	2.84 mg/L	10 ml	2.84 mg/L	1	0.07	0.50		<1	11/27/19 03:24	N
KQ1917721-16	Carbon, Total Organic	DUP	K1911034-006	Water	6.43 mg/L	10 ml	6.43 mg/L	1	0.07	0.50		<1	11/27/19 03:52	N
KQ1917721-17	Carbon, Total Organic	DUP	K1911034-007	Water	3.62 mg/L	10 ml	3.62 mg/L	1	0.07	0.50		1	11/27/19 04:20	N
KQ1917721-18	Carbon, Total Organic	DUP	K1911034-008	Water	4.76 mg/L	10 ml	4.76 mg/L	1	0.07	0.50		<1	11/27/19 04:48	N
KQ1917721-19	Carbon, Total Organic	DUP	K1911034-009	Water	3.55 mg/L	10 ml	3.55 mg/L	1	0.07	0.50		1	11/27/19 05:16	N
KQ1917721-20	Carbon, Total Organic	DUP	K1911034-010	Water	4.60 mg/L	10 ml	4.60 mg/L	1	0.07	0.50		3	11/27/19 05:44	N

# 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:** 661466 **Method/Testcode:** 415.1/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?
K1910963-002	Carbon, Dissolved Organic	N/A		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 08:23:00	N
K1911043-002	Carbon, Dissolved Organic (DOC)	N/A		Water	1.70 mg/L	10 mL	1.70 mg/L	1	0.07	0.50			11/27/19 09:20:00	N
KQ1917722-01	Carbon, Dissolved Organic	CCV		Water	24.12 mg/L	10 mL	24.1 mg/L	1					11/27/19 07:24:00	N
KQ1917722-01	Carbon, Dissolved Organic (DOC)	CCV		Water	24.12 mg/L	10 mL	24.1 mg/L	1					11/27/19 07:24:00	N
KQ1917722-02	Carbon, Dissolved Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 07:38:00	N
KQ1917722-02	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 07:38:00	N
KQ1917722-03	Carbon, Dissolved Organic	CCV		Water	24.23 mg/L	10 mL	24.2 mg/L	1					11/27/19 10:17:00	N
KQ1917722-03	Carbon, Dissolved Organic (DOC)	CCV		Water	24.23 mg/L	10 mL	24.2 mg/L	1					11/27/19 10:17:00	N
KQ1917722-04	Carbon, Dissolved Organic	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 10:31:00	N
KQ1917722-04	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 10:31:00	N
KQ1917722-05	Carbon, Dissolved Organic	MB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 07:53:00	N
KQ1917722-05	Carbon, Dissolved Organic (DOC)	MB		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 07:53:00	N
KQ1917722-06	Carbon, Dissolved Organic	LCS		Water	24.76 mg/L	10 mL	24.8 mg/L	1	0.07	0.50	99		11/27/19 08:08:00	N
KQ1917722-06	Carbon, Dissolved Organic (DOC)	LCS		Water	24.76 mg/L	10 mL	24.8 mg/L	1	0.07	0.50	99		11/27/19 08:08:00	N
KQ1917722-07	Carbon, Dissolved Organic	MS	K1910963-002	Water	25.49 mg/L	10 mL	25.5 mg/L	1	0.07	0.50	102		11/27/19 08:51:00	N
KQ1917722-08	Carbon, Dissolved Organic	DUP	K1910963-002	Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/27/19 08:23:00	N
KQ1917722-09	Carbon, Dissolved Organic (DOC)	DUP	K1911043-002	Water	1.75 mg/L	10 mL	1.75 mg/L	1	0.07	0.50		3	11/27/19 09:20:00	N
KQ1917722-10	Carbon, Dissolved Organic (DOC)	N/A		Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50			11/27/19 08:23:00	N
KQ1917722-11	Carbon, Dissolved Organic (DOC)	DUP	KQ1917722-10	Water	0.00 mg/L	10 mL	0.50 mg/L U	1	0.07	0.50		NC	11/27/19 08:23:00	N
KQ1917722-12	Carbon, Dissolved Organic (DOC)	MS	KQ1917722-10	Water	25.49 mg/L	10 mL	25.5 mg/L	1	0.07	0.50	102		11/27/19 08:51:00	N

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
CBA	RB	1			0.0000	0	<0.5	
2	ccv	1	24.383	0.0000	24.3827	24.3827	24.4	11/26/2019
3	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/26/2019
4	mb	1	0.000	0.0000	0.0000	0	<0.5	11/26/2019
5	lcs	1	25.010	0.0000	25.0096	25.0096	25.0	11/26/2019
6	K1910847-004	20	3.251	0.0000	3.2507	65.014	65.01	11/26/2019
7	K1910847-004	20	3.241	0.0000	3.2405	64.81	64.8	11/26/2019
8	K1910803-002	200	0.898	0.0000	0.8975	179.5	180	11/26/2019
9	K1910803-002	200	0.925	0.0000	0.9249	184.98	184.98	11/26/2019
10	K1910803-003	1	14.267	0.0000	14.2670	14.267	14.27	11/26/2019
11	K1910803-003	1	15.165	0.0000	15.1650	15.165	15.2	11/26/2019
12	K1910803-004	100	13.033	0.0000	13.0326	1303.26	1303.26	11/26/2019
13	K1910803-004	100	12.361	0.0000	12.3610	1236.1	1236.10	11/26/2019
14	K1910803-005	1	16.696	0.0000	16.6964	16.6964	16.70	11/26/2019
15	K1910803-005	1	16.522	0.0000	16.5216	16.5216	16.5	11/26/2019
16	K1911085-001	1	1.165	0.0000	1.1654	1.1654	1.2	11/26/2019
17	K1911085-001	1	1.261	0.0000	1.2605	1.2605	1.26	11/26/2019
18	KQ1917720-11	1	27.011	0.0000	27.0105	27.0105	27.0	11/26/2019
19	ccv	1	24.839	0.0000	24.8385	24.8385	24.8	11/26/2019
20	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/26/2019
21	K1911085-002	1	1.276	0.0000	1.2760	1.276	1.28	11/26/2019
22	K1911085-002	1	1.208	0.0000	1.2081	1.2081	1.2	11/26/2019
23	K1911085-003	1	0.733	0.0000	0.7327	0.7327	0.7	11/26/2019
24	K1911085-003	1	0.715	0.0000	0.7146	0.7146	0.71	11/26/2019
25	K1911085-004	1	0.442	0.0000	0.4422	0.4422	<0.5	11/26/2019

ICAL Date 10/20/16 ICAL ID#:11-GEN-05-51A

LCS =24.0 ppm APG 4013 Lot #010615 (REF# 11-GEN-05-50N)

CCV = 25.0 ppm (Ref.#11-GEN-05-52E)

Spike: 0.05 ml of 5000 ppm stock ----> 10.0 ml =25.0 ppm x Dilution Factor (Ref.# 11-GEN-05-51M)

		date	time
Analyzed By: BCP	Date Analyzed	11/20/19	
Reviewed By:	Date Reviewed	12/2/19	

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
26	K1911085-004	1	0.421	0.0000	0.4205	0.4205	<0.5	11/26/2019
27	K1911096-001	1	0.788	0.0000	0.7884	0.7884	0.79	11/26/2019
28	K1911096-001	1	0.831	0.0000	0.8314	0.8314	0.8	11/26/2019
29	K1911084-001	1	0.122	0.0000	0.1219	0.1219	<0.5	11/26/2019
30	K1911084-001	1	0.126	0.0000	0.1262	0.1262	<0.5	11/26/2019
31	K1911084-002	1	0.175	0.0000	0.1751	0.1751	<0.5	11/26/2019
32	K1911084-002	1	0.172	0.0000	0.1718	0.1718	<0.5	11/26/2019
33	K1911084-003	1	10.564	0.0000	10.5636	10.5636	10.6	11/26/2019
34	K1911084-003	1	10.562	0.0000	10.5616	10.5616	10.6	11/26/2019
35	K1911084-004	1	0.431	0.0000	0.4313	0.4313	<0.5	11/26/2019
36	K1911084-004	1	0.316	0.0000	0.3155	0.3155	<0.5	11/26/2019
37	K1911084-005	1	0.144	0.0000	0.1438	0.1438	<0.5	11/26/2019
38	K1911084-005	1	0.059	0.0000	0.0587	0.0587	<0.5	11/26/2019
39	K1911037-001	1	5.794	0.0000	5.7939	5.7939	5.8	11/26/2019
40	K1911037-001	1	5.877	0.0000	5.8773	5.8773	5.9	11/26/2019
41	ccv	1	24.373	0.0000	24.3729	24.3729	24.4	11/26/2019
42	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/26/2019
43	K1911037-002	1	25.829	0.0000	25.8285	25.8285	25.8	11/26/2019
44	K1911037-002	1	26.233	0.0000	26.2334	26.2334	26.2	11/26/2019
45	K1911037-003	1	0.631	0.0000	0.6306	0.6306	0.6	11/26/2019
46	K1911037-003	1	0.406	0.0000	0.4058	0.4058	<0.5	11/26/2019
47	K1911050-001	1	16.222	0.0000	16.2221	16.2221	16.2	11/27/2019
48	K1911050-001	1	16.339	0.0000	16.3389	16.3389	16.3	11/27/2019
49	K1911050-005	1	1.977	0.0000	1.9767	1.9767	2.0	11/27/2019
50	K1911050-005	1	1.935	0.0000	1.9351	1.9351	1.9	11/27/2019

Analyzed By: BCP	Date Analyzed 11/26/19
Reviewed By:	Date Reviewed 12/2/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
51	ccv	1	24.586	0.0000	24.5857	24.5857	24.59	11/27/2019
52	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
53		1		0.0000	0.0000	0	<0.5	
54		1		0.0000	0.0000	0	<0.5	
55		1		0.0000	0.0000	0	<0.5	
56		1		0.0000	0.0000	0	<0.5	
57		1		0.0000	0.0000	0	<0.5	
58		1		0.0000	0.0000	0	<0.5	
59		1		0.0000	0.0000	0	<0.5	
60		1		0.0000	0.0000	0	<0.5	
61		1		0.0000	0.0000	0	<0.5	
62		1		0.0000	0.0000	0	<0.5	
63		1		0.0000	0.0000	0	<0.5	
64		1		0.0000	0.0000	0	<0.5	
65		1		0.0000	0.0000	0	<0.5	
66		1		0.0000	0.0000	0	<0.5	
67		1		0.0000	0.0000	0	<0.5	
68		1		0.0000	0.0000	0	<0.5	
69		1		0.0000	0.0000	0	<0.5	
70		1		0.0000	0.0000	0	<0.5	
71		1		0.0000	0.0000	0	<0.5	
72		1		0.0000	0.0000	0	<0.5	
73		1		0.0000	0.0000	0	<0.5	
74		1		0.0000	0.0000	0	<0.5	
75		1		0.0000	0.0000	0	<0.5	

Analyzed By: [illegible]	Date Analyzed 11/26/19
Reviewed By: [illegible]	Date Reviewed 12/2/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
CBA	RB	1			0.0000	0	<0.5	
2	ccv	1	24.373	0.0000	24.3729	24.3729	24.4	11/26/2019
3	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/26/2019
4	mb	1	0.000	0.0000	0.0000	0	<0.5	11/26/2019
5	lcs	1	24.702	0.0000	24.7023	24.7023	24.7	11/26/2019
6	K1911034-001	1	4.162	0.0000	4.1616	4.1616	4.16	11/27/2019
7	K1911034-001	1	4.162	0.0000	4.1619	4.1619	4.2	11/27/2019
8	K1911034-002	1	5.084	0.0000	5.0839	5.0839	5	11/27/2019
9	K1911034-002	1	5.087	0.0000	5.0872	5.0872	5.09	11/27/2019
10	K1911034-003	1	4.263	0.0000	4.2629	4.2629	4.26	11/27/2019
11	K1911034-003	1	4.258	0.0000	4.2581	4.2581	4.3	11/27/2019
12	K1911034-004	1	12.665	0.0000	12.6646	12.6646	12.66	11/27/2019
13	K1911034-004	1	12.375	0.0000	12.3749	12.3749	12.37	11/27/2019
14	ccv	1	24.586	0.0000	24.5857	24.5857	24.59	11/27/2019
15	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
16	K1911034-005	1	2.851	0.0000	2.8509	2.8509	2.9	11/27/2019
17	K1911034-005	1	2.841	0.0000	2.8414	2.8414	2.84	11/27/2019
18	K1911034-006	1	6.468	0.0000	6.4677	6.4677	6.5	11/27/2019
19	K1911034-006	1	6.427	0.0000	6.4268	6.4268	6.4	11/27/2019
20	K1911034-007	1	3.577	0.0000	3.5774	3.5774	3.58	11/27/2019
21	K1911034-007	1	3.619	0.0000	3.6185	3.6185	3.62	11/27/2019
22	K1911034-008	1	4.732	0.0000	4.7321	4.7321	4.7	11/27/2019
23	K1911034-008	1	4.765	0.0000	4.7648	4.7648	4.8	11/27/2019
24	K1911034-009	1	3.591	0.0000	3.5914	3.5914	3.59	11/27/2019
25	K1911034-009	1	3.548	0.0000	3.5484	3.5484	3.55	11/27/2019

ICAL Date 10/20/16 ICAL ID#:11-GEN-05-51A

LCS =24.0 ppm APG 4013 Lot #010615 (REF# 11-GEN-05-50N)

CCV = 25.0 ppm (Ref.#11-GEN-05-52E)

Spike: 0.05 ml of 5000 ppm stock ----> 10.0 ml =25.0 ppm x Dilution Factor (Ref.# 11-GEN-05-51M)

		date	time
Analyzed By: BCB	Date Analyzed	11/26/19	
Reviewed By:	Date Reviewed	12/2/19	

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
26	K1911034-010	1	4.735	0.0000	4.7348	4.7348	4.73	11/27/2019
27	K1911034-010	1	4.602	0.0000	4.6022	4.6022	4.60	11/27/2019
28	K1910963-001	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
29	K1910963-001	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
30	KQ1917721-09	1	25.134	0.0000	25.1340	25.134	25.1	11/27/2019
31	ccv	1	24.121	0.0000	24.1211	24.1211	24.1	11/27/2019
32	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
33		1		0.0000	0.0000	0	<0.5	
34		1		0.0000	0.0000	0	<0.5	
35		1		0.0000	0.0000	0	<0.5	
36		1		0.0000	0.0000	0	<0.5	
37		1		0.0000	0.0000	0	<0.5	
38		1		0.0000	0.0000	0	<0.5	
39		1		0.0000	0.0000	0	<0.5	
40		1		0.0000	0.0000	0	<0.5	
41		1		0.0000	0.0000	0	<0.5	
42		1		0.0000	0.0000	0	<0.5	
43		1		0.0000	0.0000	0	<0.5	
44		1		0.0000	0.0000	0	<0.5	
45		1		0.0000	0.0000	0	<0.5	
46		1		0.0000	0.0000	0	<0.5	
47		1		0.0000	0.0000	0	<0.5	
48		1		0.0000	0.0000	0	<0.5	
49		1		0.0000	0.0000	0	<0.5	
50		1		0.0000	0.0000	0	<0.5	

Analyzed By: BW	Date Analyzed 11/26/19
Reviewed By:	Date Reviewed 12/2/19

ALS ENVIRONMENTAL

Matrix: WATER

Analysis: Total Organic Carbon (WATER) Method:Oxidation EPA 415.1/9060/5310C

Printout	Sample #	Dil. Factor	Solution Conc.,mg/L	Blank Correction, mg/L	Net mg/L	TOC mg/L	Reported TOC mg/L	
CBA	RB	1			0.0000	0	<0.5	
2	ccv	1	24.121	0.0000	24.1211	24.1211	24.1	11/27/2019
3	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
4	mb	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
5	lcs	1	24.756	0.0000	24.7562	24.7562	24.8	11/27/2019
6	K1910963-002	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
7	K1910963-002	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
8	K1910963-002 ms	1	25.491	0.0000	25.4906	25.4906	25	11/27/2019
9	K1911043-002	50	1.697	0.0000	1.6970	84.85	84.85	11/27/2019
10	K1911043-002	50	1.748	0.0000	1.7483	87.415	87.42	11/27/2019
11	ccv	1	24.234	0.0000	24.2344	24.2344	24.2	11/27/2019
12	ccb	1	0.000	0.0000	0.0000	0	<0.5	11/27/2019
13		1		0.0000	0.0000	0	<0.5	
14		1		0.0000	0.0000	0	<0.5	
15		1		0.0000	0.0000	0	<0.5	
16		1		0.0000	0.0000	0	<0.5	
17		1		0.0000	0.0000	0	<0.5	
18		1		0.0000	0.0000	0	<0.5	
19		1		0.0000	0.0000	0	<0.5	
20		1		0.0000	0.0000	0	<0.5	
21		1		0.0000	0.0000	0	<0.5	
22		1		0.0000	0.0000	0	<0.5	
23		1		0.0000	0.0000	0	<0.5	
24		1		0.0000	0.0000	0	<0.5	
25		1		0.0000	0.0000	0	<0.5	

ICAL Date 10/20/16 ICAL ID#:11-GEN-05-51A

LCS =24.0 ppm APG 4013 Lot #010615 (REF# 11-GEN-05-50N)

CCV = 25.0 ppm (Ref.#11-GEN-05-52E)

Spike: 0.05 ml of 5000 ppm stock ----> 10.0 ml =25.0 ppm x Dilution Factor (Ref.# 11-GEN-05-51M)

		date	time
Analyzed By:		Date Analyzed	11/26/19
Reviewed By:		Date Reviewed	12/2/19

TOC: 661464, 661465
DOC: 661466

Schedule: 11262019

Version: 5
Instrument: Fusion1
Last Saved by: Fusion1 (Fusion1)
Last Saved on: 2019/11/26 11:38 - Tuesday

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	K1910847-004.01 20x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
4	Sample	K1910803-002.01 200x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
5	Sample	K1910803-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
6	Sample	K1910803-004.01 100x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
7	Sample	K1910803-005.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
8	Sample	K1911085-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
9	Sample	K1911085-001.01 ms	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
10	Sample	K1911085-002.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
11	Sample	K1911085-003.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
12	Sample	K1911085-004.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
13	Sample	K1911096-001.01	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
14	Sample	K1911084-001.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
15	Sample	K1911084-002.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
16	Sample	K1911084-003.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
17	Sample	K1911084-004.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
18	Sample	K1911084-005.04	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
19	Sample	K1911037-001.02	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	K1911037-002.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
22	Sample	K1911037-003.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
23	Sample	K1911050-001.08	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
24	Sample	K1911050-005.09	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
25	Sample	K1911034-001.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
26	Sample	K1911034-002.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
27	Sample	K1911034-003.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
28	Sample	K1911034-004.02	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	K1911034-005.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
30	Sample	K1911034-006.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
31	Sample	K1911034-007.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
32	Sample	K1911034-008.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
33	Sample	K1911034-009.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
34	Sample	K1911034-010.02	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
35	Sample	K1910963-001.08	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
36	Sample	K1910963-001.08 ms	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
37	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
38	Sample	FB 11/22/19	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

Schedule: 11262019

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 [25.0 ppm]	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
40	Sample	K1910963-002.10 doc	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
41	Sample	K1910963-002.10 ms doc	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
42	Sample	RB	CAS_salt_010711 (CAS_salt_010711)	1	True	Ready
43	Sample	K1911043-002.01 doc 50x	CAS_salt_010711 (CAS_salt_010711)	2	True	Ready
44	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 - 11262019
Tuesday, November 26, 2019 10:48 AM

(View - Reps, Unused Reps, Meta-Data, Signature, History)
Printed on 2019/11/27 12:19 - Wednesday

Report Summary Information

Company Location:	Gen Chem Lab		
Schedule Name:	11262019	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)		
Comment:			

Report Results

Sample Type: Clean — From Schedule Version 2

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/11/26 10:48

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	14.10	17.92	3.82	49.80	05:22
2	TC Clean	10.56	14.21	3.66	50.06	04:02
3	TC Clean	2.88	6.61	3.72	50.11	03:48
4	TC Clean	2.30	5.98	3.68	50.04	03:46

Sample Type: Clean — From Schedule Version 3

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/11/26 11:10

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	11.69	15.35	3.66	49.64	05:11
2	TC Clean	4.38	8.07	3.69	50.07	04:02
3	TC Clean	1.75	5.60	3.85	50.06	03:46

4	TC Clean	1.69	5.44	3.75	50.04	03:46

Sample Type: Clean — From Schedule Version 4

	Pos	Analysis Type	Sample ID	Start Time
◆	(clean)		Clean	2019/11/26 11:33

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	11.94	15.55	3.61	49.82	05:24
2	TC Clean	4.50	8.40	3.90	50.14	04:02
3	TC Clean	1.90	5.70	3.81	50.15	03:57
4	TC Clean	1.54	5.37	3.83	50.13	03:56

Sample Type: Blank (Creating v1324) — From Schedule Version 5

	Pos	Analysis Type	Sample ID	Start Time
◆	(blank)		Reagent/Acid Blank	2019/11/26 11:56

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	0.95	4.60	3.65	49.63	05:20
2	TC Clean	5.07	8.76	3.70	50.08	04:02
3	TC Clean	2.11	5.67	3.55	50.12	03:49
4	TC Clean	2.00	5.72	3.72	50.10	03:45
5	Reagent Blank	4.00	7.73	3.74	50.16	05:07
6	Acid Blank	1.33	4.87	3.54	49.64	05:27

Sample Type: Sample — From Schedule Version 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	D	TOC	RB	0.3449 ppm	0.0000 ppm	0.0000%	2019/11/26 12:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3449	3.4494	11.12	14.98	3.86	50.33	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 5

	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)	24.3827 ppm (PASS)	0.0000 ppm	0%	2019/11/26 12:44

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.3827	243.8273	174.97	178.89	3.92	50.40	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 5

	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%	2019/11/26 12:59

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	7.52	11.31	3.79	50.39	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 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	1	TOC	MB1	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/26 13:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	6.58	10.65	4.06	50.39	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS From Schedule Version 5

	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)	25.0096 ppm (PASS)	0.0000 ppm	0%	2019/11/26 13:28

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	25.0096	250.0957	179.23	183.05	3.83	50.39	10:30

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 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	2	TOC	ICS	0.5966 ppm	0.0000 ppm	0.0000%	2019/11/26 13:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5966	5.9656	12.83	16.66	3.83	50.42	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	3	TOC	K1910847-004.01 20x	3.2456 ppm	0.0072 ppm	0.2200%	2019/11/26 13:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.2507	32.5068	30.85	34.44	3.59	50.32	10:28
2	TOC	3.2405	32.4052	30.78	34.52	3.74	50.36	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	4	TOC	K1910803-002.01 200x	0.9112 ppm	0.0194 ppm	2.1300%	2019/11/26 14:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.8975	8.9754	14.88	18.48	3.60	50.30	10:25
2	TOC	0.9249	9.2494	15.06	18.56	3.50	50.32	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	5	TOC	K1910803-003.01	14.7160 ppm	0.6350 ppm	4.3200%	2019/11/26 14:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	14.2670	142.6698	105.63	109.34	3.72	50.29	10:27
2	TOC	15.1650	151.6504	111.72	115.38	3.65	50.36	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	6	TOC	K1910803-004.01 100x	12.6968 ppm	0.4749 ppm	3.7400%	2019/11/26 15:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	13.0326	130.3259	97.25	100.87	3.62	50.25	10:29
2	TOC	12.3610	123.6095	92.69	96.45	3.76	50.27	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	7	TOC	K1910803-005.01	16.6090 ppm	0.1237 ppm	0.7400%	2019/11/26 15:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	16.6964	166.9644	122.12	125.79	3.68	50.24	10:29
2	TOC	16.5216	165.2157	120.93	124.49	3.56	50.25	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	8	TOC	K1911085-001.01	1.2129 ppm	0.0673 ppm	5.5500%	2019/11/26 16:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.1654	11.6536	16.69	20.36	3.67	50.28	10:31
2	TOC	1.2605	12.6053	17.34	20.94	3.60	50.25	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	9	TOC	K1911085-001.01 ms	27.0105 ppm	0.0000 ppm	0.0000%	2019/11/26 16:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.0105	270.1046	192.13	195.57	3.44	50.25	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 5

			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)	24.8385 ppm (PASS)	0.0000 ppm	0%	2019/11/26 17:01

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.8385	248.3854	178.06	181.67	3.60	50.28	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 5

	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%	2019/11/26 17:15

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	7.91	11.57	3.66	50.23	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 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	10	TOC	K1911085-002.01	1.2420 ppm	0.0480 ppm	3.8700%	2019/11/26 17:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2760	12.7600	17.44	21.14	3.70	50.29	10:27
2	TOC	1.2081	12.0809	16.98	20.57	3.58	50.24	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	11	TOC	K1911085-003.01	0.7236 ppm	0.0128 ppm	1.7700%	2019/11/26 17:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7327	7.3269	13.76	17.23	3.47	50.29	10:31
2	TOC	0.7146	7.1457	13.63	17.20	3.56	50.29	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC)	CAS_salt_010711	CAS_salt_010711

(v1324) (v4) (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	12	TOC	K1911085-004.01	0.4313 ppm	0.0153 ppm	3.5500%	2019/11/26 18:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4422	4.4217	11.78	15.35	3.56	50.28	10:27
2	TOC	0.4205	4.2051	11.64	15.08	3.44	50.24	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	13	TOC	K1911096-001.01	0.8099 ppm	0.0304 ppm	3.7600%	2019/11/26 18:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7884	7.8837	14.13	17.80	3.66	50.36	10:27
2	TOC	0.8314	8.3139	14.43	18.14	3.71	50.35	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	14	TOC	K1911084-001.04	0.1240 ppm	0.0030 ppm	2.4400%	2019/11/26 19:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1219	1.2190	9.61	13.15	3.54	50.37	10:26
2	TOC	0.1262	1.2617	9.64	13.19	3.55	50.38	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	15	TOC	K1911084-002.04	0.1735 ppm	0.0023 ppm	1.3200%	2019/11/26 19:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1751	1.7508	9.97	13.43	3.46	50.37	10:27
2	TOC	0.1718	1.7184	9.95	13.43	3.48	50.37	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	16	TOC	K1911084-003.04	10.5626 ppm	0.0015 ppm	0.0100%	2019/11/26 20:19

Rep	Base	ppm	µg	Adjusted	NDIR (Abs)	Baseline	Pressure	Run

#	Analysis Type			(Abs)		(Abs)	(psig)	Time
1	TOC	10.5636	105.6365	80.49	84.23	3.74	50.34	10:27
2	TOC	10.5616	105.6159	80.47	84.07	3.59	50.31	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	17	TOC	K1911084-004.04	0.3734 ppm	0.0819 ppm	21.9300%	2019/11/26 20:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4313	4.3127	11.71	15.33	3.62	50.32	10:25
2	TOC	0.3155	3.1548	10.92	14.83	3.91	50.28	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	18	TOC	K1911084-005.04	0.1013 ppm	0.0602 ppm	59.4500%	2019/11/26 21:15

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1438	1.4385	9.76	13.29	3.53	50.29	10:31
2	TOC	0.0587	0.5870	9.18	12.97	3.79	50.26	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	19	TOC	K1911037-001.02	5.8356 ppm	0.0590 ppm	1.0100%	2019/11/26 21:43

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.7939	57.9387	48.11	51.69	3.57	50.25	10:27
2	TOC	5.8773	58.7725	48.68	52.12	3.45	50.26	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 5

	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)	24.3729 ppm (PASS)	0.0000 ppm	0%	2019/11/26 22:11

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

B	TOC	25 ppm	1	24.3729	243.7286	174.90	178.54	3.63	50.23	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 5

	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%	2019/11/26 22:26

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	6.16	9.80	3.64	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

Sample Type: Sample — From Schedule Version 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	20	TOC	MB2	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/26 22:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.40	9.08	3.68	50.22	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — From Schedule Version 5

	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)	24.7023 ppm (PASS)	0.0000 ppm	0%	2019/11/26 22:55

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.7023	247.0227	177.14	180.67	3.53	50.21	10:30

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 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	21	TOC	K1911037-002.02	26.0309 ppm	0.2863 ppm	1.1000%	2019/11/26 23:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.8285	258.2851	184.10	187.69	3.59	50.23	10:26
2	TOC	26.2334	262.3335	186.85	190.55	3.70	50.22	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	22	TOC	K1911037-003.02	0.5182 ppm	0.1590 ppm	30.6800%	2019/11/26 23:38

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6306	6.3059	13.06	16.67	3.61	50.22	10:31
2	TOC	0.4058	4.0578	11.54	15.13	3.59	50.21	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	23	TOC	K1911050-001.08	16.2805 ppm	0.0826 ppm	0.5100%	2019/11/27 00:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	16.2221	162.2207	118.90	122.49	3.59	50.22	10:30
2	TOC	16.3389	163.3889	119.69	123.24	3.55	50.22	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	24	TOC	K1911050-005.09	1.9559 ppm	0.0294 ppm	1.5000%	2019/11/27 00:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.9767	19.7666	22.20	25.66	3.46	50.20	10:27
2	TOC	1.9351	19.3511	21.92	25.52	3.60	50.19	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	25	TOC	K1911034-001.02	4.1617 ppm	0.0002 ppm	0.0100%	2019/11/27 01:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time

1	TOC	4.1616	41.6156	37.03	40.51	3.48	50.18	10:27
2	TOC	4.1619	41.6186	37.03	40.56	3.53	50.19	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	26	TOC	K1911034-002.02	5.0856 ppm	0.0023 ppm	0.0500%	2019/11/27 01:30

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.0839	50.8393	43.29	46.91	3.62	50.22	10:29
2	TOC	5.0872	50.8717	43.31	46.84	3.52	50.20	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	27	TOC	K1911034-003.02	4.2605 ppm	0.0034 ppm	0.0800%	2019/11/27 01:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.2629	42.6292	37.72	41.27	3.55	50.18	10:30
2	TOC	4.2581	42.5806	37.69	41.21	3.53	50.18	10:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	28	TOC	K1911034-004.02	12.5198 ppm	0.2048 ppm	1.6400%	2019/11/27 02:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	12.6646	126.6458	94.75	98.26	3.51	50.20	10:26
2	TOC	12.3749	123.7495	92.78	96.37	3.58	50.17	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 5

	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)	24.5857 ppm (PASS)	0.0000 ppm	0%	2019/11/27 02:54

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.5857	245.8573	176.35	180.01	3.66	50.20	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 5

	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%	2019/11/27 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	5.59	9.21	3.62	50.20	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 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	29	TOC	K1911034-005.02	2.8461 ppm	0.0067 ppm	0.2300%	2019/11/27 03:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.8509	28.5085	28.13	31.62	3.49	50.18	10:28
2	TOC	2.8414	28.4143	28.07	31.70	3.63	50.17	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	30	TOC	K1911034-006.02	6.4472 ppm	0.0290 ppm	0.4500%	2019/11/27 03:52

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.4677	64.6771	52.68	56.17	3.48	50.19	10:29
2	TOC	6.4268	64.2675	52.41	55.95	3.55	50.21	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	31	TOC	K1911034-007.02	3.5980 ppm	0.0291 ppm	0.8100%	2019/11/27 04:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.5774	35.7744	33.07	36.76	3.69	50.19	10:28

2	TOC	3.6185	36.1854	33.34	36.91	3.56	50.19	10:26

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	32	TOC	K1911034-008.02	4.7485 ppm	0.0231 ppm	0.4900%	2019/11/27 04:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.7321	47.3213	40.90	44.39	3.48	50.17	10:27
2	TOC	4.7648	47.6484	41.13	44.66	3.53	50.23	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	33	TOC	K1911034-009.02	3.5699 ppm	0.0304 ppm	0.8500%	2019/11/27 05:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.5914	35.9143	33.16	36.78	3.62	50.21	10:32
2	TOC	3.5484	35.4841	32.87	36.46	3.59	50.23	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	34	TOC	K1911034-010.02	4.6685 ppm	0.0938 ppm	2.0100%	2019/11/27 05:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.7348	47.3478	40.92	44.47	3.54	50.21	10:31
2	TOC	4.6022	46.0219	40.02	43.57	3.55	50.21	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◈	35	TOC	K1910963-001.08	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/27 06:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.60	9.13	3.53	50.20	10:27
2	TOC	0.0000	0.0000	5.48	9.09	3.61	50.20	10:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

◆	36	TOC	K1910963-001.08 ms	25.1340 ppm	0.0000 ppm	0.0000%	2019/11/27 06:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.1340	251.3405	179.39	183.06	3.67	50.18	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	37	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/27 06:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	6.20	9.87	3.67	50.20	10:31

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	38	TOC	FB 11/22/19	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/27 07:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.41	9.05	3.64	50.19	10:33

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 5

	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)	24.1211 ppm (PASS)	0.0000 ppm	0%	2019/11/27 07:24

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.1211	241.2109	173.20	176.64	3.44	50.16	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 5

	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%	2019/11/27 07:38

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	5.36	8.98	3.61	50.19	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 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	39	TOC	MB3	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/27 07:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	4.44	8.13	3.69	50.14	10:32

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> LCS — From Schedule Version 5

	Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆	C	TOC	25.0000	1:1	[TOC] LCS [25.0 ppm]	0 / infinity (NA / NA)	24.7562 ppm (PASS)	0.0000 ppm	0%	2019/11/27 08:08

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
C	TOC	25.0 ppm	1	24.7562	247.5618	177.51	181.18	3.68	50.13	10:30

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 5

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	40	TOC	K1910963-002.10 doc	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/27 08:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	7.50	11.12	3.62	50.20	10:29
2	TOC	0.0000	0.0000	7.53	11.19	3.66	50.15	10:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	41	TOC	K1910963-002.10 ms doc	25.4906 ppm	0.0000 ppm	0.0000%	2019/11/27 08:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.4906	254.9056	181.81	185.37	3.56	50.16	10:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	42	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/27 09:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.58	9.04	3.47	50.18	10:34

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	43	TOC	K1911043-002.01 doc 50x	1.7227 ppm	0.0363 ppm	2.1000%	2019/11/27 09:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6970	16.9704	20.30	23.88	3.58	50.17	10:26
2	TOC	1.7483	17.4831	20.65	24.23	3.58	50.23	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

	Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆	44	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2019/11/27 09:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	5.12	8.91	3.79	50.22	10:25
2	TOC	0.0000	0.0000	5.28	8.95	3.67	50.19	10:30

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 8.7826 (IC) (v1324)	CAS_salt_010711 (v4)	CAS_salt_010711 (v30)

Sample Type: Check Standard --> CCV 25 ppm From Schedule Version 5

	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)	24.2344 ppm	0.0000 ppm	0%	2019/11/27 10:17

							(PASS)			

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.2344	242.3438	173.96	177.48	3.52	50.20	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 5

	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%	2019/11/27 10:31

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0 ppm	1	0.0000	0.0000	5.35	8.99	3.64	50.23	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

Meta Data Used in this Report

Blanks

Version	Reagent (Abs)	Acid (Abs)	DI IC (Abs)	DI TC (Abs)	DI TOC (Abs)	Save Time	Operator
v1323	1.3397	1.1360	0.0000	0.0000	0.0000	2019/11/23 16:30	Fusion1 (Fusion1)
v1324	1.3317	1.3300	0.0000	0.0000	0.0000	2019/11/26 12:29	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
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	2019/11/27 10:46

StarLIMS Run: 661464, 661465, 661466

Analysis: DOC/TOC

Method: SM 5310 C, 9060A, 415.1, 9060

CCV: 11-GEN-05-82C 50 ppm LCS: 11-GEN-05-79J 25.0 ppm

ICAL Date: 3/6/19

ICAL ID: 11-GEN-05-76H

ICS ID: 11-GEN-05-78M

ICS TV: 25.0 ppm ICS % R < 1

Spike ID: 11-GEN-05-82C 0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-83D

21 % H3PO4: 11-GEN-05-83E

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, 129001F, N11314F, Marge

FILTER ID: 16967789

25 BCP 11/20/19

Analyzed By: BCP	Date Analyzed: 11/20/19
Reviewed By: JC	Date Reviewed: 12/2/19

Contract No. W9128F-13-D-0012, Task Order No. W9128BV17F0150 • Final • Rev 0 • April 2021

Appendix E

Quality Control Summary Report

ACRONYMS AND ABBREVIATIONS

%	percent
%D	percent difference
ALS	ALS Environmental Laboratories
CCB	continuing calibration blank
DQSR	Data Quality Summary Report
DoD	U.S. Department of Defense
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LHAAP	Longhorn Army Ammunition Plant
LOQ	limit of quantitation
MS	matrix spike
MSD	matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
QAPP	Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant, Karnack Texas: Appendix A: Standard Operating Procedures and Appendix B: Basewide Uniform Federal Policy-Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RARC	*Remedial Action Completion Report*
RPD	relative percent difference
RRF	relative response factor
SDG	sample delivery group
SM	standard method
SOP	standard operating procedure
TOC	total organic carbon
USACE	U.S Army Corps of Engineer
VOC	volatile organic compound

1. DATA QUALITY SUMMARY REPORT

This Data Quality Summary Report (DQSR) describes the findings of the review of data for groundwater sampling activities conducted from January 21, 2019 through November 13, 2019, and is provided to document the quality of the analytical data used in the *Remedial Action Completion Report (RACR), LHAAP-04 Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack Texas*. Sampling procedures and overall quality control (QC) and quality assurance protocols for groundwater sampling are presented in the *Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant, Karnack Texas (IWWP): Appendix A: Standard Operating Procedures and Appendix B: Basewide Uniform Federal Policy-Quality Assurance Project Plan (QAPP) (Bhate 2018)*.

This DQSR focuses on the data quality and usability of the samples collected from the following sampling events:

- January 2019 Groundwater Sampling Event
- November 2019 Baseline Groundwater Sampling Event
- November 2019 Post Injection Groundwater Sampling Event

During the period from January 21, 2019 through November 13, 2019, groundwater samples were collected and submitted to the primary laboratory, ALS Environmental Laboratories (ALS) located in Houston, Texas. ALS in Houston performed all analyses in house with the exception of the following:

- Total organic carbon (TOC) analysis was performed by ALS in Kelso, Washington; and
- Perchlorate analysis was conducted by ALS in Salt Lake, Utah.

ALS Laboratories in all three locations are accredited by the U.S. Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) Version 5.1 and National Environmental Laboratory Accreditation Program (NELAP) in the State of Texas to perform the analyses throughout the project duration.

Groundwater samples from the sampling events were analyzed for one or more of the following list of parameters:

- Perchlorate – EPA Method 6850
- TOC – Standard Method (SM) 5310C
- Anions (Nitrate and Nitrite as nitrogen and sulfate) – EPA Method 9056A
- Alkalinity – SM 2320B

Specific analyses performed for each sample and for each sampling event are presented on the table included as Attachment E-1. All analytical results from January 21, 2019 through November 13, 2019 sampling activities were received in sample delivery groups (SDGs). Appendix D presents laboratory data packages. Attachment E-1 (provided at the end of this report) summarizes SDG numbers, sample numbers, sample locations, sample collection dates, analysis methods, analysis dates, and laboratories. An APTIM project chemist manually performed EPA Level III data review on 100% of the groundwater sample results. EPA Level III data review was performed in accordance with the guidelines and control criteria specified in the following documents:

- QAPP (Bhate 2018)
- *DoD Quality Systems Manual for Environmental Laboratories, Version 5.1* (DoD 2017)
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (2006), SW-846* (EPA 1996 and updates)
- *Standard Methods for the Examination of Water and Wastewater (21st Edition)* (American Public Health Association et al. 2005)
- *USEPA Contract Laboratory Program, National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017)
- *USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Superfund Methods Data Review, Final* (EPA 2017)

The following QC elements were included in the EPA Level III data review:

- Sample preservation and sample extraction and analysis holding times
- Laboratory method blanks
- Initial and continuing calibration blanks (anions and TOC analyses only)
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) recoveries
- Matrix spike (MS)/matrix spike duplicate (MSD) recoveries
- Relative percent differences (RPDs)
- Initial calibration and initial calibration verifications (ICVs)
- Continuing calibration verifications (CCVs)
- Field blanks

Analytical data were reviewed in terms of precision, bias, representativeness, comparability, and completeness as follows:

- *Bias* is demonstrated by recovery of target analytes from fortified blank and sample matrices, LCS/LCSD, and MS/MSD, respectively. For organic methods, bias is also demonstrated through recovery of surrogates from each field and QC sample. The recovery of target analytes from fortified samples is compared with the acceptance criteria defined in the QAPP (Bhate, 2018) and DoD Quality Systems Manual (QSM). When the acceptance criteria are not available in the QAPP or DoD QSM, results are compared with the laboratory in-house control limits. When these criteria are not met, the data are qualified accordingly.
- *Precision* is expressed as the RPD between the results of replicate sample analyses: sample duplicates, LCSDs, and MSDs. When analyte RPDs exceed the acceptance criteria, the data are qualified accordingly.
- *Representativeness* of the samples submitted for analysis is ensured by adherence to standard sampling techniques and protocols.
- *Comparability* of sample results is ensured through the use of approved sampling and analysis methods.
- *Completeness* is expressed as a ratio of the number of usable data points to the total number of analytical data results.

The following sections present the EPA Level III data review findings. The discussion summarizes data quality exceedances and their potential impact on the quality and usability of analytical results. Attachment E-2 presents definitions of data qualification. Attachment E-3 summarizes the qualified data.

1.1 Data Quality Outliers

1.1.1 Sample Preservation and Sample Extraction and Analysis Holding Times (Reason Codes 02, 02A and 02B)

The sample coolers and samples contained within were received intact at the laboratory and were held within the required 0 to 6 degrees Celsius, and when required, were chemically preserved in accordance with EPA and SM preservation requirements.

Sample holding times were evaluated by comparing the sample collection dates to the sample extraction and analysis dates. Extraction and analysis holding times were reviewed for all samples to determine the validity of the sample results.

One groundwater sample from monitoring well (04WW05) was collected from the November 2019 baseline groundwater sampling event and submitted to the laboratory for perchlorate, TOC, anions and

alkalinity analyses. All sample containers were received in good condition by the laboratory; however due to laboratory login error, the anions analysis was not logged into the system for analysis. When the oversight was discovered, the 48-hour holding time for nitrate and nitrite as nitrogen was missed. The following table summarizes the affected sample number, analysis, holding time exceedance and holding time requirement:

SDG Number	Analytical Method	Sample Number	Holding Time Outlier (days)	Holding Time Requirement (days)	Data Qualification
HS19110320	EPA9056A	04WW05-191106	Nitrate/Nitrite: 19	2	X

Nitrate and nitrite as nitrogen in the sample was analyzed 19 days after the 48-hour holding time had expired. Because the holding time was grossly exceeded, the non-detected result for nitrate and nitrite as nitrogen in the sample was not usable and was consequently rejected (X). Sulfate in the same sample met the analysis holding time requirement and the sulfate result was not affected and qualified. Except as noted, analysis holding time requirements were achieved for all other samples and for all other analyses.

It should be noted that the sample login oversight was an isolated incidence. The laboratory has since taken corrective actions to ensure that the login errors will not reoccur in the future. Upon sample receipt, the laboratories checked the sample containers against the chain of custody forms and notified APTIM if discrepancies between the sample containers and chain of custody forms were identified. Discrepancies were resolved before the laboratories started analysis. Sample conditions such as cooler temperatures, chemical preservatives, and headspace were documented on the sample receipt form and included in the laboratory data packages. After analysis, department managers reviewed the data to verify that method requirements were followed and target analytes were correctly identified and quantified. Prior to data reporting, the laboratories performed internal QC review to ensure the accuracy and completeness of analytical results.

1.1.2 Laboratory Method Blanks (Reason Code 06A)

The field sample results were evaluated with respect to the laboratory method blank prepared and analyzed for each analytical batch and for each analytical method. All laboratory method blanks were free of perchlorate, TOC, anions, and alkalinity.

1.1.3 Initial and Continuing Calibration Blanks (Reason Code 06B)

In addition to the laboratory method blanks for anions and TOC analyses, initial and continuing calibration blank (CCB) results were reviewed to ensure that the instrument was free of contamination prior to the analysis. All initial and continuing calibration blanks were free of TOC and anions.

1.1.4 Laboratory Control Sample/Laboratory Control Sample Duplicate Recoveries and Precisions (Reason Codes 11, 11A, and 11B)

The LCS is an aliquot of analyte-free matrix spiked with target analytes that is prepared with each analytical batch and for each analytical method. The recovery of target analytes from the LCS analysis is a measurement of method performance in an interference-free sample matrix. The review indicated that LCS recoveries and precisions met the established QC requirements for perchlorate, TOC, anions, and alkalinity analyses.

In addition to the LCS analysis, the laboratory performed sample duplicate analysis on project-specific groundwater samples to assess precisions of sample results. The laboratory duplicate analysis was performed for LHAAP-04 samples submitted for TOC analysis. Acceptable precision results were achieved for all laboratory duplicate samples.

1.1.5 Matrix Spike/Matrix Spike Duplicate Recoveries and Precisions (Reason Codes 08, 08A, and 08B)

The MS and MSD samples are a portion of a field sample spiked with target analytes that are prepared with each analytical batch and with each method. The MS/MSD results are used to evaluate any bias introduced to the method due to matrix interference, and to measure bias and precision for each analytical batch.

In accordance with the QAPP requirements (Bhate 2018), the MS/MSD samples are to be collected at a rate of 1 per 20 samples or 5%. During the January and November baseline groundwater sampling events, 5% MS/MSD samples were collected achieving the MS/MSD sample frequency requirement. The following site-specific groundwater samples were spiked for MS/MSD analysis:

SDG Number	Sample Number	Sample Date	MS/MSD Analysis
HS1911045/1902392	LHSMW01-190122	1/22/2019	Perchlorate
HS19110320/1931753	04WW11-191106	11/6/2019	Perchlorate
HS19110320	04WW05-191106	11/6/2019	Nitrate and Nitrite as Nitrogen

The MS bias and precision results met the established QC requirements for perchlorate and nitrate and nitrite as nitrogen analyses for all three spiked samples.

1.1.6 Initial Calibration (Reason Codes 04, 04A, and 04B)

Instrument calibration is performed for perchlorate, TOC, and anions analyses according to the EPA method requirements (EPA 1996). The linear analytical range is established for each method by analysis of calibration standards prepared at increasing concentrations that cover the expected sample concentrations. The acceptability of the initial calibration is determined by calculation of a percent relative standard deviation or coefficient. The initial calibration results were acceptable for all the listed analyses.

Immediately after the initial calibration for each analysis, initial calibration verification was conducted at the mid-point of instrument calibration range by using a second-source calibration standard to verify the accuracy of the initial calibration. The review indicated acceptable initial calibration verification results for perchlorate, TOC and anions analyses.

1.1.7 Continuing Calibration Verification (Reason Codes 05, 05A, and 05B)

Routinely during sample analysis, the stability of the analytical system is monitored by analysis of continuing calibration standards at concentrations near the mid-point of the instrument calibration range. The review indicated that CCVs were conducted at proper frequencies and that the percent difference (%D) values between the relative response factor (RRF) in the initial calibration and the RRF in the continuing calibration met the calibration requirements for perchlorate, TOC and anions analyses.

1.1.8 Trip Blanks (Reason Code 06D)

Trip blanks were prepared by the laboratory and stored with the groundwater samples collected for volatile organic compounds (VOCs) analysis. During January 11, 2019 through November 13, 2019 sampling activities, no groundwater samples were collected for VOC analysis, and therefore no trip blanks were required.

1.1.9 Field Duplicates

In accordance with the QAPP requirements (Bhate 2018), field duplicate samples are to be collected at a minimum rate of 10% of the total number of groundwater samples. Field duplicate samples are evaluated by calculating the RPD between the parent sample and its duplicate. The RPD is calculated using the following equation:

$$RPD = |(S-D)/[(S+D)/2]| \times 100$$

Where:

S = sample result

D = duplicate result

Acceptable precision control criteria are established at less than or equal to 30% for water samples. The RPD is calculated between pairs of field duplicate samples when both results are reported at or above the LOQ.

A total of three field duplicates were collected from the period of January 21, 2019 through November 13, 2019. Field duplicates were collected using the same sampling technique and analyzed for the same analytical parameters as their associated parent samples, Attachment E-4 presents the field duplicate results. As presented on the table, perchlorate was detected above the LOQ in a field duplicate pair (04WW09-190122) from the January 2019 groundwater sampling event. The RPD for the analyte was 9.09% achieving the 30% field precision goal. Field duplicates were also collected from monitoring well (04WW02) from the January and November 2019 baseline groundwater sampling events and analyzed for perchlorate only. Perchlorate was not detected in both pairs and therefore field precisions were not evaluated for the two pairs. Overall, the field duplicate results demonstrated acceptable field sampling and analytical precision for perchlorate analysis.

1.2 Completeness

The following sections present a discussion of technical completeness for the LHAAP-04 groundwater sampling events. Completeness results are calculated for groundwater and field duplicate samples that are used for project decisions. Completeness results are presented in Attachment E-5.

1.2.1 Technical Completeness

Technical completeness is a quantitative measure of the data usability based on the number of rejected data compared to the total number of sample results. The technical completeness goal for each method is

established at equal to or greater than 95%. The technical completeness calculation considers all data that are not rejected to be usable. The technical completeness is calculated as follows:

$$\% \text{ Technical Completeness} = \frac{\text{Number of Usable Results}}{\text{Total Number of Results}} \times 100$$

As discussed in the previous sections, the result of nitrate and nitrite as nitrogen in one sample (04WW05) from the November 2019 baseline groundwater sampling event was rejected (X) due to the holding time exceedance. The data quality and usability of the sulfate result in the same sample however was not affected as the sulfate was analyzed within the holding time requirement. The technical completeness for EPA Method 9056A was 50% and did not meet the 95% technical completeness objective. With the exception of EPA Method 9056A, the technical completeness was 100% for all other methods for the LHAAP-04 groundwater sampling activities, exceeding the 95% technical completeness objective. Therefore, the project data quality objectives were achieved for EPA Method 6850 and Standard Methods 2320 and 5310C for the LHAAP-04 groundwater sampling events.

1.3 Representativeness and Comparability

During sampling, samplers followed the approved QAPP requirements (Bhate 2018) and established sampling SOPs to collect, preserve, document, and ship samples to off-site laboratories, thus ensuring the representativeness of the groundwater samples collected for the sampling events.

Upon sample receipt, the laboratory reviewed sample conditions to ensure that sample containers, preservatives (when applicable), and requested analyses matched the chain-of-custody requirements. Discrepancies between the chain-of-custody forms and sample containers were brought to the attention of the APTIM project chemist and resolved prior to sample analysis.

ALS Laboratories are DoD and NELAP certified and adhered to the most current EPA Methods, QAPP (Bhate 2018), and DoD QSM (DoD 2017) requirements to prepare, analyze, and report the data. This ensures the comparability of the analytical results between different samples and different sampling events. APTIM project chemist performed EPA Level III data validation on 100% of the analytical data obtained from the January 2019 through November 2019 sampling events to verify that the laboratories complied with the DoD QSM, QAPP, and method requirements. Analytical results that were outside the established QC requirements were qualified and the data quality and usability were discussed in the previous sections. Based on a review of the chain-of-custody forms, sample receipt forms, and laboratory data packages, the analytical data reported for LHAAP-04 sampling events has met the comparability requirements.

1.4 Summary

The analytical data has been reviewed for precision, bias, representativeness, comparability, and completeness. With the exception of nitrate and nitrite as nitrogen in one sample, all other QC elements met their respective QC requirements. The result of nitrate and nitrite as nitrogen in one sample was rejected as a result of the holding time exceedance. In order to verify the presence or absence of nitrate and nitrite as nitrogen, it is recommended that monitoring well (04WW05) be re-sampled for nitrate and nitrite as nitrogen during the next sampling event. With the exception of EPA Method 9056A, the 95% technical completeness goal was exceeded for all other methods for all the sampling events. All data except nitrate and nitrite as nitrogen in one sample, are usable for their intended purposes.

REFERENCES

American Public Health Association, American Water Works Association, and Water Environment Federation. 2005. *Standard Methods for the Examination of Water and Wastewater, 21st Edition.* American Public Health Association: Washington, DC.

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EPA. 1996. *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (2006), SW-846 On-line*. Office of Solid Waste, Washington D.C. http://www.epa.gov/osw/hazard/testmethods/sw846.

United States Department of Defense (DoD). 2017. *DoD Quality Systems Manual for Environmental Laboratories, Version 5.1.* January.

List of Attachments

Attachment E-1: Summary of Samples Collected, Sample Date, Sample Location, and Analysis Method

Attachment E-2: Data Qualification Flags

Attachment E-3: Qualified Data Summary

Attachment E-4: Summary of Field Duplicate Results

Attachment E-5: Technical Completeness

Attachment E-1: Summary of Sample Collected, Sample Date, Sample Location, and Analysis Method

SDG Number	Task Code	Sample Number	Location ID	Sample Date	Sample Type	Analytical Method	Analysis Date	Lab
1902253	04 JAN 2019	04WW03-190121	04WW03	01/21/2019	REG	SW6850	01/28/2019	ALSS
1902253	04 JAN 2019	04WW02-190121	04WW02	01/21/2019	REG	SW6850	01/28/2019	ALSS
1902253	04 JAN 2019	04WW02-190121-FD	04WW02	01/21/2019	FD	SW6850	01/28/2019	ALSS
1902253	04 JAN 2019	LHSMW02-190121	LHSMW02	01/21/2019	REG	SW6850	01/28/2019	ALSS
1902253	04 JAN 2019	04WW04-190121	04WW04	01/21/2019	REG	SW6850	01/28/2019	ALSS
1902253	04 JAN 2019	04WW05-190121	04WW05	01/21/2019	REG	SW6850	01/28/2019	ALSS
1902253	04 JAN 2019	04WW06-190121	04WW06	01/21/2019	REG	SW6850	01/28/2019	ALSS
1902392	04 JAN 2019	04WW11-190122	04WW11	01/22/2019	REG	SW6850	01/28/2019	ALSS
1902392	04 JAN 2019	04WW09-190122	04WW09	01/22/2019	REG	SW6850	01/28/2019	ALSS
1902392	04 JAN 2019	04WW09-190122-FD	04WW09	01/22/2019	FD	SW6850	01/28/2019	ALSS
1902392	04 JAN 2019	04WW10-190122	04WW10	01/22/2019	REG	SW6850	01/28/2019	ALSS
1902392	04 JAN 2019	LHSMW01-190122	LHSMW01	01/22/2019	REG	SW6850	01/28/2019	ALSS
1902392	04 JAN 2019	04WW07-190122	04WW07	01/22/2019	REG	SW6850	01/28/2019	ALSS
1902392	04 JAN 2019	04WW01-190122	04WW01	01/22/2019	REG	SW6850	01/28/2019	ALSS
1931753	04 BASELINE NOV 2019	04WW02-191105	04WW02	11/05/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	04WW02-191105-FD	04WW02	11/05/2019	FD	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	LHSMW02-191105	LHSMW02	11/05/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	04WW03-191106	04WW03	11/06/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	04WW06-191106	04WW06	11/06/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	04WW11-191106	04WW11	11/06/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	04WW05-191106	04WW05	11/06/2019	REG	SW6850	11/19/2019	ALSS
HS19110320	04 BASELINE NOV 2019	04WW05-191106	04WW05	11/06/2019	REG	SM2320B	11/09/2019	ALSHT
HS19110320	04 BASELINE NOV 2019	04WW05-191106	04WW05	11/06/2019	REG	SW9056	11/27/2019	ALSHT
K1910576	04 BASELINE NOV 2019	04WW05-191106	04WW05	11/06/2019	REG	SM5310C	11/16/2019	ALS
1931753	04 BASELINE NOV 2019	04WW08-191106	04WW08	11/06/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	04WW04-191106	04WW04	11/06/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	LHSMW01-191106	LHSMW01	11/06/2019	REG	SW6850	11/19/2019	ALSS
1931753	04 BASELINE NOV 2019	FIRE STATION WELL-191106	Fire Station Well	11/06/2019	REG	SW6850	11/19/2019	ALSS
K1910847	04 POST INJ NOV 2019	04WW09-191113-POST-INJ	04WW09	11/13/2019	REG	SM5310C	11/23/2019	ALS
K1910847	04 POST INJ NOV 2019	04WW05-191113-POST-INJ	04WW05	11/13/2019	REG	SM5310C	11/23/2019	ALS
K1910847	04 POST INJ NOV 2019	04WW07-191113-POST-INJ	04WW07	11/13/2019	REG	SM5310C	11/23/2019	ALS
K1910847	04 POST INJ NOV 2019	04WW010-191113-POST-INJ	04WW10	11/13/2019	REG	SM5310C	11/26/2019	ALS

Notes:

SDG - sample delivery group

REG - regular samples shipped to the laboratory

FD - field duplicate samples shipped to the laboratory

ALS/ALSHT/ALSS - ALS Laboratories in Houston, Salt Lake, Kelso

Attachment E-2. Data Qualification Flags

Data Qualifier Definitions for Organic and Inorganic Data Review

Qualifier	Definition
	No Qualifier indicates that the data are acceptable both qualitatively and quantitatively.
U	The analyte was analyzed for but was not detected above the reported limit of detection.
J	The analyte was analyzed for and was positively identified, but the reported numerical value may not be consistent with the amount actually present in the environmental sample. Results are estimated, although the data are considered usable and may be used as appropriate to meet project objectives. Results are qualitatively acceptable and quantitatively uncertain.
J-	The analyte was positively identified; the associated numerical value is its approximate concentration with a low bias in the sample.
J+	The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification.”
NJ	The analysis indicates the presence of an analyte that has been ”tentatively identified,” and the associated value represents its approximate concentration.
UJ	The analyte was not detected above the reported limit of detection. However, the reported limit of detection is approximate and may or may not represent the actual limit of detection necessary to accurately and precisely measure the analyte in the sample.
X	The analyte was analyzed for, but the presence or absence of the analyte has not been verified. Re-sampling and re-analysis may be necessary to confirm or deny the presence of the analyte. Results are rejected, and data are unusable for any purposes.

Attachment E-3: Qualified Data Summary

Sample	Sample Type	Sample Date	Analyte	SDG	Result	LOQ	Units	Qualifier
Reason Code 02A		Method SW9056						
04WW05-191106	REG	11/06/2019	Nitrogen	HS19110320	0.5	1.00	mg/L	X

Note:

Please see **Attachment E-2** for definitions of qualifiers

mg/L - milligrams per liter

LOQ - limit of quantitation

REG - regular samples shipped to the laboratory

SDG - sample delivery group

Attachment E-4: Summary of Field Duplicate Results

			Location Code:	04WW02					04WW02				
			Sample Number:	04WW02-190121		04WW02-190121-FD			04WW02-191105		04WW02-191105-FD		
			Sample Date:	01/21/2019		01/21/2019			11/05/2019		11/05/2019		
			Sample Purpose:	REG		FD			REG		FD		
			Sample Type:	GW		GW			GW		GW		
			Depth:	6.47 - 6.69 ft		6.47 - 6.69 ft			0 - 0 ft		0 - 0 ft		
Test Group	Parameter	Units	Filtered	Result	VQ	Result	VQ	Relative Percent Difference	Result	VQ	Result	VQ	Relative Percent Difference
PERCHLORATE	Perchlorate	ug/L	Yes	2	U	2	U	NC	2	U	2	U	NC

Notes:

Please see Attachment E-2 for definitions of qualifiers

ug/L - micrograms per liter

REG - regular samples shipped to the laboratory

FD - field duplicate samples shipped to the laboratory

VQ - validation qualifiers

NC - not calculated. Field precision results are calculated when target compounds are detected above the limit of quantitation in both primary and duplicate samples

Attachment E-4: Summary of Field Duplicate Results

			Location Code:	04WW09				
			Sample Number:	04WW09-190122		04WW09-190122-FD		
			Sample Date:	01/22/2019		01/22/2019		
			Sample Purpose:	REG		FD		
			Sample Type:	GW		GW		
			Depth:	6.5 - 6.74 ft		6.5 - 6.74 ft		
Test Group	Parameter	Units	Filtered	Result	VQ	Result	VQ	Relative Percent Difference
PERCHLORATE	Perchlorate	ug/L	Yes	2100		2300		9.09

Notes:

Please see Attachment E-2 for definitions of qualifiers

ug/L - micrograms per liter

REG - regular samples shipped to the laboratory

FD - field duplicate samples shipped to the laboratory

VQ - validation qualifiers

NC - not calculated. Field precision results are calculated when target compounds are detected above the limit of quantitation in both primary and duplicate samples

Attachment E-5: Technical Completeness

Analytical Method	Number of Analytes	Number of Samples	Number of Results	Number of Rejected Results	Number of Useable Results	Technical Completeness [Goal = 95 %] (percent)
GW Environmental Samples						
SM2320B	1	1	1	0	1	100%
SM5310	1	5	5	0	5	100%
SW6850	1	25	25	0	25	100%
SW9056	2	1	2	1	1	50%

Notes:

Not all samples have equal analytes per method